

DOCTOR OF PHILOSOPHY

Physical activity and sedentary behaviour during retirement transition in Maltese Civil Servants

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Physical activity and sedentary behaviour during retirement transition in Maltese Civil Servants



By
Karl Spiteri

PhD

September 2022

Physical activity and sedentary behaviour during retirement transition in Maltese Civil Servants

By

Karl Spiteri

*A thesis submitted in partial fulfilment of the University's requirements for
the Doctor of Philosophy*

September 2022



Ethics approval

1. Ethics approval certificate one

Changes in Physical Activity and Sedentary Behaviour in Maltese Civil Servants and Predictors of Change

P115641



Certificate of Ethical Approval

Applicant: Karl Spiteri
Project Title: Changes in Physical Activity and Sedentary Behaviour in
Maltese Civil Servants and Predictors of Change

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval: 15 Jan 2021
Project Reference Number: P115641

2. Ethics approval certificate two

Physical activity and retirement in Maltese population

Ethics Review ID: ER5441966

Workflow Status: Application Approved

Type of Ethics Review Template: No human participants, human tissue or personal data

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Q4. Proposed Start Date of Data Collection: 01/12/2017

Q5. Proposed End Date of Data Collection : 31/08/2018

Q6. Will the research involve any of the following

- i) Participants under 5 years old: No
- ii) Pregnant women: No
- iii) 5000 or more participants: No
- iv) Research being conducted in an overseas country: No
- Q7. If overseas, specify the location: Malta

Q8. Is the research externally funded?: No

Q9. Will the research be conducted with partners and subcontractors?: No

Is another UK HEI the lead partner?: No

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- ii. Relatives/carers of patients recruited because of their past or present use of the NHS or Social Care: No
- iii. Access to data, organs, or other bodily material of past or present NHS patients: No
- iv. Foetal material and IVF involving NHS patients: No
- v. The recently dead in NHS premises: No
- vi. Participants who are unable to provide informed consent due to their incapacity even if the project is not health related: No
- vii. Prisoners or others within the criminal justice system recruited for health-related research: No

3. Ethics approval certificate three

Physical activity and sedentary behaviour during retirement transition in Maltese Civil Servants

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Workflow Status: Application Approved

Type of Ethics Review Template: All other research with human participants

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- ii) Pregnant women: No
- iii) 5000 or more participants: No
- iv) Research being conducted in an overseas country: Yes

Q7. If overseas, specify the location: Malta

Q8. Is the research externally funded?: No

Q9. Will the research be conducted with partners and subcontractors?: No

Q10. Does the research involve one or more of the following?

- i. Patients recruited because of their past or present use of the NHS or Social Care: No
- ii. Relatives/carers of patients recruited because of their past or present use of the NHS or Social Care: No
- iii. Access to data, organs, or other bodily material of past or present NHS patients: No
- iv. Foetal material and IVF involving NHS patients: No
- v. The recently dead in NHS premises: No
- vi. Participants who are unable to provide informed consent due to their incapacity even if the project is not health related: No
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Is another UK HEI the lead partner?: No

Q10. Does the research involve one or more of the following?

- i. Patients recruited because of their past or present use of the NHS or Social Care: No
- ii. Relatives/carers of patients recruited because of their past or present use of the NHS or Social Care: No
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Abstract

Introduction: Physical activity (PA) guidelines for older adults recommend aerobic activities for 75 minutes at vigorous intensity or 150 minutes at moderate intensity per week or a combination of both. Balance and / or strength training is encouraged at least three times a week, whilst trying to reduce sitting time. In Malta only 28% of persons aged 65+ years reach the recommended World Health Organisation PA guidelines. Malta has one of the lowest prevalence of people meeting PA guidelines across the European region. Retirement is a life event that can influence PA and sedentary behaviour (SB) so can be used as an opportunity to promote positive health behaviours.

Research Question, Aims and Objectives: The research questions for this thesis was - Does the retirement transition influence PA and SB in Maltese civil servants; and how can the retirement transition influence these health behaviours? The aim was therefore to measure PA and SB during the retirement transition quantitatively as well as glean data on their experiences qualitatively. To realise the aims, the following objectives were set 1) to identify recent prevalence and trends of PA and SB in the Maltese population pre- and post-retirement, 2) to identify changes in PA and SB resulting with retirement in Maltese civil servants, and 3) to identify predictors of any changes in PA and SB with the retirement transition in Maltese civil servants.

Methods: Four studies were undertaken to address the objectives. The studies included a secondary data analysis of a national data set which examined differences between retired and employed individuals. Thereafter a systematic literature review of barriers and motivators in middle-aged and older persons was compiled. To ensure optimal use, previously validated and reliable tools were translated into Maltese and reliability tested. The last study was a sequential mixed-method (MM) study of civil servant aged ≥ 60 years, who were followed during their retirement transition for two years. A proportion of the research participants in the MM study retired while the others remained employed. Ethical approval for the study was obtained from Sheffield Hallam University, Coventry University and University of Malta.

Results: Study 1: The secondary data analysis included data from 4690 participants between the ages of 50 and 74 years. Cross-sectional data from 2002, 2008 and 2014 was analysed and there was a statistically significant difference between those employed and retired, with the latter undertaking less physical activity metabolic equivalent min per week (PA MET min per week) in 2002 and 2008. When adjusting for covariates, people in employment carried out less PA MET min per week (OR-0.16 – 0.02) compared to retired individuals. Using multilevel modelling, this study found that individual factors such Body Mass Index and long-standing illness are predictors of PA behaviour as opposed to time trends.

Study 2 - The systematic review included 55 articles, 49 qualitative and 6 quantitative. Analysis was categorised into 50–64-year-olds and 65–70-year-olds with differences in motivators identified between the age groups. In the older age group, social influences, reinforcement, and assistance in managing change were the most identified motivators. In the younger age group,

goal-setting, the belief that a physical activity will be beneficial, and social influences were identified as the most important motivators.

Study 3 - The reliability testing of the International Physical Activity Questionnaire – long version (IPAQ-long) and Exercise benefit barrier scale – 2 (EMI-2) found that both tools had similar reliability to the original English versions of the questionnaires. Therefore, they were considered reliable to use for the MM study.

Study 4 - The longitudinal MM study found that there were no changes in total PA and sitting behaviour with retirement in Maltese civil servants. People who retired carried out more domestic PA compared to when they were in employment, which resulted in higher moderate intensity PA behaviour. People perceived that their sitting time would increase with retirement in the qualitative interviews, but this was not found in the quantitative data so there was a disconnect. Past PA behaviour was an important predictor of future PA behaviour, but not for SB. Retirement can reduce barriers towards PA but there were minimal changes in intrinsic motivation with retirement.

Conclusion:

This thesis highlights Maltese Civil Servants start discerning about their retirement life before deciding to retire. During the retirement transition, people start planning for activities that will take place after retirement. Participants based much of their post-retirement PA and exercise on past experiences of exercise, not only their current PA behaviour. The person's perceptions towards PA must be taken into account. On retirement people start adjusting as they either want to be or feel physically active. During the pre-retirement period, there is an awareness on the need to reduce sitting time and yet during the post retirement period sitting time was regarded to be part of the retirement process; concurrently an effort was being made to try and be active.

This thesis provides the foundation for the development of an intervention in Malta to support people during the retirement transition. Interventions which assist retired people to adjust into a routine which includes PA that fits their perception and reduces sedentary activity can be effective. Any intervention which is targeting a behaviour change during the retirement transition must address the retirement process starting at the pre-retirement phase when people are discerning about their retirement. Health behaviours are often considered of secondary importance and yet changes in their PA engagement and patterns will inevitably happen because of retirement. Any intervention needs to consider the retirement transition and not focus solely on health behaviours. Interventions to reduce sitting time might be easier to implement.

For

Claire and Eve, my family.

May we continue journeying together.

The end of a journey means the start of another.

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Individual Contributions

The studies presented in this thesis have resulted in the following publications:

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Spiteri, K., England, K., Calleja, N., Xerri de Caro, J., Smith, L., Grafton, K., Broom, D. (2021) ‘Physical Activity Behaviour in 50- to 74-Year-Olds: Differences between Employed and Retired Individuals’, *Journal of Ageing and Longevity*, 1(1), pp. 11–23. Doi: 10.3390/jal1010003.

Spiteri, K., Grafton, K., Xerri de Caro, J., Broom, D. (2021) ‘Translation of the International Physical Activity Questionnaire to Maltese and Reliability Testing’, *Journal for the Measurement of Physical Behaviour*, pp. 1–8. Doi: 10.1123/jmpb.2020-0031.

Spiteri, K., Broom, D., Grafton, K., Laventure, B., Xerri de Caro, J., (2022) “‘It is Easy to do Nothing and Easy to Sit Down’: Perceptions of Physical Activity and Sedentary Behaviors During Pre-retirement’, *Journal of Applied Gerontology*, p. 073346482110623. Doi: 10.1177/07334648211062374.

Spiteri, K., Xerri de Caro, J., Grafton, K., Broom, D. (2022) ‘Psychometric testing of the Maltese versions of the Exercise Benefits/Barriers Scale and Exercise Motivation Inventory – 2’, *Health psychology research*, 10(3). Doi: <https://doi.org/10.52965/001c.37515>.

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'Physical activity behavior in 50- to 74-year-olds: differences between employed and retired
individuals', *Journal of sports sciences*, 2021, VOL. 39, NO. SUP2, 1-66, pg59,
<https://doi.org/10.1080/02640414.2021.1978748>.

List of studies and contributors

Study	Title	Reference	Contributors	Chapter
Study 1	Physical Activity Behaviour in 50- to 74-Year-Olds: Differences between Employed and Retired Individuals	Spiteri, K. , England, K. Calleja, N., Xerri de Caro, J., Smith, L. Grafton, K., Broom, D. (2021) ‘Physical Activity Behaviour in 50- to 74-Year-Olds: Differences between Employed and Retired Individuals’, <i>Journal of Ageing and Longevity</i> , 1(1), pp. 11–23. Doi: 10.3390/jal1010003.	England Kathleen and Calleja Neville: carried out initial data collection. Lee Smith: advice on data analysis	Ch. 4 SEC. 1
Study 2	Barriers and Motivators of Physical Activity Participation in Middle-Aged and Older Adults—A Systematic Review	Spiteri, K. , Broom, D., Bekhet, A.H., Xerri de Caro, J., Laventure, B., Grafton, K. (2019) ‘Barriers and motivators of physical activity participation in middle-aged and older adults—a systematic review’, <i>Journal of Aging and Physical Activity</i> , 27(6), pp. 929–944. Doi: 10.1123/japa.2018-0343.	Hassan Bekhet: assisted in article screening	Ch. 4 SEC. 2
Study 3	Translation of the International Physical Activity Questionnaire to Maltese and Reliability Testing	Spiteri, K. , Grafton, K., Xerri de Caro, J., Broom, D. (2021) ‘Translation of the International Physical Activity Questionnaire to Maltese and Reliability Testing’, <i>Journal for the Measurement of Physical Behaviour</i> , pp. 1–8. Doi: 10.1123/jmpb.2020-0031.		Ch. 3 SEC. 3
Study 4	Psychometric testing of the Maltese versions of the Exercise Benefits/Barriers Scale and Exercise Motivation Inventory – 2	Spiteri, K. , Xerri de Caro, J., Grafton, K., Broom, D. (2022) ‘Psychometric testing of the Maltese versions of the Exercise Benefits/Barriers Scale and Exercise Motivation Inventory – 2’, <i>Health psychology research</i> , 10(3). Doi: https://doi.org/10.52965/001c.37515 .		Ch. 3 SEC. 4
Study 5	“It is Easy to do Nothing and Easy to Sit Down”: Perceptions of Physical Activity and Sedentary Behaviors During Pre-retirement	Spiteri, K. , Broom, D., Grafton, K., Laventure, B., Xerri de Caro, J., (2022) ““It is Easy to do Nothing and Easy to Sit Down”: Perceptions of Physical Activity and Sedentary Behaviors During Pre-retirement’, <i>Journal of Applied Gerontology</i> , p. 073346482110623. Doi: 10.1177/07334648211062374.		Ch. 5 SEC. 2
Study 6	Physical Activity and Sedentary Behaviour with Retirement in Maltese Civil Servants: A dialectical mixed method study	Under review		Ch. 5 SEC. 3

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Chapter 1 Introduction

This introductory chapter is divided into two sections. Firstly, is an introduction to the topic area providing a brief background of the challenge of population ageing and the influence of physical activity (PA) and sedentary behaviour (PA) on the health of older persons. It also provides a description of the Maltese situation of older persons and the prevalence of PA. Thereafter is the rationale for the programme of research as well as briefly introducing the researcher's positionality which is written in the first person. To help guide the reader it presents the thesis structure explaining how the thesis is presented. Section 2 provides a detailed account of the researcher's positionality so that any potential bias is transparent.

Section 1. Introduction

1. Background

An ageing population, defined as a higher proportion of older persons within the population, is an indicator of social and economic progress within a society (Bloom and Luca, 2016). It represents the societal triumph over premature deaths (Formosa *et al.*, 2014). Older persons are defined as people over the age of 60 or 65 years by the World Health Organisation (WHO) (United Nations, 2020) or 65 years and older by the Centers for Disease Control and Prevention (CDC) (NCCDPHP, 2022). Successful population ageing, in which older individuals participate in society to keep cognitive and functional capacity with a low probability of disability, is a challenge which most societies are facing or likely to be facing more in the future (Teater and Chonody, 2020). An ageing population presents different challenges from a public policy perspective. Within the context of a small European state like the Republic of Malta, five key policy issues have been identified to tackle population ageing: 1) income security, 2) age

discrimination, 3) citizenship, 4) community care, and 5) healthcare (Formosa *et al.*, 2014).

Prevention of non-communicable disease is one of the policy interventions identified to keep healthcare costs manageable.

Physical activity (PA) throughout life can prevent and manage chronic health related conditions which are common in older persons, to preserve functional mobility and delay the onset of disability (Physical Activity Guidelines Advisory Committee, 2018). The importance of PA by those over the age of 65 years is highlighted within the World Health Organisation's recommendations. In addition to reaching the PA recommendations it is suggested that people carry out activities focused around balance, coordination and strength training at least three times a week (Bull *et al.*, 2020). With only 28% of persons aged 65+ years reaching the recommended World Health Organisation guidelines (Department of Health Information and Research, 2008), Malta has one of the lowest prevalence of older people meeting PA guidelines across the European region (Loyen *et al.*, 2016). The number of older persons reaching balance and strength recommendations are expected to be less. In Scotland 19% of Males and 12% of female meet balance guidelines and nearly half of those reaching the aerobic recommendations reach strength guidelines (Strain *et al.*, 2016). In addition to the low levels of PA, sedentary behaviour (SB) should also be examined as its heightened presence has become a public health concern (Physical Activity Guidelines Advisory Committee, 2018; Bull *et al.*, 2020).

In older persons, SB has been associated with poorer cardiometabolic markers (Figueiró *et al.*, 2019) and self-reported physical function (Gennuso *et al.*, 2013). Compared to younger age groups, older persons have been found to engage in longer periods of SB. They sit for about 75% of their waking day (Harvey, Chastin and Skelton, 2015). The adverse effects of long periods of SB on cognitive function, depression, function and disability, physical activity behaviour, and

physical health-related quality of life in adults is irrespective of the amount of PA undertaken, even though this is less in cases of engagement in PA (Saunders *et al.*, 2020).

The promotion of PA is on the Maltese public health agenda, with national policies promoting engagement (WHO, 2018). People who achieve the recommended PA to improve health have a lower risk of developing health conditions such as coronary heart disease, stroke, type II diabetes, hypertension, depression and breast cancer (Bull *et al.*, 2020). Older persons who are not sufficiently active also utilise more health care resources than individuals who reach the recommended amount PA for health (Woolcott *et al.*, 2010).

The latest available health surveillance reports in Malta, based on self-reported data, collected by the Directorate for Health Information and Research (DHIR) revealed that 8.3% of the population aged between 20 and 79 years had diabetes and 21.4% had high blood pressure (Gauci, England and Neville, 2018). Self-reported data surveillance has found that 70% of those aged 65+ years living with overweight or obesity (Department of Health Information and Research, 2008). This increased to 76% by 2016, with men exhibiting higher obesity rates than women (Cuschieri *et al.*, 2016). It is estimated that the direct and indirect cost of obesity in the Maltese population for people aged between 18 and 75 years is €36.3 million per year (PricewaterhouseCoopers Malta, 2017). This was estimated to be 0.4% of Malta GDP and 8.1% of the health budget in 2015. These costs could be within the region of €25 to 45 million for the age group 18 to 65 years by 2050. The direct and indirect cost of living with diabetes was estimated to be between €42 and €51 million (Cuschieri *et al.*, 2016). These estimates do not take into consideration other non-communicable diseases, such as cardiovascular disease and cancer. Hence the magnitude of the cost of people not reaching the recommended amount of PA to achieve health benefits is significant for a small island state such as Malta with a current

population of approximately 500.000 inhabitants. This has already brought about a reaction from the Maltese government via the enactment of specific policies developed to promote PA within the health, education and sports sector (European Commission, 2018). However, to date there has been no data about, or policy recommendations aimed at reducing SB behaviour. Neither has there been data about, or a public policy to address PA/SB in specific societal cohorts such as retirees.

Paying attention to the known health benefits that increasing PA and reducing SB has when older persons start being active, coupled with the knowledge that a low proportion of the adult population of Malta attain the targets set by the WHO for PA, presents an opportunity to investigate societal instances when PA engagement can be positively influenced. Retirement is a life event, and an example of such a societal instance can be used as an opportunity, even within a public policy perspective, to promote positive health behaviours (Wilson and Palha, 2007; Susan Baxter *et al.*, 2016). There are instances for PA to take place in different forms throughout the day and these are subclassified into activities centred around occupation, transport, housework, and leisure. PA can be either structured, such as during sport or unstructured, such as when doing household chores (Caspersen, Powell and Christensen, 1985).

2. Rationale for this PhD and Researcher Positionality

The number of older persons is expected to increase in Malta (Formosa *et al.*, 2014). Surveillance data shows that the prevalence of PA in older persons in Malta is low (European Commission, 2018), with SB also expected to be high. Research suggests that retirement is an opportunity whereby targeted health promotion measures may serve to not only maintain existing good health behaviours but also to improve them (Wilson and Palha, 2007). Life events, such as

retirement, the entry into the labour market or change of employment have been identified as a possible barrier to participation in PA (Allender, Cowburn and Foster, 2006). Based on a review, studies have shown that life events can impact PA differently (Gropper *et al.*, 2020), but can also be used as teachable moments to encourage a behaviour change (McBride, Emmons and Lipkus, 2003). Retirement has been identified as having a positive impact on total PA engagement (Gropper *et al.*, 2020). Research on the predictors of change during retirement transition, and how the experience of retirement impacts PA was identified as lacking in the previous decade (Barnett, *et al.* 2012), with little research since.

Mindful of the positive benefits of engaging in more PA, coupled with the reduction of SB, and that retirement provides an opportunity to influence health behaviours, this PhD study sought to investigate PA and SB during the retirement transition in Maltese civil servants. In my professional experience I have been working with older persons for around 12 years. Throughout this period, I had the opportunity to occasionally provide pre-retirement talks about the importance of physical activity and exercise. When giving these presentations, I was aware that, most probably this was an ineffective way to help people adjust to retirement which sparked an interest in the subject. National research and reports on Malta suggest that there is little understanding of the influence of retirement on PA and SB. The Maltese civil service is Malta's largest employer, employing 17% of the total workforce (National Statistics Office, 2017). At the beginning of the study the civil service had a mandatory retirement age based on year of birth (example, those born before 1952 and 1955 could retire at 62 years but those born between 1956 and 1958 could retire at 63 years). This has now been extended to allow employees to work until 65 years of age after their pensionable age. Researching PA and SB changes during this period is of national interest. The findings of this study will provide an opportunity to influence public

health policy that may serve to address the attitudes and engagement of older persons towards PA and SB.

3. Thesis structure

The thesis is presented as an ‘alternative thesis’ according to Coventry University regulations and does not therefore follow the typical ‘monograph style’. The thesis has been divided into seven chapters: 1) Introduction, 2) Literature Review, 3) Methodology and Methods, 4) Secondary Data Analysis, 5) Result Mixed Methods Study, 6) Discussion, and 7) Conclusion. The first chapter introduces the topic being researched. It then presents the researcher’s positionality, which is a self-reflection process on how personal and professional experiences could have introduced bias within the study and influenced the world view of the PhD candidate. Chapter two is a literature review. It provides the background to the programme of research as part of this PhD and explains why this study was identified as an important topic to study, and how it could further knowledge within the area.

Chapter three explores and discusses the philosophical underpinnings and methodological approach of the research in relation to mixed methods (MM). Justification for using the dialectical mixed-methods approach is presented. The method is then discussed, and the study design and analysis adopted for the main longitudinal study (which addresses the research question about how the retirement transition influences PA and SB) is presented. The methods of previous studies adapted to support the longitudinal study were discussed within respective papers. This was done for ease of flow. This chapter ends by presenting two published papers which assess the psychometric properties of the translated tools which were used for data collection.

Chapter four presents the manuscripts of two papers which have been published. Two secondary analyses were carried out. These are a systematic literature review and a secondary analysis of a national data set. These studies were used to support the main MM study.

Chapter five is the results chapter of the main MM study. Within the chapter a published paper about pre-retirement perceptions has been included. The sixth chapter is a general discussion which presents the key findings in relation to the previously published literature and states what knowledge-gaps have been addressed through the PhD. The last chapter identifies ways how the body of work can influence practice nationally, and presents a personal reflection on the PhD journey how it has helped me grow personally, professionally, and academically. A short conclusion with the main findings is provided thereafter.

4. Summary

This section has introduced the topic being studied. It explained that an ageing population is a phenomenon that many countries are dealing with, and showed that identifying ways how to influence health behaviours in old age can contribute to public health benefits. This is important because retirement is a life event, which can influence PA and SB. Identifying factors that can influence PA and SB during the retirement transition can help develop future intervention towards these cohorts. The next section presents a reflection on the possible predispositions in the PhD.

Section 2. Researcher positionality

This section serves to provide the reader with my researcher positionality, that emanates from professional, personal factors and experiences that have influenced my views towards life, work,

and older persons. This bears an influence on the way this PhD study was conceptualised and eventually put in place as a study and is written in the first person.

1. Professional

I have been working as a physiotherapist with older persons for the past twelve years. My work experience is predominantly within long-term care, community physiotherapy services and mental health. I am a leader within the professional organisation nationally. This experience made me realise the diversity of perspectives available and the need to be contextual. It has helped me realise the need to use research to influence policy making and the need to present research in a way that can be used by policy makers and not only for scientific publications or thesis purposes.

My work with older persons has driven my curiosity about the life of my patients, as this helps me build a stronger therapeutic relationship. People have their own story and working with their story assisted me to build a personal relationship with the person. From my experience these stories make us unique and build our identities, more so when we get older. In addition, stories are very powerful when used to convey a message to implement policy recommendations. They have a potential impact when accompanied by appropriate numerical data, and they can persuade people that policies need to be implemented or changed. This influenced my choice to use a narrative approach as a research method.

2. Personal

Whilst doing the PhD I was blessed with the opportunity to experience my parents' transition from fulltime employment to part-time work, and then to retirement, during which they became grandparents. My own personal experience unconsciously shaped the way in which I viewed

retirement. Within the journey of research, I had to recognise these biases not to transpose my parents' experience of retirement onto the participants and the interpretation. Simultaneously, it endeared me to be empathic with what the participants could have been experiencing within their retirement transition. It was important to minimise transference onto the participants, not to influence the interpretation of their narrative.

3. PhD candidate

As a doctoral researcher I had a supervisory team made up of different expertise and philosophical perspectives. Based on my interpretation, Prof Broom comes from a positivist school of thought, which brought into the research the quantitative perspective. Prof Grafton seemed to be inclined towards the qualitative perspective with a questioning of research philosophy and experience within the area. My Maltese supervisor, Dr Xerri de Caro had knowledge of the situation in Malta, and experience in qualitative research. This helped me question the Maltese context and the mix within the supervisory team fitted with the approach and personal perspective of dialectical mixed methods. When discussing and analysing findings I had benefit of two different lenses which were integrated into one, for a deeper understanding of how the retirement transition could impact PA and SB. This mix helped me to grow further as a researcher and expand my knowledge in the two research paradigms.

4. COVID-19 pandemic

The following provides a brief overview to aid the readers in understanding how the COVID-19 situation in Malta influenced my studies. The reflection and interpretation being presented is a personal one and does not include experiences shared by participants within the study. The PhD timeline with respect to the COVID-19 pandemic is presented in Figure 1. During my fourth year

of the PhD process, after finishing my data collection for my mixed-methods study, the COVID-19 pandemic developed in Malta. Working within a large long term care institution, with around 1,500 older persons to care for, and leading the physiotherapy services within we had to reorient all our services. Being the head of section brought about a lot of work after normal working hours. In addition, being ill with COVID-19 myself in the early months of the pandemic impacted me physically (fatigue) and mentally (mental foggiess).

The awareness of COVID-19 started in January 2020, when the pandemic reached European shores. Speculative talk and jokes were made but people never thought it would reach Malta, as we had never experienced an outbreak of such magnitude before within our lifetime. At the beginning of March 2020, the first case was detected in Malta and people started to get scared. Simultaneously people were following the situation in Italy. Northern Italy was being flooded with cases and people were dying in large numbers. Together with all this, opinion articles by medical staff modelling what the situation in Malta might be like as the disease spreads were flooding the local newspapers. The calculated incidence and death rate was based on the Italian situation, and the prevalence data was frightening. As a result, a partial lock down was enforced. The fear was palpable, and the majority abided by the rules. You could see few people in the street, and most respected social distancing rules. The situation in Europe was out of control and people were terrified. In Malta, however, the situation was so well controlled that there were no deaths directly attributed to COVID-19 in the first few months (Cuschieri *et al.*, 2022).

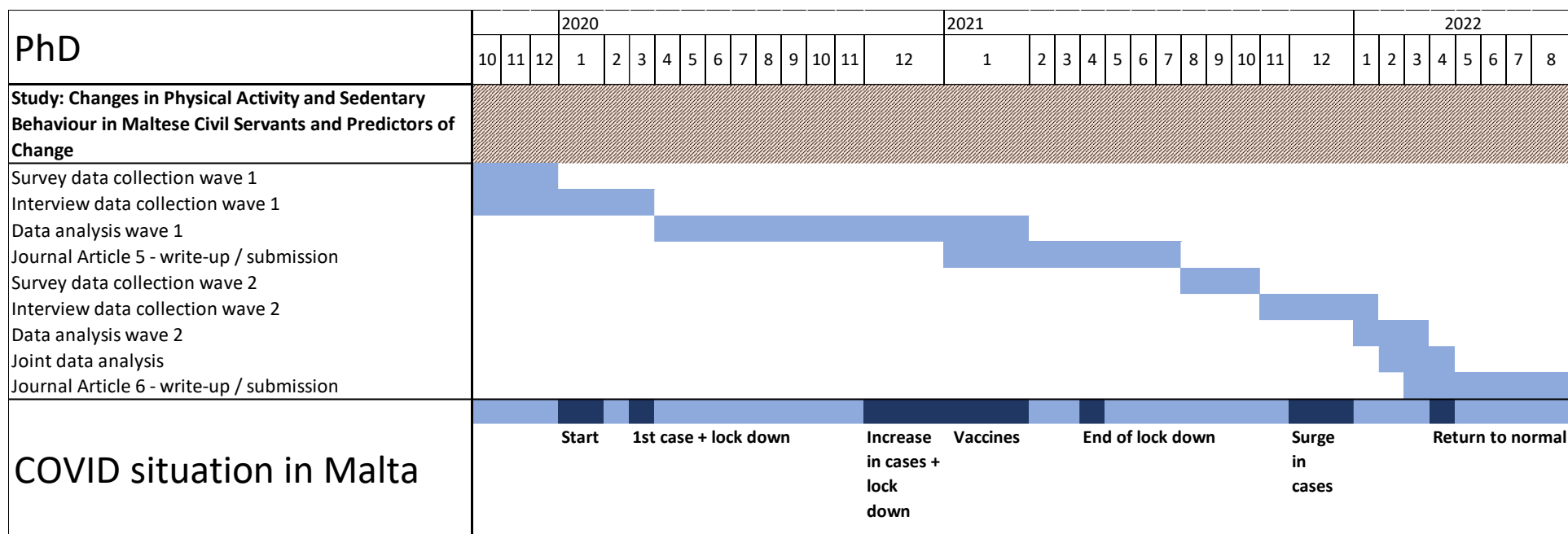


Figure 1 *PhD and COVID situation in Malta*

This first wave coincided with the pre-retirement data collection of the main study. During this period the health care services were being reoriented and, being the leader of physiotherapy in the largest long-term care institution our services had to be reoriented and adjusted. Due to work pressures and the local situation, I did not have enough insights to consider how the COVID-19 pandemic could influence the retirement transition, at this point in the study.

Due to the success of the first lockdown, people started believing that what the medical professionals were saying was just a hype. The feeling was that we managed to win the ‘war’ against COVID-19, and this gave people confidence that the worst was over. There was a false sense of reassurance. Medical professionals, however, sensed danger and warned that the situation could still get out of hand. Later in the month of June the island was opened to tourists and there was an influx of youths travelling to attend a couple of large parties. Soon after there was a surge of detected cases, and the first fatality. Fear resurged and people started being careful. The situation continued with a number of cases, and the number of as well as fatalities increased slowly throughout summer, with a decrease at the end of year. The influx of cases increased over the Christmas period in 2020 and the number continued to increase steadily until the end of March 2021. This led to another partial lock down over the Easter recess (Cuschieri *et al.*, 2022).

Compared to previous years COVID-19 related deaths resulted in excess mortality (Eurostat, 2022). Throughout 2019-2022 there were 631 deaths with COVID-19, the first being reported on in June 2020 (Ministry for Health, 2022). For comparative purposes in 2018 the total number of deaths in Malta was 3688 (England, 2018).

Once the vaccines were available there was a quick uptake by the population and life started returning to normal with herd immunity being reached by end of May 2021 (Cuschieri *et al.*, 2021). During the summer of 2021 restrictions were eased, with people being allowed to remove masks and dine in restaurants. However, summer activities which draw large crowds were still being limited. By Christmas 2021 things were nearly back to normal. However, once the Omicron variant had been imported the number of active cases increased again, and fear re-emerged within the population. After the January scare and at the time of writing, social life is returning to nearly pre-COVID-19 levels, although concern remains in certain vulnerable groups.

The post-retirement data collection was between October 2021 and January 2022. During the data collection, there was a surge in cases. Prior to starting the data collection an addendum to the ethics application was submitted to safeguard participants. Working in a long-term care institution with vulnerable people made me more concerned about safety issues when conducting interviews during the pandemic. Initially during interviews about post-retirement, I was inclined to carry them out online, and less open to doing them face-to-face. In analysing these interviews, I had to be aware of how the pandemic could have influenced perceptions, when interpreting the data.

5. Summary

These aspects were potential source of influences within the study. No knowledge developed can be value free (Creswell, 2009). A post-positivist perspective acknowledges this and attempts to reduce the research bias to reach objective knowledge. Social constructionist view knowledge developed as value laden and influenced by the researcher. The aim of this reflective piece was to aid the reader in valuing how the researcher's standpoint was brought into this PhD.

Chapter 2 Literature review

This chapter transitions the reader from the background of the study to the literature review to identify the gaps in the literature that this current PhD served to address. In compiling the review, it was necessary to read concepts that define the study, starting with a look at the determinants of physical activity (PA) and sedentary behaviour (SB), to appreciate the current literature in this context. It moves on to understand retirement as a life event through different definitions, understandings, views, and theories related to it. Finally, this chapter links PA and SB to retirement to describe the gaps in the literature.

1. Search strategy

A literature search was carried out to investigate the concepts defining the PhD. The search strategies adopted were different for each of the three concepts: 1) Determinants of PA and SB, 2) retirement as a life event, and 3) physical activity and sedentary behaviour during the retirement transition. When looking into research about determinants of PA and SB the Healthy Diet for a Healthy Life' European Joint Programming Initiative (DEDIPAC) was identified. This research group carried out various reviews of systematic reviews for PA determinants and systematic reviews for SB. These systematic literature searches were recent and findings were comparable to a previous systematic review by Bauman *et al.*, (2002) it was decided to use the DEDIPAC reviews to address these concepts in this chapter. Looking into retirement as a life event a literature search using the terms 'life event' and 'retirement' was carried out in the Google Scholar and Coventry University library generic search engine to identify literature on the topics. No literature reviews which included the definition of life events was identified. Literature reviews were identified on the definition of retirement and theoretical outlook of

retirement. These reviews were used as the basis to build the description around these concepts. The final section of the literature review was about the relationship between PA, SB and retirement. A free term literature search identified three systematic reviews on the topic. The same literature search used in these systematic reviews was used in two search engines PubMed and EBSCO, to update on the literature from the date of the systematic review until March 2022.

2. Determinants of physical activity and sedentary behaviours

a) Determinants of sedentary behaviour

An understanding of behaviour in life transitions near older adulthood is needed as older persons are vulnerable to decreasing PA and increasing SB (Condello *et al.*, 2017). The study of behaviours is complex due to bi-directional relationships between environmental, psychosocial, and other variables (Bauman *et al.*, 2002). Two relevant systematic review on determinants of SB in adult (O'Donoghue *et al.*, 2016) and older persons Chastin *et al.*, (2015) were identified.

O'Donoghue *et al.* (2016) published the results following a systematic review of the literature between 2000 and 2015, that had examined correlates of SB in adults of up to 65 years of age.

From the 75 studies that were identified in this systematic review, 58 were cross-sectional studies making it difficult to ascertain determinants. The highlights of the findings are that chronic disease, and body mass index (BMI) have a strong positive correlation with SB; those employed in manual work spend longer hours in sitting time after work. People in professional roles spend more time sitting during working hours (notably, because of working at a desk), while sitting during leisure time was inversely correlated with income. Retirement was associated with an increase in total SB, and leisure time SB (screen, reading). Similarly, after-work patterns differed across socio-economic status (SES). Whilst those in a higher SES would

spend more of their leisure time being active after work, those in lower SES would spend more of their leisure time activity in sitting. Other findings were that being older and female, correlated positively with higher sitting time. Limited evidence was identified for psychological factors, such as stress with SB (O'Donoghue *et al.*, 2016).

Determinants of SB in those ages 65 years and older were reported, following a systematic review by Chastin *et al.* (2015). The authors identified 22 studies, the majority of which used self-reported tools to measure SB, which can introduce bias on the validity of the results. Age and education were correlated with SB. Cultural variation were identified with education being inversely correlated in European studies but not in Asia. Two studies assessed retirement and sedentary time. One of the studies found higher screen viewing time, while the other found lower sedentary time. The measures of SB used were different. The review concluded that there is limited research on SB and old age, with studies being of a cross sectional design. These two systematic reviews have identified the need to explore further the views of older persons in order to be able to support the development of interventions to reduce SB (Brug and Chinapaw, 2015).

b) Determinants of physical activity

As more systematic reviews were available on the correlates and determinants of PA compared to SB, umbrella reviews on PA determinants have been carried out by the DEDIPAC research group (Carlin *et al.*, 2017; Condello *et al.*, 2017; Cortis *et al.*, 2017; Jaeschke *et al.*, 2017; O'Donoghue *et al.*, 2018; Puggina *et al.*, 2018; Aleksovska *et al.*, 2019). The umbrella reviews on determinants of PA were divided into socio-cultural, behavioural, biological, socio-economic, psychological, policy-oriented, and related to the physical environment. Each of these reviews was presented.

The umbrella review on policy determinants on PA identified one systematic review for people aged 50 years of age and over (Puggina *et al.*, 2018). The authors found that inflexible working hours have a negative impact on PA, while availability of PA programmes at community level have a positive influence on PA. This review was limited to African Americans, which limits generalisability of the findings in other cultures.

In their umbrella review on psychological determinants of PA, Cortis *et al.* (2017) identified 61 possible psychological factors which were then classified into ten categories. The authors identified two systematic reviews on psychological determinants which looked at adults over the age of 40 years. One systematic review was limited to rural women. This found a negative association with fear of injuries and falls, and a positive correlation with self-efficacy. The other review identified a positive association between beliefs and weight control/body care. The level of evidence for these associations as possible PA determinants was limited. Motivation, specifically, intrinsic motivation, was found to have a probable association with PA engagement across all age groups, while perceived benefits and barriers varied with their association to PA engagement. The authors concluded that these were not considered crucial to promote an active lifestyle. The review identified that research on psychological determinants in older persons remained limited (Cortis *et al.*, 2017).

Environmental determinants are considered to have more association in older persons compared to psychological determinants (Cortis *et al.*, 2017). Carlin *et al.* (2017) undertook an umbrella review of environmental determinants in PA. They identified 11 systematic reviews on environmental determinants in adults and older persons. Walkability of one's neighbourhood was identified as one of the factors which influenced PA participation, which interacted with neighbourhood safety (Carlin *et al.*, 2017). Another possible determinant identified was

season/temperature and weather conditions. However, the influence on PA varied, probably due to different conditions across different countries. Other determinants, such as street lighting, access, and proximity, had inconclusive evidence in their impact on PA in adults.

Jaeschke *et al.* (2017) examined socio-cultural determinants of PA which were divided into four categories in the umbrella review. The authors identified six systematic reviews which did not differentiate between adults and older persons. Having a companion was found to have a positive association with PA engagement. Living with a partner has inconsistently shown a negative association with PA.

Behavioural determinants of PA were researched by Condello *et al.* (2017). Their study identified four reviews of which one was about older persons and the rest pertaining to adults. Past PA behaviour was associated with overall PA in adults over the age of 40 years. Life events such as retirement were identified as possible influences on PA behaviour, but their impact is probably influenced by other behaviour determinants. Smoking in older persons was negatively associated with PA.

The level of evidence on biological and SES determinants on PA was found to be more consistent, compared to the previously described PA determinants. In adults, health status, fitness level, ethnicity, younger age and being male, have been found to be positively associated with PA behaviour (Aleksovska *et al.*, 2019). Convincing evidence has been found that SES influences PA behaviour and occupational PA in adults (O'Donoghue *et al.*, 2018). In older persons, the level of evidence on the influence of SES on PA behaviour was limited, however, a positive association with higher SES was found. The authors concluded that, in adults and older

persons, there needs to be more research on domain specific PA, as socio-economic factors can influence PA domains differently (O'Donoghue *et al.*, 2018).

These reviews highlight the need for further longitudinal studies on the determinants of PA (Brug *et al.*, 2017). Studies on older persons were less often carried out than in younger age groups. There was an interaction between different determinants, which made it difficult to identify an effect due to specific factors. Certain behavioural determinants were not consistently measured, which created issues with compiling data from different studies. This highlighted the need to use internationally established tools with known psychometric properties. The results from these reviews build on the previous review by Bauman *et al.* (2002), which surmised that most studies identify various correlations of PA but few conclusion can be made on actual determinants.

c) Perceptions towards PA and SB

A further consideration in the determinants of PA and SB is the perception of older persons towards these health behaviours. Using a systematic review, McGowan *et al.* (2018) examined how acceptable PA was to older persons over the age of 65 years. The authors extracted data from qualitative literature, which was then analysed using a thematic synthesis. A total of ten studies which were critically appraised using the Critical Appraisal Skills Program (CASP) tool were included. The quality of studies included by McGowan *et al.* (2018) varied from high to low quality. A total of seven descriptive themes and three analytical themes was identified. The analytical themes were: 1) older persons' construal of physical activity 2) self-identity and roles within wider society and 3) perceived vulnerability versus maintaining control (McGowan *et al.*, 2018).

Compernelle *et al.* (2020) examined older persons' perceptions of SB by undertaking a systematic review of qualitative literature followed by a thematic synthesis. A total of 15 articles was identified using CASP as the quality assessment tool. These articles had high to medium quality. The study included articles with populations with an average age of 60 years and above. This resulted in a wide age range of studies being included. The thematic analysis included the development of descriptive themes followed by analytical themes. The final analytical themes were four (a) the lack of knowledge on, and awareness of, sedentary behaviour, (b) the habitual nature of sedentary behaviour, (c) the importance of enjoyment and convenience, and (d) the key role of aging (Compernelle *et al.*, 2020).

3. Retirement as a life event

a) Understanding the concept of life events

A consensus statement on the definition of a life event was not identified. The American Psychological Association (APA) dictionary defines a life event as an important occasion throughout one's life span, that is either age related, and thus expected, such as marriage or retirement, or unrelated to age, and therefore unexpected such as an accident (American Psychological Association, 2022). Other definitions of a life event describe it as a very important event in someone's life (Oxford University Press, 2017). Throughout a life event, a person is expected to adapt to the new life situation. The adaptation period is not fixed, and depends on whether the event is perceived as positive or negative. The ability to adapt is dependent on the person's ability to find an explanation for the life event and fitting it within one's own life context (Luhmann *et al.*, 2012; Turner, Goodin and Lokey, 2012).

A life event may be interpreted by the individual in two different ways: a) disruptive, and b) developmental (Luhmann *et al.*, 2012). A disruptive perspective of a life event views the event as causing stress to the person, which would necessitate an adjustment response. The disruption in daily routine, such as loss of a spouse, getting a new job or retiring, is limited in perspective to the need to adjust. A developmental perspective towards life events views these events as parts of a continuous transition within a person's life (Luhmann *et al.*, 2012). Taking a developmental stance provides an opportunity to modify one's behaviour (Boormans, 2017). Changing the context can be a form of stimulus for behaviour modification (Wood, Tam and Witt, 2005).

Life events have been identified as teachable moments (McBride, Emmons and Lipkus, 2003). In these moments, change in behaviour can be promoted because the person is starting and adapting to a new routine, so the person may be motivated to make certain lifestyle changes. The moments can activate new intentions and goal setting when the daily cues are changed (Wood, Tam and Witt, 2005). Conceptually, three criteria have to be present for a moment to be considered teachable 1) perception of risk, 2) strong emotional response, and 3) redefinition of social role (McBride, Emmons and Lipkus, 2003). During the event the person must feel that there is an element of risk, and that one's health could improve or worsen. This event needs to trigger enough emotion to prompt a cognitive and behavioural response. If the event is experienced as positive or too negative this response might not be triggered, either by the person reaffirming one's current beliefs or downplaying the event. Finally, with the event there needs to be a redefinition of social roles. This brings with it role expectations and social influences that can impact the person's behaviour (McBride, Emmons and Lipkus, 2003). Life events can result in the possibility of changed behaviour or an opportunity to change it, but this does not imply that

the event alone can change behaviour. Using a developmental perspective towards retirement can allow the use of this life event as a teachable moment for behaviour modification.

b) Retirement as a life event

Retirement is a life event that is age related and part of life transitions. The definition of retirement varies between disciplines, the guiding principle underpinning the research, and the data available (Denton and Spencer, 2009). Another factor which influences how retirement was defined relates to the level at which it was conceptualised, that is, at societal, individual or employer level. Variations in the retirement definition were noticeable with changes in the pension system in different countries, changes in the age of retirement, programmes which allow for partial retirement, early retirement plans, and benefits adjustments based on early or delayed exit from work (Boissonneault *et al.*, 2020). These play a critical role in determining how retirement is defined.

Whilst, in times past, retirement used to be dictated and enforced on the individual, there has been a shift towards bridged employment and gradual detachment from work (Denton and Spencer, 2009). The change was expected, as retirement is a social construct which serves social institutions, social groups, and age succession. As a consequence of these changes the retirement age of 62, 63 or 65 years was becoming less relevant to studying retirement behaviour (Ekerdt, 2010). The social nature of retirement can be identified from a historical perspective, with retirement being non-existent prior to 1900 (Shultz and Wang, 2011). The concepts of retirement started developing between 1900 and 1950 with the development of social security systems and pension systems. Views about retirement continued to develop and after 2000 retirement was being seen from different aspects: psychological, economic, and career related. These are now

being integrated, with retirement being seen as an integration of different processes (Shultz and Wang, 2011).

In a literature review on how retirement is defined, (which used studies from the United States, Canada, the United Kingdom, Norway and Israel), eight different conceptual definitions were identified (Denton and Spencer, 2009): a) receipt of retirement income, b) reduction in work activity, c) being in or out of the labour market, d) the number of hours worked or income earned below a decided cut-off, e) whether one has left main employment, f) employment in later life, g) self-assessment of retirement, and h) a combination of indicators. Conceptualising retirement in different ways can influence the research outcomes and contribute towards different findings which at face value might seem comparable, but in fact deal with different aspects (Wang and Shi, 2014b). Based on Shultz & Wang (2011), Wang & Shi (2014, pg 211) defined retirement as “as an individual’s exit from the workforce, which accompanies decreased psychological commitment to and behavioural withdrawal from work”. This definition provides a view of retirement which involves the action of exiting from the workforce and a behavioural change component of stopping the work routine (Wang and Shi, 2014b).

Based on these considerations, for the purpose of this study it was decided to use the individual’s self-assessment definition of retirement. As retirement involves a withdrawal from work and a psychological commitment, the person can self-evaluate whether one feels retired or not. The withdrawal can be a gradual one, with bridge employment or sudden. As the reception of a pension is dictated by the social security system, the way it is perceived by the individual is constructed by the person. Using a self-assessment definition fit with viewing life events as teachable moments. It is an individual’s perception of the life event which makes the difference,

therefore, one's self-assessment of whether one feels retired is required, as this is linked with health behaviours.

c) Retirement theories

Retirement is not limited to the last day of work, but is a process which can be referred to as 'the retirement transition'. This process was conceptualised by various theories which can be grouped into five headings. These are retirement as: 1) a decision making process, 2) an adjustment process, 3) a career development stage 4) part of human resource management (Wang and Shultz, 2009; Wang and Shi, 2014b) and 5) resource-based dynamic model (Wang and Shultz, 2009). Some of the theories which are deemed relevant for the PhD are described. Retirement theories which have conceptualised retirement as a decision-making process view retirement as being a choice in which the person decides when to retire. The assumption in these theories is that retirement is not forced on by, for example, mandatory retirement ages. The decision to retire is based on work characteristics, financial, family situations and other non-work environment factors (Wang and Shi, 2014b). Three of the theories linked to this concept are the role theory, theory of planned behaviour, and the rational choice theory (Wang and Shultz, 2009).

Theories which view retirement as an adjustment process have a longitudinal view of retirement. The retirement process is seen as part of one's life transitions, in which the person starts to prepare for the change from being employed to being retired. The adjustment process continues after the actual retirement date until a person settles into retirement life (Wang and Shi, 2014b). Three theories which are synonymous with the adjustment process are the life course perspective, continuity theory, and role theory (Wang and Shultz, 2009). These theories view

retirement as part of a person's career. Instead of being a career exit it is late-career development stage (Wang and Shi, 2014b). These theories are relevant in the context of people deciding to go into bridge employment or work after they decide to retire (Wang and Shultz, 2009).

The resource-based dynamic model developed by Wang *et al.* (2011) considers retirement adjustment as a longitudinal process, with the adjustment period fluctuating depending on the individual's resources (Figure 2). The adjustment process is not seen as a linear process but as a fluctuating one depending on the person's resources. It integrates concepts from different theories. This model fits with the theoretical perspective of life events adapted in this study, in which such events are developmental in a person's life. Table 1 represents how the different characteristics of the study were integrated.

Table 1 *Theoretical approach to study characteristics*

Characteristic	Life events	Retirement	Retirement transition
Theoretical approach adopted	Developmental perspective	Self-assessment	Resource-based dynamic model

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Note. *The potential antecedents for resource changes listed here are illustrative rather than exhaustive.

Figure 2 Visual representation of resource-based dynamic model from Wang, M., Henkens, K., & van Solinge, H. (2011). Retirement adjustment: A review of theoretical and empirical advancements. *American Psychologist*, 66, 204–213. Doi: 10.1037/a0022414.

4. Physical activity and sedentary behaviour during retirement transition

a) **Physical activity and retirement transition**

PA is a behaviour which might be influenced during the retirement transition. A literature search was carried using the search terms ‘retirement’ and ‘PA’ and ‘systematic review’. This identified four systematic reviews pertaining to the topic. Out of the systematic reviews identified, two related directly to retirement and PA (Barnett, Guell and Ogilvie, 2012; Barnett, van Sluijs and Ogilvie, 2012), and another two to PA and life events (Engberg *et al.*, 2012; Gropper *et al.*, 2020). As the systematic reviews covered until 2020, a further systemised literature search using

the same key words as Barnett, van Sluijs *et al* (2012) within the systematic review was undertaken to identify any studies on the subject for 2020, until March 2022. A total of 375 articles from two databases, PubMed, and EBSCO, were identified. Out of these, four were considered relevant to the area of physical activity and retirement transition in people living in the community. The findings from the systematic reviews and additionally identified studies will be discussed in chronological order (Table 2).

The systematic review by Barnett, van Sluijs, *et al.* (2012) aimed to assess whether there was a change in PA, and if this varied with SES and predictors of this change. They included cross-sectional and longitudinal observational studies. The CASP check list was used to evaluate the quality of the studies to be included. Nineteen articles were included from the US, Europe and Australia. Only one article had used device-based PA tools, and 47% of the included articles assessed PA using a single-item questionnaire. This prevented the authors from carrying out a meta-analysis, which resulted in difficulties concluding whether a change in PA occurred with retirement. Based on the studies included, it was concluded that there is an increase in PA in the leisure time domain after retirement.

The cut-off points of how long before or after retirement the assessments were done were not included in Barnett, van Sluijs, *et al.*'s (2012) analysis. SES was found to influence PA after retirement, with those in manual work and low income having a steeper decrease in overall PA than those in sedentary occupations and high income. This could be due to previous PA status related to PA in the work domain. The predictors of change identified by the authors were gender, ethnic group, marital status, lifelong participation in PA, attitude towards retirement, pathway to retirement, bridge employment, and being retired for more than five years. The only conclusive predictor to having a positive influence on PA was being male.

Table 2 Literature pertaining of physical activity and retirement transition from 2020 to 2022

Study	Aim [^]	PA measure	Findings related to retirement
Barnett, van Sluijs <i>et al.</i> (2012)*	Review changes in physical activity across the transition to retirement	Various	An increase in leisure time PA.
Barnett, Guell <i>et al.</i> (2012) *	Review qualitative research on experiences of and views on PA around the transition to retirement	Various	Three main themes: a) concepts, b) motives, and c) challenges of PA in retirement
Engberg <i>et al.</i> (2012)*	Experiencing a life-change event affect PA behaviour	Various	An increase in leisure time PA.
Van Dyck <i>et al.</i> (2017) ^a	to obtain qualitative information about the change and specific multidimensional determinants of PA and SB during early retirement	Qualitative	Participants experienced a change in PA behaviour.
Gropper <i>et al.</i> (2020)*	Impact of life events and transitions on PA	Various	An increase in leisure time PA and an increase in light and moderate intensity PA
Pulakka <i>et al.</i> (2020) ^b	PA changes after transition to statutory retirement in different occupations	Device-based	There were changes in PA which varied by occupation and gender
Jürgens & Schüz (2021) ^b	Sport participation during the retirement transition	Single item question	18.5% of their sample increased their time playing sport after retirement and 10% decreased it.
Socci <i>et al.</i> (2021) ^a	How the retirement transition could impact PA	Open-ended questions	Identified patterns of PA during the retirement transition.

[^]specific to retirement and PA, * Systematic review, ^a Qualitative study, ^b Quantitative study

Barnett, Guell *et al.* (2012) had carried out another systematic review which looked at qualitative studies which focused on the views of people in retirement and how it influenced their PA behaviour. Five studies included, looked at individuals who had been retired for a period between 6 months to 5.6 years; and one study included looked at partly retired individuals. Two of the articles related to sports participation and recreational PA. The other three articles related to PA behaviours. The authors used a thematic analysis to synthesise the data. Three main themes were identified: a) concepts, b) motives, and c) challenges of PA in retirement.

In the systematic review, Barnett, Guell *et al.* (2012) synthesised the data with the findings from their previous systematic review (Barnett, van Sluijs *et al.* 2012). They identified the need to: investigate people in low SES, to include broader concepts of PA when using self-reported measures, to assess long-term developments of PA patterns after retirement, to assess if inactivity patterns change to PA behaviour with retirement, and to use objective measures of PA. The qualitative and quantitative results were merged using joint display. The studies included in the review were relevant and using the CASP as a quality measure of the article is considered appropriate.

Engberg *et al.* (2012) concluded that retirement is associated with increasing leisure time PA, but there were conflicting results on how total PA changes. The conclusion were similar to the systematic review by Barnett, van Sluijs *et al.* (2012) due to both reviews including the same articles. Gropper *et al.* (2020) explored a variety of life events and transitions on PA, including retirement. The number of identified articles dealing with retirement and PA was 29. Out of the 29 articles included by Gropper *et al.* (2020), 17 were published after the systematic review of Barnett, Guell, *et al.* (2012). The search strategy adopted by Gropper *et al.* (2020) was different

compared to Barnett, van Sluijs *et al.* (2012), and included search terms related to “life event” and not specifically to retirement.

Due to the difference in the search strategy, only one of the qualitative studies identified by Barnett, Guell *et al.* (2012) was included. The qualitative article review by Gropper *et al.* (2020) was by McDonald *et al.* (2015), who investigated factors which could influence PA during the retirement transition. The interview protocol used by McDonald *et al.* (2015) was based on the theoretical domain framework (TDF). The sample included people in the pre- and post-retirement phase, and the design was cross-sectional. A framework analysis was used to analyse the interviews from 28 participants. The main themes which were identified were: a) transitional PA phases after retirement, b) opportunities for PA, c) changes in daily structure, and d) resources for PA. The quantitative results from the other included studies were similar to the results of Barnett, Guell, *et al.* (2012). Gropper *et al.* (2020) recommended that research on life transitions should include controls, try to capture the complexity of such events, and do multiple follow-ups on the events being studied.

The additional articles identified in the literature search were two quantitative ones (Pulakka *et al.*, 2020; Jürgens and Schüz, 2021) and two qualitative ones (Van Dyck *et al.*, 2017; Socci *et al.*, 2021). Pulakka *et al.* (2020) used data from the Finnish Retirement and Aging cohort to assess PA changes after transition to statutory retirement in different occupations. They use device-based measures for PA and found that women have changes in total PA but not men. In female manual workers the decrease in PA was sharper than in non-manual workers. PA was influenced by the type of activity being undertaken pre-retirement. Those who commute actively (on foot) were likely to maintain their pre-retirement PA behaviour. Jürgens & Schüz, (2021) used data from the German Aging Survey to examine the role of neighbourhood indicators in sport

participation during the retirement transition. The authors used a single-item question to measure sports participation across two time points. Based on this question they concluded that 18.5% of their sample increased their time playing sport after retirement, and 10% decreased it. SES differences were identified in the sample confirming previous studies that higher education and employment can result in higher sport participation.

Van Dyck *et al.*'s (2017) qualitative findings about PA confirmed previous quantitative studies, as they found that participants experienced a change in PA behaviour during their early retirement. However, this change varied depending on their previous PA during their employment. The final study to be presented in this section is a longitudinal qualitative study which looked at how retirement transition can impact PA (Socci *et al.*, 2021). This was the only longitudinal study identified within the literature which looked at PA and retirement transition. The researcher interviewed 40 participants three times each during their transition into retirement. PA was measured using open-ended questions and categorised using IPAQ guidelines. The authors identified patterns of PA during the retirement transition: increasers, continuators, starters, decreasers, fluxuators, and inactive. They described the phenotype of people undergoing these types of patterns. Based on their analysis, Socci *et al.* (2021) conclude that fun as a motivator is understudied in this population.

Overall, there is an agreement that retirement results in an increase in PA in the leisure domains, and an increase in light and moderate intensity PA. However, there is inconsistency in the literature. Some studies show a decrease and increase, while others show no change in total PA. These changes depend on the moment when pre- and post-retirement PA was assessed, the participant's SES, and the types of measurement used. PA increases right after retirement but decreases later. This change might be due to age related declines.

Based on this literature review it can be concluded that the retirement transition impacts people differently according to their SES and gender. People in manual work are more likely to decrease their total PA, whilst people with higher education are more likely to increase their leisure time PA. For the majority there were minimal changes in their PA behaviour with the retirement transition, or the influence of this life event was transitory. The use of device-based PA measures was not common and single item questions to measure PA were the primary source of data. To date, only few studies have looked at the participants' perspectives within the retirement transition. This research gap was identified since 2012 by Barnett, Guell *et al.* (2012).

b) Sedentary behaviour and retirement transition

As with the topic of PA a literature search was initially undertaken with the terms 'Sedentary behaviour', 'retirement' and 'systematic review' to identify any systematic reviews on the topic. Only one such review was identified by Sprod *et al.* (2015). An updated literature search was carried out to cover 2015 until March 2022. The search strategy was modified from the article by limiting the search terms relating to SB to 'television*', 'sedentar*', 'sit', 'sitting', 'screen*'. A total of 500 articles were identified from two data bases PubMed and EBSCO. From these articles, eight were found relevant to retirement and community dwelling individuals. The findings from the systematic review and some of the additional studies identified are discussed (Table 3).

Table 3 *Changes in sedentary behaviour with retirement transition*

Study	Aim [^]	SB measure	Findings related to retirement
Barnett <i>et al.</i> (2014) ^b	Changes in SB associated with retirement	TV viewing time	TV viewing increased SES differences
Sprod <i>et al.</i> , (2015) [*]	How sedentary behaviours change across the retirement transition	Various	Total sitting time declined after retirement, while specific sedentary behaviours, such as television viewing and reading increased.
Menai <i>et al.</i> (2014) ^b	Changes in SB according to retirement status	Modifiable Activity Questionnaire	Increase in leisure-time SB, TV viewing and computer use.
Van Dyck <i>et al.</i> (2016) ^a	Examined whether changes in PA and SB change (2 years) differed between retired and recently retired adults	Leisure-time sedentary behaviour questionnaire	A decrease in passive transport (-63 min/week). An increase in computer use (+98 min/week) and TV viewing (+169 – 217 min/week). SES variability found.
Shaw <i>et al.</i> , (2017) ^a	SES as a determinant of SB in older adults	Accelerometer	SES difference with those most disadvantage having higher SB. In employed this difference is not consistent.
Sprod <i>et al.</i> (2017) ^b	Changes in time use across 24 hours during retirement transition	Multimedia Activity Recall for Children and Adults	Increase in quiet time, screen time, sleep, and a decrease in passive transport.
Jones <i>et al.</i> (2018) ^b	Longitudinal patterns of TV watching	TV watching	Retirement was associated with a 15% increase in TV watching. This increase was irrespective of SES.
Leskinen <i>et al.</i> (2018) ^b	How non-occupational SB changes with the retirement transition	Average number of hours in a week doing a specific activity	An increase in TV viewing, computer use, and other sitting down activities. Decrease in vehicle sitting. Gender differences.
Suorsa <i>et al.</i> , (2020) ^b	Compare daily sedentary time during retirement transition	Accelerometer	An increase in sedentary time in women + SES difference No change in males
Eklund <i>et al.</i> (2021) ^a	Understanding of SB in relation to retirement	Perceptions of SB	Meaning of SB changed with retirement
Suorsa <i>et al.</i> (2021) ^b	Changes in daily prolonged sitting across retirement transition	Accelerometer	Women increase sitting time and prolonged sitting time during the retirement transition. Men do not change during retirement transition. The increase for men happened prior to retirement.

[^]extracted only for sedentary behaviour, ^{*}Systematic review, ^aQualitative study, ^bQuantitative study

The number of included articles in the systematic review by Sprod *et al.*(2015) was 12. These were from the US, Europe, Israel, Australia and South Korean. The aim of this review was to evaluate SB changes across the retirement transition. The authors used the STROBE checklist to assess the quality of the articles. This is not considered appropriate as the aim of the checklist is for reporting purposes and not for quality appraisal of articles. Measures of SB varied within the studies, sitting time, television viewing, reading or a combination, were used. The total sitting time seems to decrease across the included studies. This was attributed to the long sitting period during working hours. However, there were differences in specific sitting activities. Studies showed an increase in television viewing with an increase of over ten hours per week. Conclusions for reading behaviour seemed to show a slight increase, but data was inconclusive.

Out of the further nine articles identified within the literature search, which examined the retirement transition and changes in SB (Table 3), only two used device-based measures, both of which used data from the same database. The remaining articles used self-reported measures. The increase in television viewing identified in these articles confirms Sprod *et al.*'s (2015) findings. However, unlike Sprod *et al.* (2015), the conclusions were that there was a decrease in overall sitting time. Eight articles found an increase in most SB domains except for passive travelling. Using data from the Finnish retirement and aging study, Suorsa *et al.* (2021) found that the increase in SB is not limited to time during the day (quantity) but to prolonged bouts of sitting too (volume for each sitting episode). In their other study, Suorsa *et al.* (2020) argued that, based on device-based measures, the increase in SB might not be as sharp as reported when using self-reported measures. Using five wave of data from 1987 to 2008 Shaw *et al.*, (2017) found that SB at retirement is influenced by SES. The data was measured using accelerometer and people who were at the lowest SES, as defined by different measures (education, car,

subjective position, income, and social class), had higher SB patterns than others higher in the social ladder. SES were not the same when they were in employment, the authors explained this due to constraints imposed by employment.

Van Dyck *et al.* (2017) carried out focus groups to examine the determinants of PA and SB during early retirement in Ghent, Belgium. Using a qualitative content analysis, the authors found that all retirees experienced a change in their SB. This was dependent on their previous activity behaviour during employment. Participants felt they had decreased the use of sitting time during transport and engaged in active transportation.

Eklund *et al.* (2021) recruited 14 retiree participants living in Sweden whose ages ranged from 64 to 75 years. They used a phenomenological approach to understand the meaning of SB for people going through the retirement transition. Participants in their study identified SB as related to ill-health, and as something to be avoided. The authors identified three typologies: 1) meaning of SB in retirement, 2) the shadow of involuntary SB, and 3) postponing SB. The meaning of SB changed with retirement. Retirement was a full-time vacation and SB was used to rest from pain. SB was balanced with PA, and lack of it resulted in being unhealthy. Prolonged SB influenced mental health, with loneliness being an attribute that led towards the development of long periods of sedentary time. Participants who were physically active viewed SB as something to use to recover after being active. Efforts to avoid SB and be active were expressed by those trying to postpone SB. SB was seen as something caused by the ageing process. The authors (Eklund *et al.*, 2021) concluded that the routine developed with the retirement transition need to be understood as part of life long behaviours.

Based on the literature, it can be concluded that there are changes in SB during the retirement transition. The magnitude of change varies by measurement and type of activities measured. The majority of studies found that there is an increase in television viewing. These changes were influenced by SESs, which reflects the type of occupation one used to have. The meaning of SB to an individual can possibly change with retirement transition however, this is not well studied.

5. Gaps identified in the literature

Based on the literature search undertaken three knowledge gaps have been identified 1) how the retirement transition could influence PA and SB, 2) a lack of longitudinal research on how retirement influences SB, and 3) no research at a Maltese national level on retirement and its influence on PA and SB. These are explored further down.

1) The retirement transition has been presented as an adjustment period (Wang and Shi, 2014b). The stance of using the resource-based dynamic model considers the adjustment period based on the resilience and resources a person has; be they social, financial, physical, emotional or cognitive, until the individual adjusts into the new social situation (Wang *et al.*, 2011). This perspective of retirement portrays the adjustment period as an individualised process with no one directional pattern. In trying to understand changes in PA and SB the current literature does not integrate the changes which take place and how people experience these changes.

2) Few studies have researched how the retirement transition might influence PA and SB behaviours concurrently in the same population group. Socci *et al.* (2021) was the only study (to the author's knowledge) who followed people through their retirement experience, and how this could have influenced their PA behaviour. However, Socci *et al.*'s (2021) measurement of PA did not use any standardised tool and considered PA intensities only, and not PA domains. One

gap in the literature pertains to the apparent absence of studies that seek to understand the retirement transition, and its influence on SB in a longitudinal approach.

3) The last gap in the literature is the lack of knowledge on how PA and SB changes for retired individuals on a national level in Malta. The retirement transition is understood to be influenced by several factors such as social aspects and the systems regulating social security in the country. At the same time, PA and SB seem to be consistent but cultural variations have been noted. Most of the literature on these changes emanates from the US and the larger countries in Europe. There have yet been no studies, to this author's knowledge, that have emerged from small states.

The civil service is a major employer in Malta with 17% of the labour force population working for it (National Statistics Office, 2017). The Maltese Civil Service has supported the health of employees via the Employee Support Programme (ESP). Through this programme, various initiatives have taken place such as education on PA at the workplace, psychological support, and other initiatives which look at the employee holistically. Retirement might be considered as the final step of an employee's life and the end of the employer/employee relationship. As retirement is changing employees need support with transitioning into retirement (Phillipson *et al.*, 2019).

6. Research question, aims and objectives

Based on the gaps identified in the literature, as well as considering time and financial constraints, the following research question was developed:

Research question: Does the retirement transition influence PA and SB in Maltese civil servants; and how can the retirement transition influence these health behaviours?

By the end of this research programme of research as part of the PhD the aims were to:

1. Identify recent prevalence and trends of PA and SB in the Maltese population, pre- and post-retirement.
2. Identify PA and SB changes in Maltese civil servants that result from retirement.
3. Identify predictors of retirement transition induced changes in PA and SB in Maltese civil servants.

The research aims were met through the following objectives:

- A. Undertake secondary analysis on a national dataset to describe physical activity prevalence and trends in Maltese older persons around retirement age.
- B. Identify barriers and motivators to PA in middle aged persons (50-64 years) and older persons (65-70 years) through the completion of a systematic review examining previous literature.
- C. Translate survey tools into the Maltese language and examine their reliability.
- D. Assess changes in PA and SB across the retirement transition using the translated Maltese language survey tools.
- E. Explore predictors of any changes using the survey and semi-structured interviews.

Table 4 below explains how the papers to address the above aims and objectives were part of the PhD.

Table 4 *List of studies published and under review*

	Study 1	Study 2	Study 3	Study 4	Study 5	Study 6
Paper titles	Physical Activity Behaviour in 50- to 74-Year-Olds: Differences between Employed and Retired Individuals	Barriers and Motivators of Physical Activity Participation in Middle-Aged and Older Adults—A Systematic Review	Translation of the International Physical Activity Questionnaire to Maltese and Reliability Testing	Psychometric testing of the Maltese versions of the Exercise Benefits/Barriers Scale and Exercise Motivation Inventory – 2	“It is Easy to do Nothing and Easy to Sit Down”: Perceptions of Physical Activity and Sedentary Behaviors During Pre-retirement	Mixed methods study submitted to the International Journal of Environmental Research and Public Health
Aim & Objective addressed	1 + A (Ch. 4 SEC. 1)	B (Ch. 4 SEC. 2)	C (Ch. 3 SEC. 3)	C (Ch. 3 SEC. 4)	3 + E (Ch. 5 SEC. 2)	2 + 3 + D + E
Participants / Data sources	Secondary analysis from Health Interview Survey	Published literature	People aged 18 to 69 years.	People aged 18 to 69 years.	Pre-retirement civil servants	Civil servants 60 years of age and over.
Number of participants / data source	4690	55 (articles)	115	115	20	QUAL 19 QUAN 39
Type of analysis	Multilevel analysis	Narrative analysis	Reliability testing	Validity + reliability testing	Reflexive thematic analysis (RTA) + structural narrative analysis (SNA)	RTA + SNA + inferential statistics
Findings/Outcomes	Being retired, male, with a low BMI, of a young age, and with a good self-rated health, were found to predict PA behaviour. However, these were not strong predictors	Identified barriers were similar, but there were differences in the motivators between the two age groups.	Translated version of the MT-IPAQ-long is reliable.	Maltese version of the EMI-2 has acceptable test re-test reliability, internal consistency, and concurrent validity.	Past experiences and the discernment process of retirement were identified as influence of PA after retirement.	Total PA and SB no change. Retired had higher total PA, non-retired had higher SB. Participants commented that PA changes were inevitable with retirement as there is an adjustment process. They also commented that they expected to sit more when they retired.
Software	IBM SPSS©	Microsoft Excel	IBM SPSS©	IBM SPSS©	NVivo 13	NVivo 13 + IBM SPSS©

7. Theoretical underpinning

To understand health behaviours, a theoretical perspective needs to be considered (Nilsen, 2015). Changes in health behaviour need to be understood as part of a theoretical perspective for findings to be practical and allow for use in interventions. There is no one theoretical approach which is agreed upon by experts (Lynch *et al.*, 2018).

The Theoretical Domains Framework (TDF) can be used to identify influences on behaviour (McGowan, Powell and French, 2020). The benefit of using a framework over a specific theory is that PA and SB are different health behaviours with different determinants (Noar, Chabot and Zimmerman, 2008). Theories like the Health Belief Model (Champion and Skinner, 2008), or self-determination theory (Ryan and Deci, 2017) consider a mechanism for how change occurs. A framework describes determinants which can act as barriers or facilitators for a behaviour change to occur (Nilsen, 2015). Using a framework to guide the programme of research need not be restrictive and limit the researchers' thinking (Francis, O'Connor and Curran, 2012). Even though frameworks might consider various theories when being developed, being too rigid might limit or overreach the findings. The TDF is a well-known and highly used framework which can facilitate inclusion of different determinants; however, it does not specify relationships between the determinants (Francis, O'Connor and Curran, 2012).

The TDF was developed with the aim of improving the use of behaviour change theories by creating a framework which integrates concepts from various theories (Michie *et al.*, 2005). The use of theories in interventional studies around the retirement period was used by fewer than two-thirds of studies identified in a systematic review of interventional studies around retirement age (Baxter *et al.*, 2016). Studying the retirement transition using a framework will make the

findings useful and provide a tool to integrate findings within a practical application. The TDF was developed in 2005 but later refined by checking its content validity (Cane, Connor and Michie, 2012). The final model consists of 14 domains each of which has various constructs (Table 5).

Table 5 *Theoretical domain framework domains and definitions: adapted from Cane et al. (2012)* Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7(37), 1–17. Pg 13

Construct	Definition
1. Knowledge	An awareness of the existence of something.
2. Skills	An ability or proficiency acquired through practice.
3. Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting.
4. Beliefs about capabilities	Acceptance of the truth, reality or validity about an ability, talent, or facility that a person can put to constructive use.
5. Optimism	The confidence that things will happen for the best or that desired goals will be attained.
6. Beliefs about Consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation.
7. Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus.
8. Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way.
9. Goals	Mental representations of outcomes or end states that an individual wants to achieve.
10. Memory, attention, and decision processes	The ability to retain information, focus selectively on aspects of the environment, and choose between two or more alternatives.
11. Environmental context and resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour.
12. Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours.
13. Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event.
14. Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions.

8. Chapter Summary

This chapter has reviewed the literature pertaining to PA, SB and retirement transition. Based on the literature identified, there were few known determinants for these health behaviours, due to the complexity of the behaviours and lack of longitudinal studies undertaken. Older populations have not been researched as much as other age groups when examining PA and SB determinants. The second section discussed literature on life events and adapted the operational definition of retirement and retirement transition to be used in this PhD. Retirement was considered from a self-assessment perspective, while a resource-based dynamic approach was adapted for the retirement transition.

The chapter has identified how PA and SB are influenced by the retirement transition. PA seems to increase after retirement, while SB also seems to increase, especially television viewing. It was determined that different SESs and genders are influenced differently by retirement, and adopt particular PA and SB patterns. Older people's perspectives on how retirement influences these health behaviours and motivation are areas which were not frequently considered in studies. No national research on the situation in Malta was found. The gaps in the literature led to the development of the research question, aims and objectives for this PhD. The studies and findings that have met these objectives have been published in peer reviewed journals or are under review for future publication. These are presented in the next chapters as has been identified in Table 4. The next chapter justifies the philosophical underpinnings of how the research was undertaken. This is based on the researcher's positionality and the need to adopt a mixed methods approach to answer the research question using a qualitative and quantitative paradigm.

Chapter 3 Methodology and Methods

Section 1. Methodology

It is pertinent to discuss the methodological approach used in the programme of research for the PhD. The need for a mixed methods (MM) approach to research has to be dictated by the research question (Tashakkori and Creswell, 2007), which was developed based on the literature gaps discussed in Chapter 2. A short reflection of the values which influenced, the different approaches within mixed methods will be discussed. The approach chosen and the rationale for using it will be provided. This leads into the methods section, which is based on the methodology. This section presents the methods used for the main mixed-methods study and the results from two published papers about the psychometric properties of the translated tools into Maltese.

1. The research process

Each approach to the research project requires a justification, and these justifications need to be set at the outset (Crotty, 2015). The approach brings with it assumptions about reality and the way knowledge can be created. The research project needs to be defined in terms of epistemology, theoretical perspective, methodology, and methods (Crotty, 2015). In the MM literature, the term paradigm is used to incorporate the epistemological stance, and the theoretical perspective, and/or the methodology. The term ‘paradigm’ was coined by Kuhn to describe an approach to research within a research group (Kuhn, 2012). Using Crotty’s approach to the development of the research proposal instead of the paradigm approach makes a distinction between the philosophical stance informing the method and theory of knowledge within the theoretical perspective (Koro-Ljungberg *et al.*, 2009).

2. Research questions

Research question: Does the retirement transition influence PA and SB in Maltese civil servants?
and; How can the retirement transition influence these health behaviours?

By the end of this research programme, the aim was to:

1. Identify recent prevalence and trends of PA and SB in the Maltese population pre- and post-retirement.
2. Identify changes in PA and SB resulting with retirement in Maltese civil servants.
3. Identify predictors of any changes in PA and SB with the retirement transition in Maltese civil servants.

3. Context

Contextualising, Malta is a relatively small island with a total population of 515,000 within a total area of 316 km². The Maltese public service has a total of approximately 40,000 employees making it the biggest employer in the country. Being a professional working within the public sector for the past 12 years, has provided the researcher with understanding of the work ethos and approach taken within the organisation. This makes the researcher an ‘insider’ to the research population being studied.

As reflected upon in Chapter 1 in the medical field, the positivist approach is predominant. Experiments are the gold standard to identify what works and what does not. The gerontological background, however, brings with it the importance of the social aspect and the individualistic side, which is based on a more interpretative paradigm. These two approaches are both present in the researcher’s background. Academics within the PhD supervisory team also come from

different perspectives and backgrounds, strong on different sides of the research continuum. An academically stimulating debate was presented in the literature review to decide which research approach is best. This led to what is called the ‘paradigm war’ (Alise and Teddlie, 2010). As there was a shift in the beliefs of social researcher and behavioural scientists, a debate developed on which belief system is best. One of these paradigm wars is between the quantitative and qualitative approaches. The MM approach has been identified as the third research paradigm the could possibly bring an end to the paradigm war, as it tries to integrate both sides together (Johnson and Onwuegbuzie, 2004).

4. Mixed methods

In research, different philosophical viewpoints have been in existence since Plato and Protagoras of Abdera (O’Brien, 2017). Aristotle had proposed two different methods of developing knowledge: one inductive and the other deductive (Teddlie and Tashakkori, 2009). An inductive style focuses on individual meaning, while a deductive style builds on general statements and hypotheses (Creswell, 2009). Research science became more defined with the scientific revolution. Philosophical discussions on epistemology became focused and influenced the way science was carried out. In the 19th century August Comte developed the word ‘positivism’. This was the chosen approach for behavioural scientists in an attempt to replicate the natural sciences (Alise and Teddlie, 2010). Ideologies based on constructivism developed later on. They focused on the importance of the subjective meaning and human experience in the human sciences. In the 1950s and 60s this became an alternative vision to positivism. This led to the paradigm war between qualitative and quantitative approaches. In response to this, in the 1990s, MM started developing (Teddlie and Tashakkori, 2009). As cited by Teddlie and Tashakkori (2009) the first study credited as being MM was by Donald Campbell and Donald Fiske, undertaken in 1959.

The authors had suggested the use of at least two methods to collect data on the same trait to enhance validation. The term triangulation (in which two sets of data—quantitative and qualitative—forming two points of a research triangle converge into the third to reach a conclusion) was coined by Charles Webb in 1966. This was seen as a way for different methods to complement each other. Norman Denzin introduced the role of the paradigm when mixing methods and highlighted the difficulty in using different paradigms within the same research (Teddle and Tashakkori, 2009).

MM can be both a method or a methodology (Creswell *et al.*, 2006) and there are still disagreements in the field on certain definitions (Teddle and Tashakkori, 2012). MM research has been defined as:

“research in which the investigator collects and analyses data, integrates findings and draws inferences using both qualitative and quantitative methods in a single study or program of inquiry” (Teddle & Tashakkori, 2009, p. 7).

What is agreed within the field is that mixing should not be limited to numerical/narrative character of the method but integrated at other levels (Somekh and Lewin, 2004). MM goes beyond the concept of triangulation (Greene, 2007). Mixing can occur concurrently at three different levels: method, methodology and paradigm (Greene, 2012). The complexities of human phenomena justify this mixing. The questions and challenge of this approach is the possibility of mixing at paradigm level (Somekh and Lewin, 2004). Within MM the terms QUAL and QUAN are used to differentiate between the qualitative and quantitative approaches (Morse, 1991). The capitals within the nomenclature denominate the priority. A symbol between the two is included to indicate the type (sequential, simultaneous or embedded) (Teddle and Tashakkori, 2006).

5. Mixed methods paradigm

Within the research continuum, MM can be situated and used anywhere on the continuum presented in Figure 3.



Figure 3 *Research Continuum*

Different philosophical approaches have been put forward to identify and advocate for MM.

These are post-positivism, critical realism, constructivism, pragmatism, transformativism, and the dialectical approach (Teddlie and Tashakkori, 2009; Shannon-Baker, 2015). Using a theoretical framework was suggested as a possible approach within MM (Greene and Caracelli, 1997). These approaches are based on Anglo-European philosophies. A new approach which is being advocated is the yin-yang approach based on Eastern philosophies (Fetters and Robin, 2018). While most of these approaches take a one-sided stand to their epistemological stance, the dialectical and the yin-yang philosophies believe that the two approaches can co-exist and build on each other's weaknesses to gain a better understanding of complex phenomena.

6. Dialectic Approach to Mixed Methods

The dialectical stance argues that two or more philosophical approaches (paradigms) can be used in the same study in a respectful dialogue. The aim is to look at the differences and gain new understandings. The dialectic approach is a framework and not a paradigm. It is an approach on how two equally weighted theoretical perspectives can come together (Teddlie and Tashakkori,

2009; Shannon-Baker, 2015). This was first identified by Greene and Caracelli (1997). They said that paradigm differences are important but, through synthesis of methods richer and more accurate designs can be obtained. They suggested mixing post-positivist and interpretative paradigms through a process of dialectical tacking.

The aim is to get to a deeper meaning rather than a situational response. In their book Greene and Caracelli (1997) highlight examples from a research project in 1987, which combined ethnography with quantitative work. The authors suggest that differences between subjectivity-objectivity and relativism-realism should be acknowledged but contrasts, conflict and tension should be worked through to generate an integrated synthesis, which is both generative and grounded in people's lives (Greene and Caracelli, 1997). Aware of the criticism of combining epistemologies they suggested focusing on the value such research can contribute towards society (Greene and Caracelli, 1997). The discussion around whether epistemologies can be combined is still ongoing. Building on the work of Greene, the idea of working with 'mental notes' was put forward as a way to combine the two paradigms while at the same time avoid using epistemological terms (Greene, 2007; Shannon-Baker, 2015). In proposing to use mental notes the authors relate more to a pragmatic, rather than dialectical, approach in using MM.

A dialectic approach can be used because both epistemologies have their limitations. It is acknowledged that all philosophical assumptions are not fully justified (Somekh and Lewin, 2004). The post-positivist perspective is criticised because of trying to reduce social phenomena to simple things. Value-free or culture free knowledge is impossible, and statistics can be a cause of misinterpretation (Scotland, 2012). The interpretive perspective is criticised for three things: problems of transferability, the research use of subjectivity when interpreting the data, and the possibility of the research becoming regarded as objective reality is validated (Scotland, 2012).

Using these two perspectives might seem contradictory at first but, by using them together, better insight can be gained than using only one (Moffatt *et al.*, 2006). Together, they can give more insight than each individually can, resulting in more than the sum of their respective counterparts. When comparing the results from the two perspectives, difference, complementarity (Moffatt *et al.*, 2006) or diffraction (Uprichard and Dawney, 2019) might be obtained, which can lead to further exploration, questions or confirmation of results. Using the dialectical approach is a response to critics of MM who dubbed it as 'post-positivism dressed in drag' (Giddings, 2006, p. 198). MM is critiqued for going with 'what works' and ignoring philosophical discussion (Giddings, 2006). According to a review of the use of MM in health service by O'Cathain, Murphy and Nicholl (2007) the what works approach is evident in studies reviewed. Johnson *et al.* (2017) argued that MM was used in a pragmatic way, without well thought out philosophical pragmatism. In O'Cathain, Murphy and Nicholl (2007) review, only a third of the research provided justification for using MM. The qualitative role was not commonly used as the main role and conversion of results was rarely undertaken. The authors concluded that MM was seen as an opportunity to tap into funding. Using such an approach downgrades qualitative approaches to a secondary status. When looking at different disciplines other than health, the use of post-positivism was as high as 90% (Alise and Teddlie, 2010). This highlights Giddings's (2006) concerns that MM is lowering qualitative research to secondary status. The dialectical approach justifies creation of knowledge from different philosophical perspectives but at the same time considers them equal.

The concept a of dialectic was re-advocated for and improved upon recently by Johnson (2017), who called a metaparadigm of dialectical pluralism. Dialectic pluralism is a form of dynamic logic of thesis, antithesis and synthesis (Johnson, 2017). This is based on Plato's *elenchus*, a

method of cross-examination for the purpose of enlightenment (Betzner, 2008). According to Johnson (2017), pluralism can occur at different levels: ontology, epistemology, and axiology. He argues that the ontological disagreement in research is not a metaphysical one, but about how one should 'carve reality'. Within an ever-changing social world, ontological disagreement can be overcome by looking at reality from a macro (objective), meso (intersubjective), and micro (subjective) perspective. At an epistemological level, mixing can occur because of the fallibility of knowledge. In the axiological aspect, social researchers have to evaluate the different values and ethical consideration each project brings (Johnson, 2017). Taking this approach would generate knowledge through a cyclical process of deductive and inductive processes.

Using the approach of dialectic pluralism this research project will consider two strands. One strand, called QUAN, considered an objectivist epistemology, and a post-positivist perspective. The other, called QUAL, is a social constructionist epistemology together with an interpretative theoretical perspective.

a) QUAN strand

Positivism is based on a realist ontology and objectivist epistemology. Realists believe that there is a reality out there and the researcher needs to find it. Reality exists independently of the researcher (Crotty, 2015). This leads to an objectivist epistemology, which holds that absolute knowledge exists and comes in the form of objective reality, so the researcher must be impartial to discover. Positivism is based on the research assumptions of determinism, empiricism, parsimony and generality (Cohen, Manion and Morrison, 2018). For example, Popper's 2nd principle of falsification suggests that no theory can ever be proven, so all statements must remain tentative forever. Post-positivism was thus developed to address the criticism of

positivism (Grant and Giddings, 2002). Post-positivism has a critical realist ontology and a modified dualist objectivism (Teddlie & Tashakkori, 2009). Reality can only be approximated, and this can be done through research and statistics (Creswell & Plano Clark, 2011). The post-positivist researcher needs to be a pure scientist and needs not to be influenced by practical or political controversies (Greene, 2012).

Post-positivist research is based on the following assumptions:

- Social reality is stable and based on pre-existing patterns (Grant and Giddings, 2002)
- Researcher are the experts and need to be value free and reduce bias (Grant and Giddings, 2002).
- Interaction with subjects needs to be kept to a minimum (Creswell & Poth, 2017; Scotland, 2012)
- Reality exists independently of the research (Scotland, 2012)
- The aim is to understand causal relations (Scotland, 2012)
- Society is stable (Gray, 2004; Crotty, 2015)
- Logic is deductive (Gray, 2004; Crotty, 2015)

This theoretical understanding was used to develop a cohort observational design. It was used to describe changes in PA and SB during the retirement transition and to analyse these in relation to other possible variables identified in the literature (Bonita, Beaglehole and Kjellstrom, 2006).

b) QUAL strand

The interpretative theoretical perspective is based on a social constructionist epistemology. According to this view, all meaningful reality is constructed through and between human beings and transmitted within society (Crotty, 2015). This approach involves both objective and subjective reality (Figure 3). Social constructionism is different from subjectivism in that it focuses on the interaction between people and the object, not the meaning imposed by subjects

on objects (Crotty, 2015). The ontology is based on relativism. There are multiple realities which exist, even if some of them are shared amongst individuals or cultures (Teddlie and Tashakkori, 2009). All knowledge created is value-laden, value free knowledge is not possible (Creswell & Poth, 2017; Scotland, 2012). Knowledge is constructed together with participants, with the aim of understanding the experience (Greene, 2012). This approach is ideal to explore complex social phenomena (Pluye and Hong, 2014).

Interpretative research is based on the following assumptions:

- Multiple realities exist (Creswell & Poth, 2017; Scotland, 2012).
- Logic is inductive (Creswell & Poth, 2017; Scotland, 2012).
- Knowledge is value laden and context specific (Creswell & Poth, 2017; Greene, 2012; Scotland, 2012).
- The world and knowledge are not independent for each other (Scotland, 2012).
- Value free knowledge is not possible (Scotland, 2012).

This study used a narrative approach to gather experiences on retirement, physical activity and sedentary behaviour (Creswell & Poth, 2017). Narrative methodology has many forms and can take different perspectives depending on the framework used by the researcher (Andrew *et al.*, 2013; Creswell & Poth, 2017). There is no single definition of narrative (Riessman, 2008). It focuses on the experience and lived experience told by individuals (Webster and Mertova, 2007). When telling stories people talk about their social interactions. These can be used to discover how meaning is constructed (Riessman, 2008). People tend to tell stories all the time, as narration is an elementary form of human communication (Bauer and Gaskell, 2003). Narrative inquiry tries to understand the meaning people give to their stories (Anderson, Kirkpatrick and Anderson, 2016). During a narrative interview people recall their experiences, put them in sequence, find possible explanations, and re-play the chain of events. Story telling is performed

by members of all classes of education (Anderson, Kirkpatrick and Anderson, 2016). This makes it ideal to research participants from different educational backgrounds, which the study set out to do. At the same time stories limit the research to what the interviewer chooses to say and what is most important to the participant (Webster and Mertova, 2007; Anderson, Kirkpatrick and Anderson, 2016).

7. Rationale

The aim of this PhD was to understand how the retirement transition influences and changes PA and SB and why such changes might occur. Given that there are two aspects: ‘does it occur?’ and ‘why does it occur?’, the dialectic approach was reasoned to be a better fit for answering the questions. The philosophical approach helped direct how to seek answers to questions (Creswell & Poth, 2017). When philosophical assumptions are not made explicit, the research process can get side-tracked and the research design can appear random, uninformed and unjustified (Koro-Ljungberg *et al.*, 2009). If this happens assessing the validity of the study would not be possible (Scott and Briggs, 2009). One would be unable to assess the way knowledge was created, the ethical principles involved, the researcher-participants relationship and the value judgement applied (Carter and Little, 2007). This dialectical approach to the research as part of the PhD was preferred to the pragmatic, what works approach, even though the pragmatic approach is considered a valid approach to developing knowledge if one follows Thomas Kuhn’s communities of practice (Denscombe, 2008). However, what makes a research process ‘quantitative’ or ‘qualitative’ is not the actual method or the variables being collected but the way the study is assessed for its quality, such as validity or trustworthiness, which goes back to the epistemology (Crotty, 2015). By using this approach, the two strands will be assessed for their quality using different criteria. The project aimed to provide a valid understanding of the

complex phenomenon of PA and SB within the context of employees in the Maltese civil service during their retirement transition.

8. Research Design

There are various authors who have proposed different typologies for MM. The typologies by Teddlie & Tashakkori (2009) were used in this research project. The study type will be sequential and embedded at different levels, with both strands being considered equal. Figure 4 represents the design being used. The research will consist of the two strands QUAN and QUAL, with separate epistemologies directing the methods, sampling, and data analysis. Validity, rigour, and trustworthiness of the strands will also be guided by the epistemology. As described previously, the QUAN strand of the study was based on an objectivist epistemology, post-positivist theoretical perspective or paradigm and a prospective-cohort method. The QUAL strand was based on a social constructionist epistemology, an interpretivist theoretical perspective and a narrative method. Integration took place at the sampling stage, with the QUAN strand feeding the QUAL strand during the analysis phase and interpretation (Spiteri *et al.*, 2018). The dialectical aspect was present in the way the results were merged for an understanding of the phenomena being studied. The way these were transposed into the study are discussed in the next section about the methods.

	QUAN strand	Integration	QUAL strand
Epistemology	Objectivist		Social Constructionist
Theoretical Perspective	Post-positivist		Interpretivism
Method	Prospective cohort		Narrative
Sampling	Total population	⇒	Quota
Tool	Survey		Interview
Type of Data	Quantitative		Qualitative
Analysis	Descriptive, Inferential statistics	⇔	Reflexive thematic analysis, Structural narrative analysis
Interpretation		Dialectical	

Figure 4 *Research design of dialectical mixed method study*

9. Summary

The methodology section described and discussed the philosophical underpinnings, which led to the research design being adopted. Two strands are being used: QUAL and QUAN. Both have been given equal importance. This was done by using a post-positivist approach for the QUAN strand and an interpretative approach for the QUAL strand. In the next section the methods and quality criteria for each strand will be discussed.

Section 2. Methods

This section describes the methods used in the main study. The methods employed kept fidelity to the research methodology discussed in the previous section. To reach the aims of this study, a dialectical mixed-methods approach was adopted, which translated in having two research strands i.e., qualitative (QUAL) and quantitative (QUAN). These are reported separately in this chapter. The mixing of methods occurred at the sampling phase, with interview sampling being based on the survey data collected, and then in the data analysis and interpretation phase (Teddle and Tashakkori, 2009; Bazeley, 2018). Even though the two strands were kept separate during

the study they were integrated to achieve a mixed-methods (MM) design (Teddle and Tashakkori, 2009). The research protocol for this study was presented at the Mixed-Methods International Research Association conference in Austria (Spiteri *et al.*, 2018). Attendance at this conference provided the researcher with an opportunity to network and engage with experts who provided feedback which then informed the methods and programme of research.

The MM study design followed a sequential QUAN → QUAL design, with both strands being considered equal. The research design was presented in Figure 4, which links the method to the study to the philosophical underpinnings discussed in the previous section.

1. Quantitative strand

The quantitative strand was a two-year longitudinal cohort study. The study collected data using standardised questionnaires. The International Physical Activity Questionnaire - long version (IPAQ-long) (IPAQ group, 2016; Spiteri, Grafton, *et al.*, 2021) was used to collect data on PA and SB. The Exercise Motivation Inventory version 2 (EMI-2) (Markland and Ingledew, 1997) was used to measure motivation towards PA, and open-ended questions were used to list barriers towards PA in the two weeks preceding data collection (Brittain *et al.*, 2012). Demographic information on age, gender, time to retirement, and government scale (which determines hierarchy and pay) were collected.

The questionnaires were available in both Maltese (due to translation) (Appendix 1) and English, for all participants to choose which language they prefer to respond in. Within the studied population English is understood by all (although to varying degree), as some knowledge of the language is a compulsory requirement to work in the civil service. However, some prefer communicating in Maltese while others have only perfunctory understanding of English. The

Maltese versions of the questionnaires ensured that participants whose preference is Maltese or who do not understand English well are not excluded. Work relating to translating the questionnaires are presented at the end of this chapter.

a) Sampling

The retirement age within the Maltese public service when starting the study was between 63 and 65 years of age depending on the participants' date of birth. As the retirement transition has no fixed beginning, it was decided to consider all participants at the age of 60 years or above to be eligible for the study. The decision to use this as a cut off was based on the reviewed literature and through discussion and debate with the supervisory team. As aforementioned, the retirement transition has no consensual beginning or ending. Some studies have used the age of 50 years as the start of the retirement transition. However, being aware of the decline in PA participation with age and possible cultural variation of PA and SB, including people over the age of 60 years was deemed appropriate to minimise influences of confounders on the data.

The total number of possible participants was 890 civil servants. From these, about 100 were expected to retire, according to data provided by the Institute of Public Service (IPS), which coordinates research within the civil service. Figures were not exact, as people had the option to retire beforehand if they had contributed enough tax contributions to receive a pension. Civil servants could ask for a one-year extension of service depending on their type of employment. This is granted on a case-by-case basis.

For the cohort study, invitations were sent to all people employed within the public service who were 60 years of age and over. Within the sample, there was a part of the population which was exposed to retirement and another part which was not. Data on potential confounding factors

which could impact PA and SB behaviour, such as gender, and marital status were obtained. Each participant acted as one's own control.

From the total population, 121 were eliminated because the email address provided was not valid. This brought the total number of eligible participants to 769. Participants were contacted through a third party, after obtaining permission to access participants from the IPS and ethical approval from Sheffield Hallam University (no. ER9249191) [Full ethical details are discussed later in the section]. Upon being contacted on their official government email address participants were provided with a recruitment email explaining the study, and email links to the consent form, followed by the questionnaires. Three reminder emails were sent to the participants. Participants were sent reminder emails of their participation mid-way through the study to maintain engagement and improve participant retention. At follow-ups participants were contacted through the provided details within the questionnaire. Up to three reminders, two weeks apart, were sent as follow-ups when participants did not respond.

b) Tools

The tools used to collect data from the survey were based on the literature review and systematic review previously undertaken and presented in Chapter 4. Within the literature review it was identified that one of the main limitations in assessing PA behaviour from pre- to post-retirement was that questionnaires do not measure PA within different domains. Depending on the type of employment PA at work might contribute to various degrees of the total PA (Barnett, Ogilvie and Guell, 2011). Using a generic PA questionnaire which either does not distinguish between the different domains or measures only leisure time PA makes it unable to identify any changes in PA behaviour in the various domains. The IPAQ-long is a self-report questionnaire which has

been widely used in the literature and measures PA in different domains, together with sitting time on weekdays and weekends.

The benefits of using this tool off set the drawbacks of using a long self-report tool. It could be argued that using a device-based measure might be deemed more valid. However, both methods of measurement have a degree of subjectivity and measure different aspects of PA (Troiano *et al.*, 2012). The IPAQ-long measures bouts of ten minutes activity, while the device-based method measures any PA which involve movement in a plane, but might not differentiate between activities such as swimming and cycling, unless a diary is used in conjunction. Any self-reported measure might be biased towards over estimation due to recall bias, possible answer providing a perceived socially desirable response and difficulty in gauging intensities (Loney *et al.*, 2011). The subjectivity of device-based methods is within the cut-off points used by researchers to carry out the analysis (Troiano *et al.*, 2014). Having a device worn to measure PA behaviour might also influence said behaviour. Considering these aspects, and the financial limitations of this study it was decided to use a self-reported measure.

The psychometric properties of the IPAQ-long are well known as it has been widely researched. The IPAQ has been translated into more than 20 different languages (IPAQ group, 2019) and the English version has a concurrent validity between 0.26-0.39 (Craig *et al.*, 2003). Various other authors (Pedišić *et al.*, 2011; Helmerhorst *et al.*, 2012; Mannocci *et al.*, 2014; Kalvenas, Burlacu and Abu-Omar, 2016) have checked the validity of IPAQ-long in other languages with device-based measures and obtained similar results. The reliability of IPAQ-long using the ‘last seven days’ as recall probe is (CC = 0.79) (Doma *et al.*, 2017), whilst that of the Maltese version has been (CC = 0.83) (Spiteri, Grafton, *et al.*, 2021) (see Section 3).

The EMI-2 questionnaire was identified in the systematic review carried out on barriers and motivators (see Section 4) as the most widely used tool to assess motivation. Motivation is the impetus that moves people to do something (Ryan and Deci, 2000; American Psychological Association, 2022). It is a hypothetical construct used to describe internal and/or external forces which makes people initiate, direct, intensify or persist in a type of behaviour (Keegan *et al.*, 2016). Motivation is described across a spectrum with three constructs 1) amotivation, 2) intrinsic motivation and 3) extrinsic motivation (Deci and Ryan, 2002). Intrinsic motivation is when engagement in an activity is based on pleasure and satisfaction obtained from the activity. Extrinsic motivation is when an activity is carried out for instrumental reason. Amotivation is when a person does not show any motivation. The concept of motivation can be abused when the term is poorly defined in publications (Plonczynski, 2000).

The EMI-2 questionnaire is based on the self-determination theory by Deci and Ryan's (1985) which identifies motivation as either being intrinsic or extrinsic (Markland and Ingledew, 1997). The instrument measures motivation on 12 scales of different types of motivation. The test re-test reliability of the initial questionnaire ranged from CC 0.59 to 0.88 over a four to five week period (Markland and Hardy, 1993). The internal consistency of the questionnaire was improved in the second version with Cronbach alpha scores being 0.85 to 0.91 for the different scales (Markland and Ingledew, 1997). This was similar to those obtained in the Maltese version as shown in Section 4. The benefit of using the EMI-2 was that it is based on a theoretical underpinning of motivation and given its use within the literature it allowed for comparison with other studies.

Based on the results of the systematic review presented in Chapter 4 Section 2, the Exercise Benefit Barrier Scale (EBBS) was identified as the tool to collect data on exercise barriers within

the cohort study. The EBBS is the most frequently used tool within the literature, therefore, its choice allowed for comparison with other studies. As with the measurement of motivation, the measurement of barriers towards exercise was varied, with multiple tools available. During the reliability study, it was noted that including the IPAQ-long, EMI-2 and EBBS in the survey made the questionnaire too long, which could have impacted compliance due to participant fatigue and/or monotony. The total questionnaire length of all the three tools was over 120 questions. After reviewing the literature and exploring in detail the definition of the constructs under study, it was decided that the measurement of motivation is a broader and more complex construct to measure than mere barriers. Using open ended questions to measure barriers towards planned PA is considered appropriate and relevant to the participants' circumstances (Gyuresik *et al.*, 2009; Brittain *et al.*, 2012). Using a list of pre-defined barriers might not capture barriers which are specific to the population under study (Brawley, Martin and Gyuresik, 1998).

c) Data analysis

The survey data was collated online using the Qualtrics platform at SHU and CU, which were approved by both universities for data safety and European Union's General Data Protection Regulations (GDPR) compliance. Questionnaires which were collected via hard copy were inputted into the online platform to obtain one spreadsheet when the data were downloaded. At the end of the data collection period, the data were downloaded from the online platform onto an Excel spreadsheet. All data were pseudo-anonymised on the working data sheet. Each participant within the survey was provided with a participant number linked to the participant's name and date of birth. This was done to allow for data linking at follow-up stage. The list was kept within the university online safety depository Q-drive (SHU) and OneDrive (CU).

The IPAQ-long was analysed following the guidelines provided by the IPAQ expert group (IPAQ group, 2016). PA behaviour was assessed as a continuous variable in MET min per week and IPAQ categories. Descriptive statistics using mean and interquartile ranges were carried out for the pre- and post-data. Descriptive analysis for EMI-2 was done using mean values and total score. Continuous data were tested for normal distribution using the Shapiro-Wilks test. If data were not normally distributed, data transformation was attempted using log and data re-tested for normal distribution. If data were not normally distributed, non-parametric equivalent tests were used.

The population was divided into two groups, those who were going to retire within less than a year, and other participants who were planning to continue working. Any statistical difference between the two groups on the total amount of PA and the different PA domains was checked using the independent T-test. Chi square was used to assess for difference by education and marital status. All data were analysed using SPSS (version 26) and the alpha level of significance was accepted as $p < 0.05$. At follow-up statistical differences between those who retired and those still in employment were checked.

Analysis of barriers towards PA was done descriptively. The barriers listed were grouped based in the type of barrier listed examples were weather-related (too hot or rain) and health related (pain or sickness). These were described descriptively for the total population. Differences between groups were assessed by the number of barriers listed and the presence or absence of identified barriers.

2. Qualitative strand

The qualitative strand consisted of a two-year follow-up study with two data collection points. The first set was taken between six months to one year pre-retirement and the other data set was collected two years after the initial one. The study used semi-structured interviews within a narrative approach by encouraging participants to use their own stories to describe their retirement experience. The interview questions were based on the Theoretical Domain Framework (TDF). The participants for the study were recruited via the survey carried out with all civil servants who were 60 years of age or older. The interviews were conducted in Maltese or English depending on the participants' preference. Data were analysed using reflexive thematic analysis and structural narrative analysis. This was done to carry out data analysis triangulation. Results from the analysis were then merged using an XY table.

a) Sampling

Recruitment of participants for the QUAL strand was drawn from the survey respondents. Participants who planned to retire within six months to one year of the first data collection who completed the survey were, asked whether they would be willing to participate in an interview with the principal investigator. To comply, they were asked to include contact details such as telephone number or email address. Quota sampling was used to recruit participants (Onwuegbuzie and Collins, 2007). The use of the narrative methodology does not dictate the number of participants required in the sample. Because the interviews were taking place longitudinally over a number of months, as suggested by Terry *et al.* (2017), 20 participants were recruited in this strand of the study, with the possibility of increasing the number of participants at follow-up in case there was a decrease in the number of participants at follow up from one

sub-group. However, this was not required. The participants were divided into categories of those being those in management positions and those in non-management positions, and those who had low or medium behaviour of PA behaviour and higher PA behaviour based on IPAQ classification. These variables (employment and current PA participation) were chosen based on influences which, according to the literature review might influence PA post-retirement. The number of males and females was equal.

b) Developing the Interview Questions

The study took a social constructionist approach to the QUAL strand and open-ended interview questions were employed to understand how participants constructed meaning through social interaction. The open-ended interview questions allowed the participants to develop their own narrative about the topic of PA, SB, and retirement. A semi-structured interview guide was developed based on the TDF (Cane, Connor and Michie, 2012). The TDF was used to ensure that the prompts were not limited to the researcher's knowledge on the subject. The TDF includes factors from various behavioural change theories. It was used to develop prompts for the interview questions and allowed for the questions to be explorative with respects to various behavioural factors. To ensure that the questions developed were not 'charged' towards specific factors within the TDF, the initial questions were open and asked for the participants experience on the subject (Appendix 2, Appendix 3, Appendix 4). As the approach chosen was narrative in the interview introduction participants were asked to share any personal stories which they wanted on the subject of PA and SB to explain their experience.

Even though it was expected that most participants would be bilingual, Maltese is still the preferred language of everyday use. Participants had to feel comfortable and able to narrate the

stories in their preferred language; therefore, a process of translating the interview questions into Maltese was undertaken. Once the interview questions were developed in English these were discussed with the supervisors (DB and KG) and a pilot study was carried out to check for consistency of questioning. The initial pilot study was done in English with the supervisors (DB and KG). During the pilot, questions were altered to make them open ended, neutral and not leading. The initial question was amended to assist participants in making use of their stories. Participants were asked to describe their daily routine.

After the questions were finalised, forward-back translation was used to translate the questions into Maltese. The questions were translated into Maltese and then re-translated into English by an independent translator. Both English versions were then compared with the local supervisor (JXDC). Rewording was done to the Maltese questions to ensure that the questions remained neutral. Once the questions in Maltese were finalised (Appendix 5, Appendix 6, Appendix 7) a pilot interview in the Maltese language was carried out with a retired individual. The interview was audio recorded and checked with the local supervisor (JXDC) to check that the language and tone used during questioning were appropriate. This did not result in changes to the questions.

c) Interviews

After the participants completed the questionnaires online, the data were analysed to classify them as management and non-management, and further subdivided into low, moderate and high level of PA behaviour. Based on the questionnaire results participants who were willing to participate in the interview were contacted via the provided contact details. Participants from each subgroup were recruited. On initial contact, which was done via telephone, the study was explained to them according to the information sheet (Appendix 8). If they agreed to participate,

an appointment was set at a time and place convenient for them. The initial interviews were all carried out pre-COVID, and all participants chose to meet at their workplace (post-COVID interviews were organised with alternative interview options, as will be explained). On meeting the participant, the information sheet was explained to them, and a consent form provided. Once the consent form was signed, the interview started. The interviews were audio recorded, but notes were still taken to assist in transcription and data analysis. Prior to, and after, the interview, a reflective diary was kept, to reflect on the interviews and personal perspectives and potential biases.

In the post-retirement interviews, participants were contacted via the details provided and asked if they were still willing to participate in the study. The information sheet was re-read to all participants. Due to the COVID-19 restrictions, participants were provided with the option to carry out the interview via telephone or online, using Zoom or Microsoft Teams. In case of face-to-face interviews, COVID restrictions suggested by the Ministry for Health in Malta, such as social distancing, were followed. All interviews took place face-to-face or online. In cases of online interviews only the audio was recorded. Interviews were transcribed verbatim by the researcher. Four of the pre-retirement and post-retirement transcripts were checked by another researcher to check for accuracy.

d) Data analysis

Two types of analysis were undertaken for the QUAL data, structural narrative analysis and reflexive thematic analysis. The data analysis process is explained in three parts for the QUAL strand. The data familiarisation and transcription were common steps of the analysis. The other

steps for the reflexive thematic analysis and structural narrative analysis were described separately.

i. Data familiarisation

Data familiarisation started during the interview process. As the interviews were being undertaken, a rapport was built with the participants. During the second interview, participants were more comfortable, and the interview felt like a continuation of the first. The fact that participants were encouraged to narrate their story helped the researcher familiarise with their story.

ii. Transcription & translation

The next step was transcription of the interviews. As the way the stories were narrated was important for the data analysis, the transcription included notes about pauses, reactions, sighs, pace, tone, and other details which could be used to gain a deeper understanding of how the participants constructed their story emotionally (Kowal and Connell, 2021). This level of detail was suggested when using a narrative approach (Cigdem, Mastoureh and Squire, 2013). The transcription process was aided by notes written during the data collection included in the reflective diary. All transcriptions were carried out by the researcher to gain data familiarisation.

The transcription process started with the interviews being heard and handwritten in draft format. These were then entered into NVivo (v13) software. When the interviews were being typed, the audio recordings were listened to a second time. After the interview, verbatim text was finalised, initial behaviour annotations were added and a third listening through the audio was done in conjunction with the interview notes to fully annotate the transcripts (Appendix 9). In the post-retirement interview, as confidence was gained with transcription skills the interviews were

typed in the NVivo software directly. The same process of going through the transcript three times was maintained. As the interviews were already transcribed, going through the interview, and annotating them was less time consuming. The process of going through the data repeatedly was used to understand the data (Kowal and Connell, 2021).

All transcription was undertaken in the interviews original language and the analysis was carried out without translating interviews into to English. Using different languages for the analysis can be challenging when presenting results in English, as language interpretation can be lost when carrying out the translation (Flick, Resch and Enzenhofer, 2018). However, the local supervisor's fluency in both the Maltese and English languages allowed for interpretation of data in original language and literal translation of the interview abstract used. Translating the interviews and carrying out the data analysis on the English translation would have posed a risk of losing cultural expressions and context from the text, possibly creating new meaning within the translated text which is not there in the original (Flick, Resch and Enzenhofer, 2018). Translation of text abstract in English took place for reporting purposes. The translation was carried out by the researcher and then discussed with the local supervisor to ensure that the socio-cultural linguistics of the extracted text were kept.

iii. Narrative structural analysis

After finishing the transcripts, data analysis continued by starting with a narrative structural analysis. The focus in the analytical approach was on the person's story and how this translated into social action (Sparkes and Smith, 2008). The narrative interview was the vehicle with which the retirement transition, PA, SB and the interaction between them was explored. After familiarising oneself with the data and the participants' stories, short profiles were created for

each participant, and their stories were written in the way they were perceived. Using these profiles gave life to the participants' stories, as each interview was given an identity. Bailey *et al.* (2013) suggested five steps to carrying out structural analyses as presented below.

Even though participants were prompted to use stories in their interviews, not all participants were competent story tellers. Whilst developing the participants' profiles, there were stories which were particularly interesting and detailed (Step 1). These stories were chosen based on the way the stories were told and narrated by the participants. Once the stories were identified the next step was to develop the story structure (Step 2). The story structure proposed by Labov and Waletzky's (1972) was used to constitute the story into its different parts. According to Labov and Waletzky's (1972) a story requires seven elements:

- a) Story stimulus - the initiation of story telling
- b) Abstract – the summary of the story
- c) Orientation – where the story is based
- d) Complicating action – the story then and now
- e) Evaluation – the teller's interpretation of the recounted events
- f) Resolution – general evaluation statement
- g) Coda – the end of the story (Riessman, 2008; Bailey, Montgomery and Mossey, 2013).

These story elements were not all present in each of the participants' story. Using these story elements, the stories were structured according to these elements. Meaning was sought to understand the social action being presented. The story structure by Labov and Waletzky's (1972) was only used as a guide to allow for the constructed nature of personal accounts (Patterson, 2017). During the interviews, the participants included events to support their notion on their retirement experiences. These were not limited to the narration. When analysing the data used to fit with the story interpretation, preliminary meaning (Step 3) was identified by asking

the question “why is this story being told?” and relating this to the story elements identified. This approach is suggested by Riessman (2008) due to the limitations of Labov and Waletzky’s (1972) structural narrative analysis.

Once meaning from the individual interviews was identified, a grouping of stories with similar structure, content and meaning was done (Step 4). This step was discussed in detail with the local supervisor. After reaching an agreement with the local supervisor on the shared meaning and content, an analytical structure with meaning supported by evidence from the interviews was developed (Step 5). The final analysis, together with the translated material, was discussed with the supervisory group to check for theoretical sense.

iv. Reflexive Thematic analysis

Thematic analysis is a widely used method of qualitative analysis within the social and health sciences (Braun and Clarke, 2014). Based on the adopted research philosophy of social constructionists this study aimed to use thematic analysis to understand the way in which participants used their language and social interaction to construct their reality (Terry *et al.*, 2017). A deductive-inductive approach was used within the analysis, focusing on capturing meaning which is not explicitly stated within the interviews (Braun, Clarke and Ranc, 2014). As the semi-structure interview questions were developed based on the TDF, it was easy to code the interviews deductively; however, to capture the non-explicit meaning, a more inductive approach was needed and the research had to be reflexive, not to limit understanding to preconceptual ideas.

The reflexive thematic process utilised to analyse the interview data had six phases:

1. Data familiarisation

2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Report writing

Step 1, Data familiarisation: The first step of data familiarisation for the reflexive thematic analysis was already carried out in the structural narrative analysis, as the same transcripts were used.

Step 2, Generating initial codes: This phase involved organising the data into meaningful groups which were then used to interpret the data. Codes were generated with the first pass through the data. As a latent approach to coding was used during this phase the participants' actions were being interpreted and not just listed as actions. One example of this is a participant becoming visibly stressed when talking about how difficult it was to decide whether to retire. Such an action was coded as retirement uncertainty. Each code was saved with a text extract.

Step 3, Searching for themes: After coding the interviews, a search for themes was done. Codes which were similar and fit with each other were grouped together. Codes for each interview, together with the respective interview abstracts, were put together, resulting in a number of themes (Braun and Clark, 2014). After this, the interviews were re-read, interpretation of codes re-evaluated, and themes refined. The choice of grouping codes into themes was based on the story interest.

Step 4, Defining and naming themes: The initial themes developed were named and based on the interpretation of the social actions. At this stage, to develop a deeper interpretation of the data, meetings with the local supervisor were carried out to discuss the themes and their naming.

During the meetings, discussion around how the themes were identified through the codes and the interview abstract was done. Themes became more defined, and their naming became more descriptive. The initial pre-retirement data were analysed individually and written as a separate reports (published paper Spiteri *et al.*, 2022) presented in Chapter 5, Section 2.1. The post-retirement data were analysed with the perspective of the pre-retirement interviews and considered as one whole story. The need for the pre-retirement results to be presented in a standalone paper was because they provided a baseline of the participants and their background stories, which could be used to understand their post-retirement experiences (Tuthill *et al.*, 2020).

Step 5, Report writing: The last step of the reflexive thematic analysis was report writing. This was an ongoing process undertaken throughout the analytical process. The steps within this analytical method were not linear but they involved moving between steps. For example, when going through the themes, some codes were revisited, and new codes were created. This aided in interpreting the data. The process was similar when dealing with the pre-retirement and post-retirement data.

e) Triangulation

In narrative methods, there is no one technique which is considered the ‘gold standard’ (Phoenix, Smith and Sparkes, 2010). Using one mode of data analysis would not have allowed the research to capture the different phenomena under study. PA and SB are complex behaviours (Troiano *et al.*, 2012) whilst ageing is a complex phenomenon (Phoenix, Smith and Sparkes, 2010).

Participants create their own meaning of these phenomena and in turn develop their own story which was then shared during the interviews (Riessman, 2008). Meaning from these stories was

constructed by interpreting these stories. In using data triangulation, meaning was developed by looking at data from different angles. Analytical diversity assisted in identifying different facets (Phoenix, Smith and Sparkes, 2010). Narrative structural analysis (Riessman, 2008; Bailey, Montgomery and Mossey, 2013), and reflexive thematic analysis (Braun and Clarke, 2006) were used separately and then results from the two analyses were compared.

Data triangulation is one approach which was used to improve data rigour and trustworthiness of qualitative data (Leech and Onwuegbuzie, 2007; Lauri, 2011). Reflexive thematic analysis aimed to identify patterns in what people say, and narrative approaches focused on how people say things (Braun, Clarke and Ranc, 2014). Grounding the study QUAL strand in a social constructionist epistemology allowed the use of these two analytical techniques. Both approaches use the same research assumptions, as they can be used from an interpretative perspective, allowing them to be used together (Riessman, 2008; Braun and Clarke, 2006) . The aim of using both approaches was not to obtain congruency in the results but to find further richness in the data by using another lens to analyse them.

Triangulation of the qualitative data took place using a jigsaw (Bazeley and Kemp, 2012; Bazeley, 2018). The jigsaw was an XY table format (Figure 5). The X-axis included results from the Reflexive Thematic Analysis, whilst the Y-axis presented the results from the Structural Narrative Analysis. The results from each row and column were marked according to whether the two set of results agree, disagree or are not common. A discussion of the results followed. The display was used as a visual aid to assist in the discussion of the results. The expectation was to check for convergence, inconsistencies and contradictions (Mathison, 1988).

























RTA \ SNA	Past experiences	Current state of PA	Retirement perceptions	PA and SB after retirement
Learned experiences				
Psychosocial factors shaping the retirement transition				
The discernment aspect of retirement				
Engagement in PA				
The inevitable process of ageing				
Cognizant SB				

Figure 5 XY table for data triangulation

Note: SNA: Structural narrative analysis; RTA: reflexive thematic analysis

3. Integration - Mixed methods

The study used a mixed-methods dialectical approach by integrating the QUAN and QUAL strands of the study to achieve fidelity with the philosophical underpinnings. A hybrid approach to MM integration was taken (Bazeley, 2018). Whilst the QUAN aspect measured PA behaviour and motivation in an ‘objective’ way, the QUAL aspect explored PA behaviour and motivation from a ‘subjective’ perspective. This was expected to identify agreement, areas of dissonance, divergence (Moran-Ellis *et al.*, 2006) and diffraction (Uprichard and Dawney, 2019). Integration at the analysis phase took place by using joint display (Fetters, Curry and Creswell, 2013; Bazeley, 2018; Johnson, Grove and Clarke, 2019). The two strands were displayed using a table format and the traffic light system was used to identify areas of agreement, dissonance, divergence (Teddlie and Tashakkori, 2009; O’Cathain, Murphy and Nicholl, 2010) or diffraction (Uprichard and Dawney, 2019). Integration of results was carried out by displaying concurrently the pre- and post- retirement results from the survey findings, reflexive thematic analysis and structural narrative analysis.

a) Study validity and rigour

Rigour within this study needed to be considered in three aspects: 1) quantitative, 2) qualitative and 3) the integrative aspect of MM (Hong and Pluye, 2019). Rigour in the quantitative aspect translated into internal validity, external validity, reliability, and objectivity. The psychometric properties of the questionnaires used were discussed previously (Markland and Ingledew, 1997; Craig *et al.*, 2003; Spiteri, Grafton, *et al.*, 2021; Spiteri *et al.*, 2022).

For the qualitative aspect, rigour considered credibility, transferability, dependability and confirmability. Rigour of qualitative was assessed by its epistemological underpinning (Loh, 2013; Levitt *et al.*, 2017). A criteriological approach to assessing rigour, such as Tracy's (2010) big eight criteria, was not used, as this has been criticised by qualitative researchers (Smith and McGannon, 2018). The aspects considered within a narrative approach are not the same as other qualitative approaches, using fixed criteria to assess study rigour was not considered appropriate.

Guiding principles were used to obtain rigour in the qualitative aspect (Loh, 2013). The social constructionist epistemology was based on a relativist ontology, which meant that there were multi-realities. These were developed through the social interactions that the participants experienced. Credibility referred to the truthful representation of data. Triangulation analysis of qualitative data was undertaken to examine the data through a different lens. Transcripts were checked to ensure they reflected the recording. Peer debriefing was used, with data analysis being discussed with the local supervisor and the results within the supervisory team. The study was of a longitudinal nature, with participants being interviewed twice, before and after going through retirement. Transferability was obtained by providing a thick description of the participants. The story of each participant was presented separately from the results section. This

allows the readers to identify who the participants were and develop an understanding of their background. In presenting the results multiple quotes were used from different settings to understand interpretation of the data. Dependability was assured by keeping an audit trail of the process. The audit trail was kept of all the interviews, who carried out the transcription, the thinking process, and the way the analysis was developed. Confirmability of the study was established by the analysis being grounded in the data. A reflective journal of the research process was kept. Members checking was considered but was not used. The researcher was interpreting the participants story longitudinally as part of the analysis and given the time lapse their explanation could have been different. Providing the transcript to ensure conformity with what participant's would not have ensured further rigour (Birt *et al.*, 2016), the transcripts were checked by another researcher to ensure conformity with the recording.

Heyvaert *et al.*'s (2016) conceptual framework to assess dimensions of MM was used as a guide for rigour of the integrative aspect of MM. Four criteria were considered from this framework: 1) truthfulness, 2) applicability, 3) consistency, and 4) neutrality. Truthfulness refers to the extent to which inferences made are based on the QUAL and QUAN strands. A joint display was used to integrate the results from the two strands. How the results were applied to the context, based on the aim of the study is referred to as applicability. This criterion was achieved by using the data available to answer the research question. Data available on a national level were obtained to position the results in the context of the national situation. Consistency refers to the way and rationale behind the mixing of the different strands took place. This was achieved by integration of the research questions, method, and analyses, all of which are central aspects of MM (Hong and Pluye, 2019). Neutrality referred to the grounding of inferences to separate strands. In using

a dialectical MM approach, the two strands, QUAL and QUAN had their own philosophical underpinnings but, at the same time they were integrated into one study.

4. Ethical issues

The initial ethics application was submitted to Sheffield Hallam University (SHU) ER5441966. On transferring to Coventry University (CU) as the new host institution for the PhD a submission for minor amendments was submitted P115641. These changes were submitted to ensure ethical coverage and quality assurance by CU and to adjustment for changes within the study due to the evolving COVID-19 situation. In the CU application the proviso to carry out the post-retirement interviews online, via CU Zoom or Microsoft Teams, was included, in case a participant did not feel safe or meeting with the researcher face to face did not conform with guidelines (Appendix 10).

Prior to starting the PhD, the programme of research was discussed with the Director of the Maltese allied health service (Appendix 11) and physiotherapy management to ensure support throughout the project, to ensure completion. As the project was of a longitudinal nature, stopping midway would have been unethical towards the participants. The need for the research project was also discussed with the assistant director within the Employee Support Program (ESP), who was responsible for the promotion of employee wellbeing across the public service. Permission to access the participants was sought from the head of the civil service and the principal permanent secretary. This was done through the permanent secretary for the Ministry for Family Children, and Social Solidarity, Mr Mark Musu (Appendix 11). Once permission was obtained contact was made through the Office of the Prime Minister (OPM) with the Institute for Public Service (IPS) which was the section responsible for research projects within the Maltese

civil service. The IPS was responsible to act as gatekeeper and contact the participants, according to the research policy within the civil service. The initial email for recruiting for the survey was sent in September 2019 with two further reminders sent within the following weeks.

a) Participant consent

Consent for the QUAN and QUAL strands of the study was obtained separately. Within the recruitment letter, participants were provided with a link to the questionnaire. Prior to starting the questionnaire, they were provided with a participant information sheet (Appendix 8) which explained the study and the need to contact participants after two years, data management, and project risk. Once participants agreed they had to tick on the consent form (Appendix 12) and then they could proceed to the questionnaire. This process was carried out online using Qualtrics. Even when participants preferred to fill in the questionnaire using a hardcopy, consent was still obtained online. As the project was of a longitudinal nature it posed data management issues, which are discussed further down.

Ethical issues within the QUAL strand of the study required further considerations. During the interviews, participants shared part of their lived experiences (Cigdem, Mastoureh and Squire, 2013). A separate information sheet (Appendix 13) consent form (Appendix 14) for the interviews was used. Participants recruited for the interview were presented with the information sheet prior to the participants signing the consent form. As the interviews were being recorded the participants questioned further what the research was about, and they were initially cautious about expressing their views, even though the research was not considered of a sensitive nature. However, during the interview process, and as people started narrating their stories, they easily expressed their views about the topic. As analysis requires interpretation of their stories, the

participants were provided with the researcher's details in case they wanted to add or remove any comments from the interview.

b) Data management

Given the longitudinal nature of the study, personal data had to be collected to ensure that participants anonymity, confidentiality, and data security, to ensure GDPR requirements were met (Gov.mt, 2020; Coventry University Group, 2021). Data were stored and backed-up on the SHU online research store and then transferred to Coventry university OneDrive. All data were kept in electronic format to ensure safety of data. When collecting data for the questionnaire, a few participants preferred to use a hard copy of the questionnaire. In such cases data collected were inputted into the online platform Qualtrics. The hard copies were kept without any identification information in a locked filing cabinet.

Electronically, data anonymity was kept by creating two separate files. One file was kept to pseudo anonymise the participants in the questionnaires and interviews. For the questionnaires, each participant's name and date of birth were coded with numbers. As interview participants would have contributed to the questionnaire, the same participant numbers were kept for the interviews. Each interviewee was also given a pseudonym. However, this was only used to present results, and not for data storage purposes. Another file with the contact details of the participants was kept with the participant numbers and no identification information.

Confidentiality of data was kept by not disclosing information which could potentially identify the participants. Data were not shared with others unless absolutely necessary. As the interviews were in Maltese, these were only shared with the local supervisor as necessary during peer debriefing.

c) Health and safety issues

Health and safety issues were considered when conducting data collection face-to-face with participants. After undertaking a risk assessment, the local situation was considered low risk and mitigation measures were put in place to decrease this risk further. Due to the COVID situation, additional infection control precautions were taken when carrying out face-to-face interview, with the use of face mask and visor. Data collection took place either in the participants workplaces, which were a government institution or places convenient for the participants, such as personal residences. The initial interviews were carried out at their place of work. Travelling was carried out by personal car journey. The local supervisor was informed of the travel schedule and the places where the interviews were taking place when interviews were not carried out at the participant's place of work. Before entering the residence, and once the interview was finalised the local supervisor was informed. To ensure safety during the interviews, a mobile phone was available at all times. The interviews were not expected to take longer than an hour and a half. If, after the expected time the supervisor was not contacted, he would call on this mobile phone number. The researcher undertook de-escalation training, to ensure preparedness against any danger. Personal safety and lone working policies were adhered to.

5. Summary

This chapter has provided an overview of the methodology and methods employed in the longitudinal study which was the main part of the PhD. It presented the design used, a sequential QUAN→QUAL design. Two sampling methods were employed, a total population for the QUAN strand and quota sampling for the QUAL strand. The tools used to collect data were a survey and semi-structured interviews. Analytical methods employed were discussed, descriptive

and inferential statistics for the survey, and analysis triangulation, reflexive thematic analysis, and structural narrative analysis for the interviews. Ethical issues for the study were presented in the end of this section. The next section presents two published papers which tested the psychometric properties of the translated tools. The following chapter presented the results from the main study for which methods were discussed above.

Section 3. Translation of the international physical activity questionnaire to Maltese and reliability testing (published paper)

This section presents the psychometric testing of the translated version of the Maltese International Physical Activity Questionnaires. The translation process and the reliability of the translated version were published in the Journal for the Measurement of Physical Behaviour. The paper is presented as published with supplementary material presented in the appendix. The formatting was kept the same due to print copyright. This paper addressed objective C. Information sheet and consent form for the cognitive interview can be found in Appendix 15 and Appendix 16. Information sheet for the reliability study and consent form can be found in Appendix 17 and Appendix 18. Appendix 19 presents the Maltese questionnaire used for this study. Supplementary material from this paper can be found in Appendix 20 for supplementary material normality distribution of test re-test difference; Appendix 21 for supplementary material Bland Altman plots.

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(Ahead of Print)

Section 4. Psychometric testing of the Maltese versions of the Exercise

Benefits/Barriers Scale and Exercise Motivation Inventory – 2 (published paper)

This section presents the psychometric testing of the translated versions of the Maltese Exercise Motivation Inventory – 2 (EMI-2) and Exercise Benefits/Barriers Scale (EBBS). The translation process, the reliability, and convergent construct validity of the translated versions were published in the journal of Health Psychology Research. The paper is presented as published with supplementary material presented in the appendix. The formatting was kept the same due to print copyright. This paper addressed objective C. As described in the methods section, after carrying out the systematic review on barriers and motivators (Chapter 4, Section 2) it was decided to use two tools, one for motivators and one for barriers. However, after completing the translation and checked the psychometric testing of the tools, it was decided to drop the EBBS due to the length of the questionnaire. Information sheet and consent form for the cognitive interview can be found in Appendix 15 and Appendix 16. Information sheet for the reliability study and consent form can be found in Appendix 17 and Appendix 18. The questionnaire used for this study can be found in Appendix 19 and supplementary file 1 is found in Appendix 22.

General

Psychometric testing of the Maltese versions of the Exercise Benefits/Barriers Scale and Exercise Motivation Inventory – 2

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Keywords: Reliability, Physical activity, Exercise, motivation, translation

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Background

Consideration of psychological factors towards exercise participation is important, especially when placed within a cultural context.

Objective

The aim of this study was to translate the Exercise Benefits/Barriers Scale and Exercise Motivation Inventory-2 to Maltese and undertake psychometric testing.

Methods

Maltese-speaking participants (n = 170) aged 18 to 69 years were recruited. 72% completed both questionnaires twice within an 8-to 48-hour period. Reliability was calculated using the Spearman correlation, intraclass correlation coefficient, and Bland-Altman plots. Convergent construct validity was tested using Spearman correlation between theoretical variables.

Results

In total 155 participants completed the questionnaires at both time points. The test/re-test reliability of the two questionnaires was >0.7 for all analyses. Correlations for validity were statistically significant (p < 0.05).

Conclusion

The translated tools have similar psychometric properties to the original version; the authors recommend that health care professionals and physical activity practitioners use these tools when examining population-level physical activity behaviour among Maltese-speaking individuals.

INTRODUCTION

Psychological factors are understood to be critical in the understanding of physical activity (PA) behaviours with as many as 84 different psychological determinants identified.¹ Two factors, motivation, and perceived barriers were found to be strongly correlated with PA behaviour. Whilst autonomous motivation and intrinsic motivation has been found to positively predict PA behaviour, this influence varies.¹ According to the self-determination theory this could be due to different types of external motivations, some of which are internalised within the persons value system.² Other types of external motivations are outwardly

conditioned and not in line with the value system and may have a negative effect on PA behaviour.³ Perceived barriers were found to negatively influence PA behaviour.¹

The measurement of barriers and motivators for PA varies across multiple tests being used. There is no gold standard described within the literature. Such tools vary according to the theoretical framework and type of PA behaviour being measured, for overall PA or exercise. Nonetheless using a tool that has been validated allows for the comparison between different cultures, and studies. Perceived barriers refer to “an individual’s evaluation of the potential obstacles that curtail him from engaging” in PA⁴ (pg. 107). Motivation is described across a spectrum ranging from

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amotivation, which is a state in which the person has no intention to act to external regulation, introjected regulation, identified regulation, and intrinsic regulation.² The latter is when an individual engages in an activity which is congruent with his/her values.^{2,5} Two established tools that have been validated to assess motivation and perceived barriers towards exercise are the Exercise Benefits/Barriers Scale (EBBS)⁵ and the Exercise Motivation Inventory – 2 (EMI-2).⁶

The EBBS was developed based on the Pender health promotion model.⁵ Two of the concepts within the model are perceived benefits of exercise behaviour and perceived barriers. The first version of the EBBS was written in English and was tested on adults aged 18 to 88 years. The tool comprises 43 questions, 14 items that assess perceived barriers and 29 that assess perceived benefits. This tool has demonstrated good reliability with a test re-test reliability correlation score across the whole questionnaire of 0.889 and an internal consistency of 0.952.⁵ The content validity of the tool was based on literature and participants' interviews. Structural validity was based on factorial analysis which identified a 10-factor solution, 6 perceived benefits and 4 perceived barriers.⁵ Similar reliability scores were obtained for different populations.⁴ The EBBS has been translated into different languages including Iranian,⁷ Turkish,⁸ Mexican,⁹ Spanish (Brazil)¹⁰ and Korean.¹¹ These translations were found to have test re-test reliability between 0.6 and 0.87.^{7,8,10,11}

The EMI-2 tool was based on the self-determination theory. It measures 14 factors, with higher order motives that vary between intrinsic and extrinsic types of motivation. Through these factors the tool measures a wide range of the possible reasons as to why a person exercises.¹² The tool was developed to be used by non-exercisers as well as exercisers.⁶ In the initial development of the tool, construct validity was demonstrated by being able to distinguish between different gender motivations, that correlated with other tools which measured social desirability and intrinsic motivation.¹² On further testing of the tool, factorial validity was carried out using sequential model testing. The results had shown that the model was valid to be used across genders. The internal reliability of the different factors was good, and with the exception of health pressure (0.686) the remaining factors were reported with a reliability of 0.832.⁶ The EMI-2 has been translated into different languages including Arabic, Dutch, Italian and Spanish.¹³ The disadvantage of the EMI-2 is due to the tool being developed towards the measurement of goal seeking behaviour, rather than true motivation.¹⁴

The aim of this current study was to a) translate the EBBS and EMI-2 into the Maltese language and b) check the test re-test reliability, internal consistency, and concurrent validity of the translated versions. To the authors knowledge this is the first study to have translated these tools into the Maltese language. The translation will allow use of reliable and validated tools within Maltese speaking populations and allow for comparison with other studies on a global scale

MATERIALS AND METHODS

The translation of the EBBS and EMI-2 was carried out following the World Health Organisation cultural adaptation guidelines. The English version was translated into Maltese by two paid professional translators. The translations were compared by authors KS and JXDC and merged into one. This Maltese version was then cross checked by three experts: 1) a public health specialist, 2) a physiotherapist, and 3) a Maltese linguist all of whom were bilingual. This ensured that semantic equivalence was maintained in the Maltese language. Minor suggestions were proposed, which were reviewed by the same two authors. The final Maltese version was then translated back into English by two different paid translators. The resulting version was compared to the original English version, whereby only minor discrepancies were identified. As the Maltese language did not allow for certain words, these differences were discussed with one of the translators and re-wording was completed.¹⁵

Cognitive interviews were undertaken with people from different educational backgrounds, to ensure semantic equivalence and eliciting the appropriate cognitive response.¹⁶ Participants were recruited using convenience sampling with over sampling in those with low educational attainment. Informed consent was obtained from the participants and interviews were held at a place convenient for them. Sample size was not decided a priori but based on saturation. A total of ten interviews were held until the questionnaires were eliciting the appropriate response. The participants' ages ranged from 25 to 67 years with an average age of 45 years (SD ± 17.4). Interviews lasted an average of 45 minutes in duration. They were conducted using open-ended questions, and the participants were asked to read the questions and verbalize their thought process to ensure that the translated version elicited similar understanding.¹⁷ These participants were not included in the psychometric testing stage.

Psychometric testing was then carried out on a broad population age group, between 18 and 69 years. Previous literature found that the EBBS has an intraclass correlation coefficient (ICC) of 0.85 for benefits and 0.79 for barrier related questions.⁴ Using a formula based on the expected ICC values,¹⁸ the minimal expected ICC value and the number of observations as recommended by Streiner et al.,¹⁹ a sample size of 116 was recommended. Considering the likelihood of non-completion which was predicted to be 15%, the quota set was 134 participants.

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Sheffield Hallam University Research Ethic committee reference number: ER9249191. Written consent was obtained from participants prior to participating in the study. Recruitment was voluntary and participants could withdraw at any time. Data was analysed in an anonymised format to maintain confidentiality of participants.

RECRUITMENT FOR PSYCHOMETRIC TESTING

Participants had to be able to read, write and be comfortable replying to the questionnaire in the Maltese language. Non-random convenience sampling was used to recruit participants. Initial contacts were from personal contacts after which snowball sampling was used to reach the required quota. Participants were given the option to complete either online or paper copies of the questionnaires depending on their preference.

The time period between the test and re-test had to be long enough to reduce recall bias but not too long that responses may change.²⁰ The questionnaire was eight pages long and included 128 questions. It took between 20 to 40 minutes to complete. Considering the length of the questionnaire, between 8 to 48 hours was deemed acceptable as a test and re-test period, and all cases were reviewed within a 48-hour timeframe. In case of online submission, the re-test was sent via email to the participant the day after their first submission, and the request was made to complete within two days. In case of paper-based submission, KS met the following day with the participants to fill in the second questionnaire, which was collected once ready. In addition to the questionnaires, demographic data on age, gender, education and self-reported height and weight were collected.

DATA ANALYSIS

EBBS SCORING AND EMI-2 SCORES

The tools published scoring sheets were used to calculate the results from the questionnaires. For the EBBS each item score ranges from 4 (strongly agree) to 1 (strongly disagree) with the barriers' score being reversed score. Scoring the EBBS culminates with a barriers and benefits score. The EMI-2 score is made up of 14 different sub scores for each motive. The mean score for each motive was calculated for each participant. The Guidelines for Reporting Reliability and Agreement Studies (GRRAS) were used²¹ to determine analysis for reliability and validity.

RELIABILITY

The reliability of the tools was calculated using Inter class correlation co-efficient (ICC), standard error of measurement (SEM) and Bland and Altman's plots. Prior to checking level of agreement, the correlation between the variables was checked. After checking for normality, Spearman correlation was used to check the correlation between test and re-test results, which if this was not significant further testing was not performed. Bland and Altman's plots were used to check for repeatability of measures by plotting the mean differences between the two measures. 95% of the difference should be within one standard deviation of the mean difference for the tool to have good repeatability.²² The SEM is the standard deviation of the measurement error.²³ SEM measures the difference in measurement between test and re-test and is a measure of reliability. Cronbach alpha was used to measure the internal consistency of the questionnaires and its subscales. As the subscale within the

questionnaires were supposed to measure the same construct the internal consistency within the subscale was expected.²⁴

VALIDITY

Convergent construct validity for the EBBS was assessed by correlation with leisure time PA, total PA and sitting time. PA was measured using the International Physical Activity Questionnaire in Maltese (IPAQ-MT).²⁵ To check the convergent construct validity of the translated EMI-2 intrinsic motivation (enjoyment, revitalisation, and nimbleness)⁵ were correlated with leisure time PA and Social Recognition, Competition, Health pressures, Ill-health avoidance with age.¹⁴

Data analysis was carried out in accordance with the EMI-2¹⁵ and EBBS guidelines.²⁶ A Microsoft Excel © spreadsheet was developed to store and analyse the data. IBM SPSS © version 26 was used for inferential statistical analysis with $p < 0.05$ deemed to be statistically significant.

RESULTS

RESPONSE RATE AND DEMOGRAPHICS

The total number of questionnaires distributed was 160 with a response rate of 85% ($n = 136$ participants) for first questionnaire. A total of 115 (72%) completed the test-retest of the questionnaires with all questions answered.

Respondents were aged between 18 and 69 years with a mean age of 39 years ($SD \pm 14.45$). The proportion of male participants was 39%, and females at 61%. The education level for 32% of the participants was secondary education or less, the remaining 68% had a tertiary level of education.

EXERCISE BENEFITS/BARRIERS SCALE

The EBBS had a total mean score of 120.5 ± 28.1 , the mean barriers score was 38.1 ± 10 and benefits score 82.4 ± 20.3 . Age was not correlated with either the barriers score ($p = 0.792$) or benefits score ($p = 0.754$). Total leisure time in MET minutes per week was positively correlated with barriers 0.184 ($p = 0.032$) and benefits 0.190 ($p = 0.027$) scores. Total PA in MET minutes per week was not significantly correlated with barriers ($p = 0.955$) or benefits ($p = 0.053$) scores. Total sitting time in minutes per week was significantly correlated with barriers score 0.204 ($p = 0.017$) but not with the benefits score ($p = 0.097$).

The ICC for the EBBS barriers score was 0.709 (CI $0.604 - 0.7900$) and 0.811 (CI $0.737 - 0.865$) for the benefit score. The Cronbach alpha of the benefits score was 0.963 and barriers score 0.899 . The SEM for the barriers score was 3.60 and benefits score was 4.66 . Bland-Altman plots for both barriers and benefits had 95% of the mean difference between test and re-test within 2 SD (supplementary file 1). Spearman correlation for barriers was 0.708 ($p < 0.001$) and for benefits score 0.821 ($p < 0.001$).

EXERCISE MOTIVATION INVENTORY - 2

The EMI-2 has 14 subscales for which the mean and SD for each are presented in [table 1](#). The EMI-2 subscales were sig-

Table 1. Descriptive statistics for EMI-2 subscale

Subscale	Mean	±SD
Stress management	3.2	1.5
Revitalisation	3.8	1.1
Enjoyment	3.2	1.4
Challenge	2.2	1.4
Social Recognition	0.86	1.2
Affiliation	1.6	1.5
Competition	1.1	1.4
Health pressures	1.6	1.5
Ill-health avoidance	3.5	1.4
Positive health	4.0	1.1
Weight management	3.5	1.4
Appearance	2.7	1.5
Strength and Endurance	3.4	1.3
Nimbleness	2.9	1.4

Table 2. EMI-2 subscales correlation with age, total PA, leisure time PA and total sitting time

Subscale	Age	Leisure time PA	Total PA	Total PA adjusted to Leisure time	Total sitting time
Enjoyment	NA	0.399**	0.314**	0.134	-0.240
Revitalisation	NA	0.187*	0.188*	0.056	-0.151
Nimbleness	NA	0.166	0.166	0.023	-0.059
Social Recognition	-0.241**	NA	NA	NA	NA
Competition	-0.425**	NA	NA	NA	NA
Health pressures	0.338**	NA	NA	NA	NA
Ill-health avoidance	0.423**	NA	NA	NA	NA

* Significant at 0.05 level; ** significant at 0.01 level; NA – not assessed

nificantly correlated with age, total PA in MET minutes per week, leisure time PA in MET minutes per week and sitting time.

Enjoyment and nimbleness subscale were not significantly correlated with sitting time. Leisure time PA and total PA was positively correlated with enjoyment but not nimbleness. The correlation between total PA, enjoyment and revitalisation was not significant when adjusted for leisure time PA (table 2). Age was significantly negatively correlated with social recognition, and competition and positively correlated with health pressures and ill-health avoidance.

The ICC for the EMI-2 subscales ranged between 0.783 to 0.916 (Table 3). The spearman correlation co-efficient ranged from 0.919 to 0.789 (Table 3). The SEM ranged between 0.19 to 0.44 (Table 3). All Bland-Altman plot had 95% of the values within 2 standard deviation (supplementary file 1).

DISCUSSION

The aim of this study was to assess the reliability and convergent construct validity of the translated versions of the

EBBS and EMI-2. The study found the reliability of both questionnaires to be acceptable for use in the Maltese language. Both questionnaires had a test re-test reliability ICC, correlation, and internal consistency higher than 0.7. The test re-test reliability correlation of the original EMI questionnaire subscales varied between 0.58 to 0.88,¹² in this study the correlation was higher. The better reliability than that presented in the originally developed tool is likely because the test re-test period was 4 to 5 weeks while in this study the period was limited to 8 to 48 hours. The potential for recall bias is a limitation of the current study, but the questionnaire was tested with additional questionnaires with a total of 145 questions. This number of questions would reduce recall bias. The short retest period also reassures that the constructs being measured would not have changed due to time. A future study could assess the Maltese versions of the tools using a test-retest period of 4-5 weeks.

Due to the limited sample size used in the study, construct validity could not be assessed using factorial analysis.^{27,28} Based on the latent analysis in initial construct validity of the tool,⁶ the study assumed that factors within the EMI-2 which are of intrinsic nature would be correlated

Table 3. Reliability testing for EMI-2 subscales

Subscale	Spearman correlation	ICC	Cronbach Alpha	SEM
Stress management	0.919*	0.916 (0.88-0.941) *	0.899*	0.190
Revitalisation	0.781*	0.816 (0.742-0.870) *	0.864*	0.301
Enjoyment	0.870*	0.882 (0.832-0.918) *	0.892*	0.248
Challenge	0.787*	0.783 (0.697-0.847) *	0.832*	0.442
Social Recognition	0.754*	0.820 (0.747-0.873) *	0.845*	0.346
Affiliation	0.840*	0.890 (0.843-0.923) *	0.877*	0.279
Competition	0.789*	0.838 (0.773-0.886) *	0.922*	0.305
Health pressures	0.825*	0.852 (0.792-0.896) *	0.773*	0.302
Ill-health avoidance	0.867*	0.871 (0.819-0.909) *	0.892*	0.243
Positive health	0.810*	0.823 (0.753-0.875) *	0.899*	0.219
Weight management	0.848*	0.889 (0.843-0.923) *	0.833*	0.283
Appearance	0.878*	0.884 (0.834-0.919) *	0.887*	0.236
Strength and Endurance	0.843*	0.848 (0.784-0.894) *	0.773*	0.298
Nimbleness	0.823*	0.828 (0.760-0.879) *	0.850*	0.356

*significant at 0.05 level

with leisure time PA, but not with total PA or sitting behaviour. Out of the two intrinsic factors identified only enjoyment was significantly positively correlated with leisure time PA unlike nimbleness. One possible reason for the lack of correlation is the translation of questions around nimbleness into the Maltese language (questions 27 and 41) being difficult to differentiate between the two. Another measure of the convergent construct validity of the translated tool was to assess the correlation between competition, social recognition, health pressure and ill-health with age,¹² due to the changes in motivation associated with aging. It is expected that competition and social recognition act less of motivators in older age, whilst health pressure and ill-health become more of a motivator.^{14,29} A negative correlation was found with competition, social recognition and a positive one with the latter two factors. This confirms that the Maltese translated version has similar concurrent validity to the original published tool.

The EBBS has already been translated into different languages, Turkish,⁸ Iranian,^{7,30} and Mexican³¹ and assessed on different age groups.¹⁰ The reliability obtained from this study is similar to the English version and the aforementioned translated versions. The reliability of the EBBS for barriers score was less than the benefit score, which was also found in the other studies. The validity of the questionnaires was confirmed through the correlation with related PA measures. As the EBBS measures perceived barriers and benefits towards exercise it was expected that scores would be correlated with leisure time PA but not total PA and sitting time. Leisure time PA is a structured form of PA which can include planned exercise, whereas other forms of PA such as domestic and transport are not. It is therefore anticipated that those with lower barriers would have higher leisure time PA.

To check the concurrent validity of the translated EMI-2 intrinsic motivation (enjoyment, revitalisation, and nimbleness)⁵ are expected to correlate with leisure time PA. Motivation changes are expected with increasing age^{14,29}:

competition and social recognition are less important whilst health and fitness reasons are more important.¹² A correlation between leisure time PA and intrinsic factors would give an indication of the convergent construct validity of the translated tool. Extrinsic motivation factors prediction of long term PA was found to be negatively correlated with long term commitment towards PA behaviour.^{32,35} However, data on length of exercise engagement was not collected within the study.

The EBBS was developed to assess barriers specific to exercise and not to the broader term of PA.⁴ The current study assessed PA behaviour using IPAQ-long which measures total PA, and leisure time PA which is related to exercise. A positive correlation with benefits and barriers scores was found with leisure time PA but not total PA. The correlation was weak but statistically significant. The weak correlation could be attributed to the possible limitations in PA measurement and the study not being able to distinguish between length of exercise engagement. The PA measurement was based on the recall of the past week, which might not be a typical week. Using self-reported measures for PA can have a social bias towards over estimation of PA behaviour engagement.³⁴ These factors might have influenced the strength of the correlation between EBBS score and leisure time PA. Another possible explanation is the nonconclusive evidence about the influence of perceived barriers on exercise participation.¹ Leisure time PA engagement is not limited to perceived benefits and barriers other factors such as a motivation and socio-economic factors influence PA behaviour, the lack of adjustment for these factors could have led to the weak positive association between perceived barriers and leisure time PA.

A high barriers score was correlated with prolonged sitting time but not benefits score. Sedentary time is reported as a measure of sitting time during a normal working day and weekends. A higher number of perceived barriers was identified to correlate with lower engagement with exercise in different population groups.^{35,36} If people are en-

gaged in less leisure time PA a high rate of sedentary activity was expected. The internal consistency of the EBBS obtained in this study was similar to other translated languages.^{7,8,10}

Compared to other studies which have assessed the reliability of these two questionnaires, this study used Bland-Altman plots (supplementary file 1) and SEM to evaluate their reliability. When using Bland-Altman plots 95% of the difference between test and re-test fit within 1 standard deviation which shows that the tools have good reliability. The maximum SEM for the EMI-2 was 0.44 which shows the test to re-test error is minimal. The SEM showed the good reliability of the EBBS. The SEM was higher for the benefits score as expected given the higher possible score.

LIMITATIONS

The main limitation of this study is the short recall period which was used for the test re-test period. However, this was mitigated with a long questionnaire to limit recollection. The small sample size was appropriate to assess for the reliability of the questionnaire as this was based on pre-established sample size calculation formula. However, a larger sample size would give more confidence in the interpretation of the validity testing of the tools given that a heterogeneous group was used and psychological determinants vary with age. Finally this study was unable to distinguish between participant's amount of time exercising based on stage of change as this influences motivation³⁵ this would have allowed for better validity testing.

This study is the first to have translated the tools into Maltese as well as test the psychometric properties. For future research it is now possible to compare different Maltese speaking populations and to conduct studies using a validated tool. Psychological determinants are important when establishing PA and exercise patterns in different populations.¹ Being able to use standardized tools which are based on theoretical knowledge allows for cross country comparison. Having translated tools which are based on theoretical knowledge can allow for the development and implementation of appropriate PA interventions. We therefore encourage practitioners and health professionals to use these tools in Maltese speaking populations when examining motivators and barriers to physical activity and exercise.

CONCLUSIONS

This study found that the Maltese versions of the EBBS and EMI-2 have an acceptable test re-test reliability and internal consistency all of which were similar to the originally developed tools. The concurrent validity of the EBBS and EMI-2 was also confirmed within the study. These findings add to the body of knowledge of translated tools which assesses psychological determinants of exercises in a different language. Based on the study results, we recommended that the translated tools can be used in populations which are Maltese speaking in order to optimise the selection and effectiveness of PA and exercise interventions.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR'S CONTRIBUTIONS

Karl Spiteri: Drafting of manuscript, Analysis, Interpretation of data, acquisition.

John Xerri de Caro: Revising manuscript, Analysis, Interpretation of data.

Kate Grafton: Revising manuscript, Analysis.

David Broom: Drafting of manuscript, Analysis, Interpretation of data.

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Chapter 4 Secondary Data Analysis

This chapter presents the results from two secondary data analyses which were undertaken to support the development of the mixed-methods study.

Section 1. Physical activity behaviour in 50- to 74-year olds: difference between employed and retired individuals (published paper)

This section presents the difference in PA between employed and retired individuals in Malta, using a repeat cross sectional study design with national data collected in 2002, 2008 and 2014. The data was obtained from the Directorate for Health Information and Research (DHIR) which carries out the Health Interview Surveys every five years. Data for the 2019 survey was not available at the time of analysis. This survey gathers information about health behaviours and determinants. The paper was published in the Journal of Ageing and Longevity. Prof Lee Smith was invited to support this paper with his expertise in using similar data sets. Prof Neville Calleja and Dr Kathleen England were responsible for the survey within the DHIR so are also authors. This paper addressed Aim 1 and objective A. The results from this study were compared to the longitudinal mixed-method study for generalisability of the findings to the national population.

Article

Physical Activity Behaviour in 50- to 74-Year-Olds: Differences between Employed and Retired Individuals

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Abstract: (1) Objectives: The study aimed to examine data from Malta's Health Interview Survey (HIS) to assess differences between persons in employment and those retired, across different time periods. (2) Methods: A repeat cross-sectional design was adopted. Data that were collected over a period of 12 years included three cross-sectional HIS waves (2002, 2008 and 2014). Data were analysed cross-sectionally and longitudinally using multilevel analysis. (3) Results: In total, 4690 participants between the ages of 50 and 74 years provided data on physical activity (PA). A statistical difference was found between those employed and retired, with the latter undertaking less PA MET min per week in 2002 and 2008. There was no difference in 2014. When adjusting for covariates, people in employment carried out less PA MET min per week (OR-0.16—0.02) compared to retired individuals. Using multilevel modelling, this study shows that individual factors such as BMI and long-standing illness are predictors of PA behaviour as opposed to time trends. (4) Conclusion: Retirement can increase PA measured in MET minutes per week. Individual factors such as BMI, long-standing health problems and self-rated health could be causing the higher levels seen in the employed population during the studied period.

Keywords: physical activity; public health; aging; retirement

1. Introduction

Participation in physical activity (PA) is beneficial for almost all facets of health in older adults. Regular and sustained PA behaviour in older adults has been associated with a reduction in the risk of cardiovascular disease, some cancers, type 2 diabetes and functional decline [1]. Not meeting PA recommendations in older age has serious health implications, including, for example, an increased risk of falls, dementia, and lower bone density [2–4]. Major life events such as the death of a spouse, a change in job status or a change in residence have been shown to impact the PA behaviour of individuals [5,6].

Retirement is a life event which is of interest because it is a social process which working individuals experience [7]. Globally, there is no standard age at which people retire from paid work. For this study, we defined retirement as receiving a retirement pension as it presented an exit from paid employment. Until 2008, in Malta, people receiving a retirement pension were unable to work in gainful employment. Transitioning from work to retirement can cause changes in lifestyle and is an opportunity whereby PA can be increased as new life adjustments are taking place [8,9].

Research highlights that leisure time PA, walking and domestic activities increase after retirement, but transport and total PA behaviour decrease [10]. There is also a preference

for the intensity of PA to be of light and moderate intensity [11]. There is inconclusive evidence as to whether changes in PA during and after this major life event are maintained. Longitudinal studies on retirement indicate an initial increase with subsequent declines or stabilization of PA behaviour thereafter [11]. Differences in reported findings are attributed to the aspect of PA domains being examined and sex differences. Socio-economic status (SES) has been identified to influence the transition into retirement in different ways. After retirement, people in a lower SES tend to engage in lower moderate and vigorous PA levels [12]. This was associated with increased reports of illness, disability, and chronic disease. There are a number of barriers and facilitators to PA in older adults which differ between those nearing retirement age and those who have retired [13]. Those nearing retirement were found to find difficulty in regulating their PA behaviour and were motivated by fitness goals. Individuals in retirement age were motivated by the social aspect of PA and lacked belief in their ability to be physically active.

Surveillance data for Malta identified just 28% of older adults aged 65 years or older achieve the recommended level of PA [14]. Every five years the Department of Health Information and Research (DHIR) in Malta conducts a Health Interview Survey (HIS), which collates data on employment status and health determinants together with PA. If employment status is associated with a change in PA behaviour it would be expected that PA behaviour between those in employment and those retired due to statutory age differs. Studies investigating changes with employment status [15–20] used longitudinal data which are currently not available in Malta. The aim of this study was to (a) use the data from the HIS to obtain information on how PA might have changed over time in older adults around the time of retirement age and (b) assess any differences in PA with employment status across different time points.

2. Materials and Methods

Applying a repeat cross-sectional study design, data were obtained from the published HIS in Malta for the years 2002, 2008 and 2014. Permission to carry out the study was obtained from the DHIR and ethical clearance from the Sheffield Hallam ethics committee, reference number ER5441966.

The HIS for each year studied contains data from around 4000 persons across all age groups representing an adequate random sample of the Maltese population. The estimated population during these years ranged from 405,000 to 420,000 inhabitants. The total sample size (16 years and older) of the HIS, from which the data were extracted ($n = 5510$ in 2002; $n = 5500$ in 2008; $n = 4086$ in 2014), was based on a stratified sample calculation carried out by the DHIR. Participants were randomly selected by computerized methods from a population register provided by the National Statistics Office. The selected participants were individuals aged 15 years and older. All data collected were anonymous, as no personal identifiers were collected. A recruitment letter was sent to potential participants by mail which was followed by a telephone call. Those who consented undertook a structured interview at their home.

Based on previous research on PA correlates [21] for the purpose of this study, the variables analysed were age, gender, employment status, education, body mass index (BMI), marital status, self-rated health, various chronic conditions, activity limitation due to health problems, smoking and PA. Employment status was measured in six categories: unemployed, boarded out, retired, gainfully employed, homemaker and other (Table A1). Employment status was based on the person's self-assessment [22]; no set of criteria was used to categorise participants as being retired. Data was collected on three different PA intensities (walking, moderate and vigorous intensity), duration per day and per week. Data on sedentary behaviour was not available and hence not analysed. Questions used were very similar to the International Physical Activity Questionnaire—Short form (IPAQ) [23]; however, the questionnaire psychometric properties in Maltese language had not yet been tested [24]. For the purposes of this study, data was taken from a stratified sample of the participant population that fell within the ages of 50 and 74 years. The

statutory age of retirement in Malta for the years studied was between 61 and 64 years and it was decided to include the 10 years prior and following the retirement age. This age range is similar to inclusion criteria adopted by Baxter et al. [9].

Data and Statistical Analysis

Analysis of the data was carried out in a cross-sectional manner for each surveyed year by examining age as a continuous variable. Data was analysed longitudinally using multilevel analysis with repeated cross-sectional data [25–27]. The categorical variables of work status and education background were merged as the limited number of participants did not allow for statistical analysis. As the survey progressed, more detailed information was gleaned on educational level such as Bachelors, post-graduate diploma, masters, and PhD (Appendix A Table A1). These were grouped together under tertiary education. In the work domain, data in six categories were collected: (1) unemployed, (2) other, (3) retired, (4) gainfully employed, (5) domestic work and (6) boarded out. The six categories were group into four groups: (1) employed, (2) retired, (3) domestic and (4) unemployed + other (Appendix A Table A2). Chronic diseases were analysed by summing the total number of diseases recorded.

Data analysis for PA was carried out in accordance with the IPAQ guidelines since the data collected via the HIS questionnaire was similar [23,28]. Both questionnaires collect data on PA behaviour including walking, moderate, and vigorous intensity PA of more than 10-min bouts at a time and number of days per week. Using the same system as IPAQ ensured a standardized approach which allowed for comparison with other studies. Three categories of PA intensity were extracted: walking, moderate and vigorous intensity PA. Data on the different intensities and durations were processed into Metabolic Equivalents (MET) minutes per week as per IPAQ guidelines. When summed up, these three intensities provided the total MET minutes per week score that was suggestive of the overall PA. MET minutes per week of PA categories were determined as low, medium or high based on IPAQ classification [23].

PA categories were statistically analysed as categorical variables for within-year variation. MET values were assessed for normal distribution using the Kolmogorov–Smirnov test. Data which were not normally distributed were transformed using $\text{Log}_{10}(x + 1)$ and rechecked for their distribution. When normal distribution was not obtained, non-parametric tests were used to analyse the data. Mean and standard deviation were presented for continuous variables. The Pearson correlation, Chi-square, ANOVA, or their non-parametric equivalents were used for the analysis between variables.

Multilevel analysis was used to model PA as a continuous variable. Predictors were included in the model based on theoretical knowledge. This analysis was used to consider the data longitudinally. Assumptions for homoscedasticity and linear relationship between variables were assessed visually using scatter plot diagrams. Individual attributes were considered as level 1 analysis (employment status, BMI, number of chronic diseases and educational level) and survey years as level 2 analysis. PA as a continuous variable was considered the dependent variable [29]. Within the multilevel analysis, only employment and retirement status were considered.

A Microsoft Excel® spreadsheet was developed to store and analyses the data. IBM SPSS® (version 26) was used to complete the inferential statistical analysis. Statistical significance was accepted if $p < 0.05$.

3. Results

The number of included participants for the three years was 4690. The proportion of males and females was 47% and 53%, respectively. A higher proportion of retired individuals was present in 2002. The absence of any chronic disease was reported by 18% of the participants, whilst 10% reported more than five chronic diseases. The level of educational was higher in the 2014 survey. Table 1 provides a descriptive analysis of the variables collected and the significant differences between the survey years.

Table 1. Demographics by year of survey for the total population.

Demographic per Survey Year	2002 n (%)	2008 n (%)	2014 n (%)	p Value
Sex				
Male	682 (46.2)	654 (46.9)	859 (47.5)	0.76
Female	795 (53.8)	741 (53.1)	951 (52.5)	
Employment status				
Employed	414 (28) ^a	421 (30.1) ^a	538 (29.7) ^a	<0.001 *
Retired	498 (33.6) ^a	369 (26.4) ^b	544 (30.1) ^{a,b}	
Other	100 (6.8) ^b	83 (5.9) ^{a,b}	81 (4.5) ^b	
Domestic	462 (31.2) ^a	489 (34.9) ^b	646 (35.7) ^b	
Marital status				
Single	174 (11.9) ^a	192 (13.7) ^a	243 (13.4) ^a	<0.001 *
Married	1125 (76.7) ^a	1048 (75) ^a	1263 (69.8) ^b	
Widowed	122 (8.3) ^{a,b}	101 (7.2) ^b	174 (9.6) ^a	
Other	46 (3.1) ^a	57 (4.1) ^a	130 (7.2) ^b	
BMI (mean)	28.1	28.0	28.3	0.31
BMI categories				
Underweight	143 (10.4) ^a	307 (23.3) ^b	302 (17.8) ^c	<0.001 *
Healthy weight	394 (28.6) ^a	294 (17.8) ^b	395 (23.3) ^b	
Overweight	440 (32) ^a	395 (30) ^a	488 (28.8) ^a	
Obese	399 (29) ^a	320 (24.3) ^b	510 (30.1) ^a	
Non-smokers	1220 (82.7) ^a	1087 (78) ^b	1433 (79.5) ^{a,b}	<0.001 *
Self-rated health				
Good	818 (55.3) ^a	947 (67.7) ^b	1250 (69.7) ^b	<0.001 *
Fair	590 (67.7) ^a	397 (28.4) ^b	479 (26.7) ^b	
Bad	71 (69.7) ^b	55 (3.9) ^a	65 (3.6) ^a	
Education				
No school + special schools	82 (5.6) ^a	30 (2.1) ^b	13 (0.7) ^c	<0.001 *
Primary	789 (53.5) ^b	604 (43.2) ^b	626 (34.6) ^c	
Secondary	519 (35.2) ^c	647 (46.2) ^b	1010 (55.9) ^c	
Tertiary	84 (5.7) ^a	118 (8.4) ^b	159 (8.8) ^b	
Mean self-reported chronic illness	3	2	2	<0.001 *
Long-standing illness (yes)	553 (37.6) ^a	686 (49.5) ^b	911 (50.4) ^b	<0.001 *
Activity limitation (no)	1324 (89.5) ^a	949 (67.8) ^b	1664 (92) ^c	<0.001 *
PA behaviour				
Low	803 (54.3) ^a	733 (52.4) ^a	910 (50.3) ^a	<0.001 *
Moderate	398 (26.9) ^a	480 (34.3) ^b	785 (43.4) ^c	
High	279 (18.9) ^a	187 (13.4) ^b	115 (6.4) ^c	
PA total MET minutes per week (mean)	1932	1169	943	<0.001 *

* indicates significance at the 0.05 level. BMI = Body mass index; PA = Physical activity behaviour. ^{a,b,c} identifies statistical difference between columns.

In 2014, 6.4% of the participants reported high PA behaviour, which is less when compared to 2008 (13.4%) and 2002 (18.9%). However, the number of people reporting moderate PA behaviour was greater in 2014 (43%) compared to 2008 (34%) and 2002 (27%). Higher mean MET min per week scores were observed in 2002, and the lowest scores were observed in 2014. Based on ANOVA test with Dunnett's correction, the difference was statistically significant between years ($p < 0.001$). A higher variability in total MET min per week was obtained in 2002, and the lowest variability in total MET min per week was seen in 2014.

When comparing people in employment and those in retirement, there was a statistical difference in 2002 and 2008 but not 2014 (Table 2). What is noticeable is a decrease in the mean MET min per week in both groups. Employed individuals had statistically significant higher vigorous activity MET minutes per week than those in retirement in 2002 and 2008 (Table 3). In 2014, the mean vigorous activity MET minutes per week was still slightly higher in those in employment but the difference was not statistically significant ($p = 0.36$).

Table 2. Interquartile ranges for total MET min per week employed vs. retired.

Year	Total MET min per Week								<i>p</i> Value
	Employed				Retired				
	<i>n</i>	25th	50th	75th	25th	<i>n</i>	50th	75th	
2002	414	99	693	2966	99	498	693	2310	0.03 *
2008	421	132	693	1893	165	369	657	1386	<0.001 *
2014	538	264	660	1316	198	544	671	1320	0.86

* indicates significance at the 0.05 level. MET = metabolic equivalent.

Table 3. Mean PA at different intensities comparing employed and retired individuals.

Year	Employment Status	Mean Total Walk MET min per Week		p Value	Mean Total Moderate MET min per Week		p Value	Mean Total Vigorous MET min per Week		p Value
2002	Employed	446		0.26	459		0.75	485		<0.001 *
	Retired	465			455			432		
2008	Employed	386		0.21	407		0.64	405		0.02 *
	Retired	406			382			384		
2014	Employed	539		0.75	547		0.36	544		0.36
	Retired	544			536			539		

* indicates significance at the 0.05 level.

Analysis of the IPAQ categories across the three surveys shows that 52.2% ($n = 2446$) of the participants reported low PA behaviour and 12.4% ($n = 581$) reported high PA behaviour. The findings in each PA category were similar for employed and retired persons (Table 4). The variables which were consistently significantly associated with total PA MET minutes per week across the three surveys were the presence of a long-standing illness, activity limitation, self-rated health, BMI and number of chronic conditions. Age, employment status and education were not always statistically related to PA categories (Table 5). Analysis with independent variable with walking, moderate and vigorous intensity PA as dependent variables are present in Appendix B.

Statistical modelling was carried out for the dependent variable of PA as a continuous variable. Total PA data were skewed, so data transformation was carried out to achieve data normalization. Initial model testing was carried out between total PA (dependent variable) and survey year as a second-level model [29]. The intercept within the model was not statistically significant ($p = 0.364$). The interclass correlation co-efficient for the level-2 model was 0.006. Testing with level 1 (individual data) was included in the model. The model intercept of level-1 data was statistically significant ($p < 0.001$). Data are presented in Table 6.

Table 4. Physical activity IPAQ categories with employment status.

Year	PA Category	Employed n (%)	Retired n (%)	p Value
2002	Low	213 (51.4) ^a	254 (51) ^a	0.44
	Moderate	109 (26.3) ^a	147 (29.5) ^a	
	High	92 (22.2) ^a	97 (19.5) ^a	
2008	Low	207 (49.2) ^a	183 (49.6) ^a	0.025 *
	Moderate	141 (26.3) ^a	139 (37.7) ^a	
	High	73 (17.3) ^a	47 (12.7) ^b	
2014	Low	271 (50.4) ^a	263 (48.3) ^a	0.79
	Moderate	227 (42.2) ^a	240 (44.1) ^a	
	High	40 (7.4) ^a	41 (7.5) ^a	

* indicates significance at the 0.05 level; ^{a,b} identifies statistical difference between columns.

Table 5. Total MET min per week and independent variables.

Variable	2002 (n = 912)	2008 (n = 790)	2014 (n = 1082)
Activity limitation ^	−5.796 **	−2.611 **	−4.972 **
Long-standing health problems ^	−5.539 **	−2.773 **	−7.065 **
Smoking ^	−0.508	−0.523	−1.678
Sex (male) ^	−3.334 **	−2.869 *	−0.441
Self-rated health ~	<0.001 **	<0.001 **	<0.001 **
Education ~	0.014	<0.001 **	0.010 *
Employment ~	0.181	0.004 *	0.832
Chronic conditions +	−0.104 **	−0.106 **	−0.136 **
BMI (kg/m ²) +	−0.111 **	−0.097 **	−0.161 **
Age (years) +	−0.043	−0.093 **	−0.043

^ Mann–Whitney U test used the Z score. ~ Kruskal–Wallis H test used the p value. * Spearman correlation used the correlation co-efficient r. + indicates significance at the 0.05 level. ** indicates significance at the 0.01 level.

Table 6. Multilevel analysis includes level 1 (individual) and level 2 (survey year).

	Level 1 Variable	Std Error	t	95% CI	p Value
Employment status	Intercept	0.45	14.81	2.21–4.03	<0.001
	Employed	0.334	−2.67	−0.16–0.02	0.007 *
Sex	Retired				
	Male	0.03	2.35	0.01–0.11	0.19
	Female				
	BMI	0.02	−4.11	−0.01–0.004	<0.001 **
	Age	0.002	−2.35	−0.01–0.001	0.03 *
	Single	0.06	−1.19	−0.18–0.04	0.25
	Married	0.05	−1.12	−0.15–0.04	0.27
	Widowed	0.06	−0.78	−0.17–0.08	0.43
	Divorced				
	Very good	0.14	2.51	0.07–0.63	0.02 *
	Good	0.14	1.70	−0.04–0.51	0.09
	Fair	0.14	0.449	−0.02–0.34	0.63
	Bad	0.16	−0.083	−0.43–0.17	0.41
	Very Bad				
	No school	0.12	0.29	−0.66–0.90	0.77
	Primary	0.14	0.35	−0.63–0.90	0.72
	Secondary	0.12	0.31	−0.63–0.88	0.75
	Tertiary	0.15	0.37	−0.62–0.91	0.71
	Special schools				
	Yes	−0.05	−1.99	−0.09–0.001	0.04 *
	No				
	Level 2 Variable				
	Survey year	0.004		−0.0004–0.032	0.363

* indicates significance at the 0.05 level. ** indicates significance at the 0.01 level.

4. Discussion

The aim of this study was to assess differences in PA behaviour between people retired due to old age and those in employment. Data from three cross-sectional surveys in Malta were used. In the studied population throughout the years, there was an increase in the proportion of people participating in moderate PA behaviour and a decrease in high PA behaviour, which was found to be statistically significant. The proportion of people who

had a low level of PA behaviour remained not significantly different throughout the years. Consistent with trends reported in other countries such as Australia and the USA [30], a higher proportion of people within the total population reached moderate PA behaviour in each of the survey years.

When considering the total sample across the years, there was a decrease in the mean total MET minute per week which could be attributed to less people reaching high PA behaviour. There are less people who have high PA behaviour and more who have moderate PA behaviour. Statistical differences found when measuring PA categorially or in MET minutes per week were not congruent. IPAQ categories are based on a mix of days per week, duration and MET minutes per week, whilst continuous PA scores are in MET minutes per week; therefore, both parameters measure different aspects of PA behaviour.

There was a difference in the PA behaviour between retired and employed in the years of 2002 and 2008, when measured using MET minutes per week. This difference was only present in 2008 when grouping PA behaviour according to IPAQ categories. The difference in MET minutes per week is attributed to the amount of vigorous PA carried out by employed individuals which was significantly higher than those who retired for 2002 and 2008. Results indicate that there was a decrease in PA intensity in retired individuals, a difference that was not present in 2014. Studies found that there is a gradual decrease in the amount of vigorous PA, starting at the age of 40 years which continues to decrease in old-age retirees, even when adjusting for covariates (BMI, SES, limiting long-standing illness) [31,32]. The percentage of employed individuals reaching high levels of PA behaviour decreased by 14.8% from 2002 to 2014 in our data.

During the 12 years, the difference in MET minutes per week between retired and employed decreased, and any future data will be able to indicate whether there is a trend with retired individuals becoming more physically active than those in employment. However, these differences were not present when PA behaviour was analysed using IPAQ PA categories. A higher proportion of the retired individuals attained moderate PA behaviour compared to those employed. Leisure time PA activity has been shown to increase after retirement, which might be of vigorous or moderate intensity [10]. Similarly, our results indicate that there is a shift in the intensity level.

Leisure time PA tends to be higher in people with higher SES [31]. Education was used as a proxy for SES. The education levels in the studied cohorts increased with the surveyed years. This study found no correlation between education and PA intensities. A possible explanation is that SES is a non-static construct, and cross-sectional education might not ascertain these differences [33].

There was a trend for people in retirement to undertake more walking behaviour measured in MET min per week when compared to those in employment, but this did not reach statistical significance. Other studies have found a significant increase in walking activity after retirement [31,34,35]. These studies followed people across their retirement and looked at individual difference in PA behaviour. Malta exhibits a car culture with 80% of the population using a car to commute, even for the shortest distances with trips that could be walked in 10 min [36]. This might explain why no statistical difference was found between those employed and unemployed for car use, being high across all age groups.

In analysing the data on total MET minutes per week, for employed and retired people, longitudinally using multilevel modelling and considering survey years as a 2nd-level analysis, the data were found not to be statistically significant. One possible reason for this is the skewness in PA behaviour which required data transformation. In using data transformation, this could have influenced the statistical relationship [37]. Individual level (1st level) factors, i.e., being retired, male, low BMI, young age and good self-rated health, were found to predict PA behaviour. However, these predictors were not strong in explaining PA behaviour. This could mean that there are other variables, such as food intake and sleep, for which data were not collected but can predict PA behaviour better and should be measured in future studies.

Similar to other studies [38], when examining PA behaviour with age this was only found to predict PA behaviour in the multilevel model. Having a long-standing health problem was associated with PA behaviour in all three survey years and within the model. In all three surveys a long-standing health problem was the most significantly associated factor with total MET. The presence of a long-standing health problem was related to the presence of activity limitation and self-rated health. These covariates might influence PA behaviour differently due to the interaction between these different factors when including them all together within the multilevel model, which would cause interaction between the variables as they measure conjoint factors. In old age, self-rated health is influenced by a person's outlook with respect to any concurrent abilities, whilst activity limitation is dependent on the person's physical abilities [39]. Self-rated health can influence the type of PA behaviour undertaken, as it reflects a person's outlook of self-ability [40,41]. However, given that the study age range was fixed throughout the three surveys, the correlation between age and PA behaviour could have been influenced.

Any increase in PA after retirement is believed to be short lived, and a decrease in PA is expected thereafter [11]. This study indicates that there are other important factors which influence PA behaviour when retired. Retirement is a process with no universally accepted start date [42,43]. Taking a resource-based dynamic process towards retirement explains why other variables such as history of PA and self-efficacy might be more important predictors of PA post-retirement rather than employment status. Retirement adjustment is influenced by the person's resources [43] and differences might not be present when analysing data at a population level.

4.1. Limitations and Strengths

This study is based on the analysis of secondary data, and therefore the data were not specifically collected for the study purpose, which creates limitations of result generalization specific to the effect of retirement [44]. One of the major limitations of the study is the inability to follow participants over time, due to the anonymous nature of the primary data collection. However, the sample size was large enough to be representative of the Maltese population.

The measurement of PA was completed using an in-house questionnaire, so its psychometric properties cannot be ascertained. However, it was similar to the IPAQ short form which has been deemed to be valid and reliable. Measurement of sedentary behaviour would have provided useful data for analysis and should be included in future iterations of the survey. Using questions similar to IPAQ in the older population might not be the most appropriate tool as there are other tools which are more specific to older adults [45]. Using MET minutes per week is a measure of absolute physiological intensity whilst self-reported measures measure relative intensity, which creates a discrepancy within the measurement [46]. This discrepancy occurred across all the populations under study.

The clear strength of this study is that to the authors' knowledge it is the first attempt to identify the possible effect of retirement on PA in the Maltese population. The study was able to distinguish between those in retirement and still employed. The recruited participant sample was representative of the population. The sample was able to assess cross-sectional changes across the 12 years under study. The analysis of PA was based on IPAQ guidelines, an international approved system with frequent use within the literature. This made it possible to analyse PA data in a continuous and categorical format [47].

4.2. Future Research

Given the limitations of secondary analysis, the relationship between PA and retirement should be examined further. Exploring the possible change in PA and its causes during retirement can help support national policy development to support PA promotion during the retirement transition. Future research should use a longitudinal design, measure PA, follow the same participants over time and explore how the experience of retirement might influence PA later in life using qualitative means.

4.3. Practical Implications

The PA behaviour within the population decreased over time due to fewer people reaching vigorous PA behaviour. PA behaviours are expected to decrease with age, so promoting PA levels during retirement may have a beneficial influence on the health of the population [8]. Being in retirement was found to predict positive PA behaviours. An exploration of how retirement can have a beneficial influence on PA behaviour is warranted as well as interventions to encourage more vigorous PA behaviour.

5. Conclusions

This study investigated employment status and PA behaviour at a population and individual level by looking at the data longitudinally using a repeat cross-sectional design. Across the 12 years, based on the statistical model, people in retirement were more active than those in employment. Other factors such as BMI, long-standing health problems, age and self-rated health could be causing the higher levels seen in the employed population during the studied years. Irrespective of these variables, the study found that PA behaviour was similar between retired and employed persons in 2014. The levels of PA may be increasing among the retired population compared to those in employment, and analysis of future data set could be used to indicate whether this is a one-time cohort effect or a developing period trend.

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Data Availability Statement: Data can be made available by request to the Directorate for health information and research, Ministry for Health, Malta. <https://deputyprimeminister.gov.mt/en/dhir/Pages/Introduction.aspx> (accessed on 2 August 2021).

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Appendix A

The Health interview survey collated data on education into seven different categories: no formal education, primary, lower secondary, upper secondary, post-secondary, tertiary first stage, tertiary second stage. The categories were grouped into five groups: no formal education, primary, secondary, and tertiary (Table A1). Work status was grouped into three categories: unemployed, which included boarded-out and permanent disability, domestic work, pensioners or retired and employed (Table A2).

Table A1. Transformation of education categories.

Education Categories Used in Analysis	Education Categories in 2002	Education Categories in 2008	Education Categories in 2014
No Schooling	No Schooling	No formal education	No formal education
Primary	Special schools Primary Secondary	Primary Lower Secondary	Schools for special needs Primary Secondary general
Secondary	Upper secondary	Upper secondary	Secondary with vocational training Foundation and introductory courses at MCAST 1 or less year Post-secondary general
		Post-secondary	Post-secondary vocational courses of 2 years or less Post-secondary vocational courses of more than 2 years University level diploma/certificate of MCAST higher nation
Tertiary	Tertiary	Tertiary first stage Tertiary second stage	Bachelor's degree or equivalent Postgraduate diploma/certificate Master's degree PhD

Table A2. Transformation of work categories.

Work Categories Used in Analysis	Work Categories in 2002	Work Categories in 2008	Work Categories in 2014
Unemployed + other	Unemployed Other Boarded out	Unemployed Other Permanent disability	Unemployed Other inactive person Permanent disability
Retired	Pensioner	Retirement / given up business	In retirement
Employed Domestic	Gainfully employed Homemaker	Working for pay or profit Domestic work	Working for pay or profit Fulfilling domestic tasks

Appendix B

Table A3. Walking MET min per week and independent variables.

Variable	2002 (n)	2008 (n)	2014 (n)
Activity limitation ^	−4.846 **	−1.635	−4.854 **
Long standing health problems ^	−3.3733 **	−0.308	−7.289 **
Smoking ^	−0.556	−1.372	−1.351
Sex (male) ^	−0.55	−0.555	−0.262
Self-rated health ~	<0.001 **	<0.001 **	<0.001 **
Education ~	0.827	0.016 *	0.272
Employment ~	0.134	0.317	0.981
Chronic conditions +	−0.079 **	−0.35	−0.12 **
BMI (kg/m ²) +	−0.106 **	−0.077 *	−0.135 **
Age (years) +	−0.012	−0.023	−0.28

^ Mann-Whitney U test used Z score. ~ Kruskal-Wallis H test used p value. + Spearman Correlation used correlation co-efficient r. * indicates significance at 0.05 level. ** indicates significance at 0.01 level.

Table A4. Moderate MET min per week and independent variables.

Variable	2002 (n)	2008 (n)	2014 (n)
Activity limitation ~	−3.457 *	−1.791	−2.288 *
Long standing health problems ~	−3.347 **	−3.751 **	−2.983 *
Smoking ~	−0.767	−0.071	−1.465
Sex (male) ~	−2.852 *	−1.285	−2.055 *
Self-rated health ~	<0.001 **	<0.001 **	<0.001 **
Education ~	<0.001 **	0.002 *	<0.001 **
Employment ~	0.306	0.010 *	0.053
Chronic conditions +	−0.025	−0.105 **	−0.088 *
BMI (kg/m ²) +	−0.083 *	−0.053	−0.123 **
Age (years) +	−0.008	−0.084 *	−0.051 *

~ Mann-Whitney U test used Z score. ~ Kruskal-Wallis H test used p value. + Spearman Correlation used correlation co-efficient r. * indicates significance at 0.05 level. ** indicates significance at 0.01 level.

Table A5. Vigorous MET min per week and independent variables.

Variable	2002 (n)	2008 (n)	2014 (n)
Activity limitation ~	−2.242 *	−0.167	−0.178
Long standing health problems ~	−4.4116 **	−3.067 *	−0.729
Smoking ~	−1.355	−0.034	−1.651
Sex (male) ~	−3.285 *	−1.424	−0.236
Self-rated health ~	<0.001 **	<0.001 **	<0.001 **
Education ~	0.005 *	0.229	0.008 *
Employment ~	<0.001 **	0.063	0.833
Chronic conditions +	−0.084 **	−0.072 **	−0.22
BMI (kg/m ²) +	−0.045	−0.046	−0.071 **
Age (years) +	−128 **	−0.78 **	−0.49 *

~ Mann-Whitney U test used Z score. ~ Kruskal-Wallis H test used p value. + Spearman Correlation used correlation co-efficient r. * indicates significance at 0.05 level. ** indicates significance at 0.01 level.

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Section 2. Barriers and motivators of physical activity participation in middle-aged and older adults-a systematic review (published paper)

This section presents the results of a systematic review which was undertaken to check for differences in barriers and motivators between middle-aged and older adults. The paper was published in the Journal for Ageing and Physical Activity. Ms Amira Hassan Bekhet collaborated on this project by screening the articles and contributed to critical appraisal which were used to ensure quality of the research process. This paper addressed objective B.

Retirement brings about changes in the person's daily routine which could influence barriers and motivators towards PA participation. As the age of 65 years is synonymous with retirement age this review checked whether there were differences between middle-aged (who were presumed to be still in employment) and older adults (who were considered retired). The paper uses the theoretical domain framework to make the results useful to other researchers when implementing health promotion interventions. The results from the study were used to inform the choice of data collection tools to be used, and for comparison of the findings with the literature of the mixed-methods study. It is worth noting that this paper is becoming highly cited ($n = 75$).

Supplementary files part of this paper is found in the appendix. The PROSPERO protocol is available in Appendix 23. Supplementary material 1 is available in Appendix 24; supplementary material 2 in Appendix 25; supplementary material 3 in Appendix 26.

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6. Summary

This chapter has presented the results from two secondary data analyses which were used to address specific objectives within the PhD to develop the main MM study. The next chapter presents the results of the MM study. In Chapter 6, the findings from the secondary analysis and the MM study are discussed in view of the knowledge gaps identified through the literature review (Chapter 2).

Chapter 5 Results Mixed Method study

Section 1. Pre and post retirement data quantitative part

This chapter is divided into four sections. The first section presents results from the quantitative (QUAN) strand of the study. Data was collected using the English and translated Maltese version of the IPAQ-long (Spiteri, Grafton, *et al.*, 2021), EMI-2 (Spiteri *et al.*, 2022), questions about barriers towards PA and demographic information. These results address objective D of the PhD to assess changes in PA and SB following retirement. Pre- and post- retirement quantitative data are presented in this section. The following section presents the pre-retirement data from the qualitative (QUAL) strand. Results presented were part of a published paper (Karl Spiteri *et al.*, 2022), it provides an overview about who the participants were and their perceptions about retirement. Section three presents the post-retirement QUAL data, and the final section integrates the results from previous sections. Data for the MM study have been submitted to the journal International Journal of Environmental Research and Public Health for publication in a special issue and is currently under review.

1. Demographic profile

Civil servants who were 60 years of age and older and still in employment were emailed the recruitment letter. A total of 3 reminders were sent via email. The total number of potential participants was 881. The response rate was 11% with a total of 96 questionnaires. Out of the 96 not all questionnaires were considered completed. Questionnaires' guidelines were used to determine completion. The EMI-2 was considered incomplete if there were 4 or more questions not answered. The IPAQ-long was considered incomplete if data was missing for time or days.

When the IPAQ-long was incomplete the questionnaire was discarded. The total number of incomplete IPAQ-long was 7, obtaining a 92.7% inclusion rate.

The sex divide was 49.4% (n = 44) male and 50.6% (n = 45) female. The service grades ranged between scale 2 (top management) to 15 (porter). 50% of the participants were scale 6 (management) and above, the rest were scale 7 and below. 19% of the participants had secondary or primary level of education, 27% (n = 24) had post-secondary level of education and the rest 53.9% (n = 48) had tertiary level of education. 7.9% were single, 85.4% (n = 76) were married, 5.6% (n = 5) lived with a partner and 1 person was widowed. 20% (n = 27) of the participants were unsure whether they will retire within the next year, 45% (n = 40) did not plan to retire within the next year, 24.7% (n = 22) were planning to retire within the coming year.

2. Pre-retirement physical activity and sedentary behaviour

a) Descriptive and demographic differences

Data collected for PA behaviour and sitting time are presented in Table 6. The mean sitting time was 2207 min per week and for total PA was 4706 MET min per week. Shapiro-Wilk test was used to test for normality, but none of the variables were normally distributed. Non-parametric testing was used to test for statistical differences between the groups.

Table 6 *Pre-retirement PA and SB of total population*

	Mean	25th Percentile	Median	75th Percentile
Total sitting time per week	2207	960	2160	3060
Total PA (MET min per week)	4706	1040	2133	5108
Total vigorous (MET min per week)	1085	0	0	480
Total moderate (MET min per week)	2673	285	960	2880
Total walking (MET min per week)	949	297	693	1188
Total leisure (MET min per week)	1276	0	198	990
Total domestic (MET min per week)	2280	225	675	2280
Total transport (MET min per week)	398	46	264	594
Total work	753	0	33	594

Statistical difference in PA behaviour and planning to be retired was not present within the population Table 7. No statistical difference was presents between sexes Table 8. Difference with education level were present in the pre-retirement phase, those with a higher education had higher sitting time and higher total PA in transport domain, Table 9.

Table 7 *Statistical difference between retirement planning*

	Plan to retire		Unsure		Not planning to retire		Kruskal-Wallis test
	Mean	SD	Mean	SD	Mean	SD	p-value
Total sitting time per week	1958	1671	2364	1719	2106	1502	0.612
Total PA (MET min per week)	3217	3501	4503	8681	5101	7790	0.635
Total vigorous (MET min per week)	402	1186	777	1929	1569	4118	0.915
Total moderate (MET min per week)	2126	2794	2779	7822	2556	3735	0.153
Total walking (MET min per week)	688	953	947	798	976	1181	0.327
Total leisure (MET min per week)	791	1779	1168	2343	1469	4403	0.462
Total domestic (MET min per week)	1842	2651	2447	7568	2110	3361	0.131
Total transport (MET min per week)	278	573	315	352	472	442	0.069
Total work	305	571	573	1160	1049	2438	0.534

Table 8 *Sex differences*

Sex	Male		Females		Mann-Whitney U test
	Mean	SD	Mean	SD	p-value
Total sitting time per week	2493	1822	1797	1289	0.054
Total PA (MET min per week)	3537	4440	5262	9049	0.378
Total vigorous (MET min per week)	806	1823	1222	3806	0.365
Total moderate (MET min per week)	1812	2786	3181	6539	0.166
Total walking (MET min per week)	918	1239	859	862	0.501
Total leisure (MET min per week)	824	1533	1559	4350	0.946
Total domestic (MET min per week)	1543	2542	2718	6272	0.136
Total transport (MET min per week)	376	539	369	378	0.445
Total work	794	2094	618	1379	0.652

Table 9 *Educational difference*

Education	Primary / Secondary		Post- secondary		Tertiary		Kruskal- Wallis test
	Mean	SD	Mean	SD	Mean	SD	p-value
Total sitting time per week	1808	939	1656	1506	2524	1765	0.043*
Total PA (MET min per week)	3771	4160	2290	2035	5783	9259	0.583
Total vigorous (MET min per week)	1073	2414	205	446	1434	3798	0.406
Total moderate (MET min per week)	1986	2298	1263	1504	3360	6669	0.515
Total walking (MET min per week)	711	794	821	933	989	1131	0.447
Total leisure (MET min per week)	1433	3149	456	569	1509	4072	0.914
Total domestic (MET min per week)	1477	1930	1033	1431	2970	6368	0.447
Total transport (MET min per week)	269	395	342	613	426	386	0.033*
Total work	592	1567	459	610	879	2199	0.635

PA behaviour was also measured using the IPAQ PA categories. There were 23.6% (n = 21) of the population who were categorised as having low levels of PA. 38.2% (n = 34) had moderate or high levels of PA. Statistical difference between sex was checked using Chi square, this was not statistically significant (p = 0.732). No statistical difference in plans for retire (p = 0.317), and education (p = 0.360).

Pre-retirement motivation towards exercise was measured using the EMI-2 (Table 10). The lowest motivations were social recognition and competition with a mean of 0.73. The highest motivations were positive health, and ill-health avoidance with a mean of 3.54 and 3.53 respectively. In testing for normality, the Shapiro-Wilk test was used and none of the variables were normally distributed.

Table 10 *Description of EMI-2 results*

Variable	Mean	SD
Stress Management	2.69	1.777
Revitalisation	3.04	1.713
Enjoyment	2.52	1.790
Challenge	1.63	1.546
Social Recognition	0.73	1.047
Affiliation	1.23	1.394
Competition	0.73	1.172
Health Pressures	1.60	1.508
Ill-Health Avoidance	3.53	1.817
Positive Health	3.54	1.794
Weight Management	2.95	1.850
Appearance	2.01	1.686
Strength & Endurance	2.57	1.672
Nimbleness	2.87	1.705

Statistical difference was checked between sexes using Mann-Whitney U test (Table 11). There was a statistically significant difference in motivation in enjoyment, appearance and strength & endurance between sexes. Females had a higher mean motivation in enjoyment, appearance and strength & endurance.

Table 11 *Sex difference in EMI-2*

Variable	Male		Females		P-value	Z
	Mean	SD	Mean	SD		
Stress Management	2	2	3	2	.099	-1.651
Revitalisation	3	2	3	2	0.059	-1.891
Enjoyment	2	2	3	2	0.026*	-2.183
Challenge	1	2	2	2	0.203	-1.273
Social Recognition	1	1	1	1	0.852	-0.186
Affiliation	1	1	1	2	0.183	-1.331
Competition	1	1	1	1	0.957	-0.054
Health Pressures	2	2	1	1	0.408	-0.827
Ill-Health Avoidance	3	2	4	2	0.288	-1.062
Positive Health	3	2	4	2	0.170	-1.373
Weight Management	3	2	3	2	0.589	-0.541
Appearance	2	2	2	2	0.034*	-2.124
Strength & Endurance	2	2	3	2	0.006*	-2.764
Nimbleness	3	2	3	2	0.070	-1.810

Using Kruskal-Wallis H test statistical difference was checked between educational groups (Table 12) and plans to retire (Table 13). There was a statistical difference in revitalisation with higher mean in those with lower education, but no statistical difference was found for the remaining motivation constructs. There was a statistically significant difference in exercise motivation in enjoyment, challenge, and social recognition, in those with different retirement plans. Those who were unsure whether to retire had the highest mean enjoyment, social recognition and challenge followed by those who plan to continue working.

Table 12 *Educational difference*

Variable	Primary / Secondary		Post- secondary		Tertiary		Kruskal-Wallis test
	Mean	SD	Mean	SD	Mean	SD	P-value
Stress Management	3	2	3	2	2	2	0.625
Revitalisation	4	2	3	2	3	2	0.026*
Enjoyment	3	2	3	2	2	2	0.139
Challenge	3	2	2	1	1	1	0.053
Social Recognition	1	2	1	1	1	1	0.456
Affiliation	2	2	2	2	1	1	0.092
Competition	1	2	1	1	0	1	0.541
Health Pressures	2	2	2	2	1	1	0.224
Ill-Health Avoidance	4	2	3	2	3	2	0.241
Positive Health	4	2	3	2	3	2	0.133
Weight Management	4	2	3	2	3	2	0.315
Appearance	2	2	2	2	2	2	0.535
Strength & Endurance	3	2	2	2	2	2	0.197
Nimbleness	3	2	3	2	3	2	0.380

Table 13 *Retirement planning differences*

Variable	Plan to retire		Not planning to retire		Unsure		Kruskal-Wallis test
	Mean	SD	Mean	SD	Mean	SD	p-value
Stress Management	3	2	2	2	3	2	0.338
Revitalisation	3	2	3	2	4	1	0.090
Enjoyment	2	2	2	2	3	2	0.007*
Challenge	2	2	1	1	2	2	0.042*
Social Recognition	0	1	1	1	1	1	0.010*
Affiliation	1	2	1	1	2	1	0.205
Competition	1	1	1	1	1	1	0.163
Health Pressures	2	2	2	1	1	2	0.523
Ill-Health Avoidance	3	2	3	2	4	2	0.847
Positive Health	3	2	3	2	4	2	0.167
Weight Management	3	2	3	2	3	2	0.525
Appearance	2	2	2	2	2	2	0.291
Strength & Endurance	3	2	2	2	3	1	0.060
Nimbleness	3	2	2	2	3	1	0.252

Participants were asked if they identified any barriers which did not allow them to participate in their planned PA and to list down the barriers they identified. Half of the participants (50%)

identified barriers which stopped them from participating in their planned PA. The rest did not identify any barriers. The identified barriers were written down by participants. These were then coded in different categories and counted. The identified barriers are in Table 14, the most identified barriers were health problems, the least identified were lack of confidence and no support from others.

Table 14 *Type of barriers identified*

Barrier	Count
Health Problems	14
Family	10
Weather	4
Work	10
Not enough time	9
Lack of motivation	5
Tired, lack of energy	3
Environment	2
Lack of confidence	1
No support from others	1

b) Inferential statistics between variables

A statistical difference with motivation constructs and the perceived barriers toward PA (yes/no) was assessed using Mann-Whitney U test (Table 15). There was a statistical difference in stress management, revitalization, enjoyment, and strength and endurance, those who perceived barriers had higher mean motivation in those domains.

Table 15 *Perceived barriers and motivational constructs*

Variable	Barriers	
	P-value	Z
Stress Management	0.050*	-1.961
Revitalisation	0.045*	-2.006
Enjoyment	0.047*	-1.991
Challenge	0.293	-1.051
Social Recognition	0.314	-1.006
Affiliation	0.105	-1.620
Competition	0.655	-0.446
Health Pressures	0.864	-0.171
Ill-Health Avoidance	0.568	-0.570
Positive Health	0.419	-0.808
Weight Management	0.340	-0.954
Appearance	0.940	-0.075
Strength & Endurance	0.010*	-2.586
Nimbleness	0.120	-1.554

Statistical analysis between the different PA domains, motivation and presence of barriers were assessed statistically. Spearman correlation was used to evaluate the analysis between PA domains and motivation constructs (Table 16). Mann-Whitney U was used to evaluate difference between PA domains and presence of barriers (Table 17). There was no statistical difference in the PA domains and the presence of barriers towards PA. The amount of sitting time was weakly statistically correlated (0.232) with ill-health avoidance ($p = 0.029$). Total sitting time was not correlated statistically with any motivational construct within the EMI-2. Total PA was correlated statistically with most constructs except for social recognition, health pressure and appearance. Total work PA and total vigorous PA were not statistically correlated with any construct. Total moderate, walking and leisure PA were statistically correlated with various motivation constructs.

Table 16 *PA and SB with motivation constructs*

Variable		Total Sitting Time	Total PA	Total Vigorous	Total Moderate	Total walking	Total work	Total domestic	Total transport	Total leisure
Stress Management	ρ	.059	.360**	.000	.332**	.244*	.004	.340**	.087	.335**
	P-value	.583	.001	.999	.001	.021	.970	.001	.416	.001
Revitalisation	ρ	-.025	.373**	.023	.323**	.316**	.105	.314**	.136	.388**
	P-value	.815	.000	.831	.002	.003	.329	.003	.202	.000
Enjoyment	ρ	-.072	.352**	.008	.256*	.316**	.065	.240*	.137	.349**
	P-value	.505	.001	.944	.016	.003	.548	.023	.202	.001
Challenge	ρ	.036	.221*	-.107	.177	.081	-.086	.186	.048	.240*
	P-value	.737	.038	.318	.097	.453	.422	.081	.657	.024
Social Recognition	ρ	.087	.168	.042	.109	.215*	.051	.149	.128	.189
	P-value	.416	.115	.693	.311	.043	.636	.163	.232	.075
Affiliation	ρ	-.023	.311**	-.026	.260*	.261*	.107	.244*	.053	.258*
	P-value	.832	.003	.806	.014	.013	.317	.021	.625	.014
Competition	ρ	.088	.241*	.113	.179	.168	.078	.166	.008	.310**
	P-value	.414	.023	.293	.093	.115	.467	.120	.942	.003
Health Pressures	ρ	.188	.136	-.149	.241*	.023	-.038	.267*	-.027	-.006
	P-value	.078	.203	.163	.023	.831	.723	.011	.803	.953
Ill-Health Avoidance	ρ	.232*	.266*	.011	.273**	.128	.030	.255*	.059	.239*
	P-value	.029	.012	.917	.010	.232	.782	.016	.584	.024
Positive Health	ρ	.080	.262*	-.053	.226*	.171	.067	.201	.048	.169
	P-value	.458	.013	.619	.033	.109	.534	.059	.654	.114
Weight Management	ρ	.125	.225*	-.001	.271*	.098	.055	.247*	.099	.180
	P-value	.243	.034	.995	.010	.359	.609	.020	.358	.091
Appearance	ρ	.023	.142	-.097	.172	.118	-.079	.190	.110	.179
	P-value	.829	.183	.364	.108	.272	.459	.075	.305	.093
Strength & Endurance	ρ	.023	.283**	-.104	.338**	.083	-.101	.362**	.067	.176
	P-value	.829	.007	.330	.001	.438	.346	.000	.532	.098
Nimbleness	ρ	.168	.303**	.025	.346**	.040	-.136	.370**	.083	.203
	P-value	.115	.004	.817	.001	.711	.203	.000	.441	.056

*Shows statistical significance at $p < 0.05$; **Shows statistical significance at $p > 0.01$

Table 17 *PA and SB with presence of barriers*

Variable			Total Sitting Time	Total PA	Total Vigorous	Total Moderate	Total walking	Total work	Total domestic	Total transport	Total leisure
Presence of barriers	Z value		-.459	-1.627	-1.541	-.600	-.475	-.990	-1.110	-.120	-1.579
	P-value		.646	.104	.123	.549	.635	.322	.267	.905	.114

3. Post-retirement physical activity and sedentary behaviour

The response rate to the post-retirement questionnaire was 43 out of the 89 valid participants, the total response rate was 48.3%. The sex divide was 45% (n = 18) male and 55% (n = 22) female. The service grades ranged between scale 2 to 15. 46.2% of the participants were scale 6 and above, the rest were scale 7 and below. 27.5% of the participants had secondary or primary level of education, 37.5% had post-secondary level of education and the rest 35% had tertiary level of education. 7.5% were single, 87.5% were married, 2.5% lived with a partner and 1 person was widowed. 20% (n = 27). 52.5% of the participants retired since the first data collection, the remaining 47.5% were still in the same employment.

Data collected for PA behaviour and sitting time are presented in Table 18. The mean sitting time was 2258 min per week and for total PA was 3383 MET min per week. Shapiro-Wilk test was used to test for normality, but none of the variables were normally distributed. Non-parametric testing was used to test for statistical differences between the groups.

Table 18 *PA and SB of post-retirement population*

Variable	Mean	25th Percentile	Median	75th Percentile
Total sitting time per week	2258	1020	2220	3180
Total PA (MET min per week)	3383	1000	2159	4031
Total vigorous (MET min per week)	739	0	0	108
Total moderate (MET min per week)	1843	120	810	2220
Total walking (MET min per week)	801	264	594	1106
Total leisure (MET min per week)	737	0	198	774
Total domestic (MET min per week)	1646	0	540	1920
Total transport (MET min per week)	344	0	165	479
Total work	656	0	110	830

Statistical difference in PA behaviour between retired and not retired was checked using Kurskal-Wallis test (Table 19). Statistically significant difference was found for total work PA, total sitting time and total moderate. In total moderate PA retired had higher means, whilst in the other two domains not retired had higher means. Statistical difference was not presented between

sexes (Table 20). Statistically significant difference with higher education level was present, for total vigorous PA, and total transport PA (Table 21).

Table 19 *Difference in PA and SB by retirement status*

Retirement status	Retired		Not retired		Mann-Whitney test (p-value)
	Mean	SD	Mean	SD	
Total sitting time per week	1765	1004	2498	1352	0.046*
Total PA (MET min per week)	3872	3526	2880	2160	0.521
Total vigorous (MET min per week)	171	559	564	1571	0.349
Total moderate (MET min per week)	2650	2914	1070	1461	0.040*
Total walking (MET min per week)	1052	1160	1246	1221	0.502
Total leisure (MET min per week)	1012	1190	872	1482	0.365
Total domestic (MET min per week)	2522	2874	875	1266	0.071
Total transport (MET min per week)	338	637	530	867	0.264
Total work	0	0	603	900	0.000*

Table 20 *Difference between sexes*

Sex	Male		Female		Mann-Whitney U test (p-value)
	Mean	SD	Mean	SD	
Total sitting time per week	2252	1088	2000	1341	0.411
Total PA (MET min per week)	3211	3262	3556	2757	0.479
Total vigorous (MET min per week)	556	1618	195	549	0.782
Total moderate (MET min per week)	1919	2923	1880	2036	0.341
Total walking (MET min per week)	736	979	1482	1242	0.065
Total leisure (MET min per week)	1021	1543	883	1140	0.980
Total domestic (MET min per week)	1670	2800	1793	2035	0.379
Total transport (MET min per week)	357	852	490	673	0.410
Total work	163	553	390	774	0.180

Table 21 *Difference between educational level*

Education	Primary / Secondary		Post- secondary		Tertiary		Kruskal- Wallis test
	Mean	SD	Mean	SD	Mean	SD	P-value
Total sitting time per week	1855	1298	1744	1028	2749	1174	0.088
Total PA (MET min per week)	2498	2165	4341	3938	3230	2191	0.524
Total vigorous (MET min per week)	31	111	168	651	866	1829	0.024*
Total moderate (MET min per week)	1696	2125	2798	3096	1121	1653	0.287
Total walking (MET min per week)	772	1039	1375	1356	1243	1093	0.243
Total leisure (MET min per week)	445	554	1054	1368	1294	1680	0.163
Total domestic (MET min per week)	1640	2024	2658	3090	842	1400	0.467
Total transport (MET min per week)	207	351	438	945	628	786	0.035*
Total work	206	657	191	618	466	785	0.075

PA behaviour was measured using the IPAQ PA categories, there was 23.8% of the population who were categorised as having low levels of PA. 33.3% were categorised as having moderate PA and the remaining 42.9% had high level of PA. Statistical difference between sex and retirement status was checked using Chi square this was not statistically significant ($p = 0.532$ and $p 0.756$ respectively).

Motivation towards exercise was measured using the EMI-2 (Table 22). The lowest motivations were social recognition and competition with a mean of 0.73. The highest motivations were positive health, and ill-health avoidance with a mean of 3.54 and 3.53 respectively. In testing for normality, the Shapiro-Wilk test was used and none of the variables were normally distributed. Non-parametric tests were used.

Table 22 *Motivation towards exercise*

Variable	Mean	SD
Stress Management	3.50	1.383
Revitalisation	4	1.171
Enjoyment	3.56	1.409
Challenge	2.54	1.501
Social Recognition	0.85	1.177
Affiliation	1.62	1.564
Competition	0.93	1.269
Health Pressures	3.26	1.540
Ill-Health Avoidance	4.38	0.940
Positive Health	4.45	0.908
Weight Management	3.36	1.423
Appearance	2.22	1.523
Strength & Endurance	3.27	1.169
Nimbleness	3.53	1.480

Statistical difference was checked between sexes using Mann-Whitney U test (Table 23). There was no statistically significant difference in motivation between sexes.

Table 23 *Difference between sexes*

Variable	Male		Female		Mann-Whitney U test
	Mean	SD	Mean	SD	P-value
Stress Management	3	1	4	2	0.078
Revitalisation	4	1	4	1	0.189
Enjoyment	3	1	4	2	0.128
Challenge	3	1	3	2	0.977
Social Recognition	1	1	1	1	0.885
Affiliation	1	1	2	2	0.728
Competition	1	1	1	2	0.816
Health Pressures	2	1	2	2	0.954
Ill-Health Avoidance	4	1	4	1	0.954
Positive Health	4	1	5	1	0.416
Weight Management	3	1	3	2	0.622
Appearance	2	1	3	2	0.220
Strength & Endurance	3	1	3	1	0.954
Nimbleness	3	2	4	1	0.486

Using Mann-Whitney U test statistical difference was checked between retire status (Table 24) and Kruskal-Wallis H test for educational groups (Table 25). There was no statistically

significant difference in exercise motivation between the retirement status, and educational groups.

Table 24 *Difference by retirement status*

	Retired		Not retired		Mann-Whitney U test
	Mean	SD	Mean	SD	P-value
Stress Management	4	1	3	1	0.059
Revitalisation	4	1	4	1	0.051
Enjoyment	4	1	3	2	0.126
Challenge	3	1	3	2	0.851
Social Recognition	1	1	1	1	0.988
Affiliation	2	2	2	2	0.784
Competition	1	1	1	1	0.740
Health Pressures	2	2	2	2	0.965
Ill-Health Avoidance	4	1	5	1	0.167
Positive Health	4	1	5	1	0.897
Weight Management	3	1	3	2	0.675
Appearance	2	1	3	2	0.264
Strength & Endurance	3	1	3	1	0.851
Nimbleness	3	2	4	1	0.897

Table 25 *Educational difference*

Variable	Primary / Secondary		Post- secondary		Tertiary		Kruskal-Wallis test
	Mean	SD	Mean	SD	Mean	SD	P-value
Stress Management	3	2	4	1	3	2	0.309
Revitalisation	4	1	4	1	4	1	0.163
Enjoyment	4	1	4	1	3	1	0.144
Challenge	3	1	2	2	2	2	0.291
Social Recognition	1	1	1	1	1	1	0.604
Affiliation	1	2	2	2	2	2	0.718
Competition	1	2	1	1	1	1	0.489
Health Pressures	2	2	2	2	2	1	0.868
Ill-Health Avoidance	4	1	4	1	5	1	0.380
Positive Health	5	0	4	1	4	1	0.080
Weight Management	4	1	3	2	3	2	0.948
Appearance	2	2	2	1	2	2	0.948
Strength & Endurance	4	1	3	1	3	1	0.084
Nimbleness	4	2	3	2	4	1	0.583

62% identified barriers which stopped them from participating in their planned PA. The identified barriers were written down by participants. These were then coded in different categories and counted. The identified barriers are in Table 26. The most identified barrier was weather, the least identified was work.

Table 26 *Identified barriers*

Barrier	Count
Weather	10
Health Problems	9
Lack of motivation	3
Environment	2
Family	2
Not enough time	2
Work	1

c) Statistical analysis between variables

Statistical analysis between the different PA domains, motivation and presence of barriers were assessed. Spearman correlation was used to evaluate the analysis between PA domains and motivation constructs (Table 28). Mann-Whitney U was used to evaluation difference between PA domains and presence of barriers (Table 27). There was no statistical difference in the PA domains and the presence of barriers towards PA. Total sitting time was correlated significantly with stress management, revitalization, enjoyment and affiliation motivation. None of the total leisure PA, total PA and total domestic PA was correlated with motivation constructs. Total transport PA and total moderate PA were correlated statistically with stress management, revitalization, enjoyment and affiliation motivation.

Table 27 *Mann-Whitney U between presence of barriers and PA, SB.*

Variable		Total Sitting Time	Total PA	Total Vigorous	Total Moderate	Total walking	Total work	Total domestic	Total transport	Total leisure
Presence of barriers	Z value	-0.062	-0.185	-0.108	-1.064	-0.833	-0.481	-0.727	-0.537	-0.457
	P-value	0.951	0.8545	0.914	0.287	0.405	0.631	0.467	0.591	0.648

Table 28 *Spearman correlation between PA, SB, and motivation*

Variable		Total Sitting Time	Total PA	Total Vigorous	Total Moderate	Total walking	Total work (employed only)	Total domestic	Total transport	Total leisure
Stress	p	-.489**	.278	.000	.453**	.261	.295	-.019	.410*	.289
	P-value	.002	.091	1.000	.004	.114	.235	.910	.011	.079
Revitalisation	p	-.429**	.170	-.261	.382*	.218	.488*	-.233	.379*	.063
	P-value	.007	.308	.114	.018	.189	.040	.159	.019	.707
Enjoyment	p	-.544**	.327*	-.148	.393*	.363*	.559*	-.169	.417**	.211
	P-value	.000	.045	.374	.015	.025	.016	.311	.009	.203
Challenge	p	-.233	.255	.209	.220	.034	-.001	-.084	.266	.262
	P-value	.159	.122	.208	.185	.839	.998	.616	.107	.112
Social Recognition	p	-.077	-.160	.151	-.144	.018	.141	.042	-.085	-.108
	P-value	.648	.336	.367	.389	.913	.577	.802	.612	.518
Affiliation	p	-.344*	.230	.046	.154	.316	.275	.060	.256	-.057
	P-value	.035	.164	.782	.356	.053	.269	.721	.121	.736
Competition	p	-.077	-.020	.294	-.038	.154	-.122	.155	-.035	.158
	P-value	.648	.907	.073	.821	.355	.629	.353	.836	.343
Health Pressures	p	-.041	-.056	-.018	.056	.143	.002	-.043	.128	-.099
	P-value	.806	.740	.916	.738	.392	.993	.799	.443	.553
Ill-Health Avoidance	ρ	.030	.117	.273	-.048	.064	-.362	.103	.027	.115
	P-value	.857	.484	.097	.776	.705	.140	.538	.874	.493
Positive Health	ρ	-.176	.219	.186	.013	.359*	.036	.118	.074	.266
	P-value	.290	.187	.263	.940	.027	.886	.482	.658	.107
Weight Management	ρ	.118	-.162	.257	-.207	.000	-.314	-.024	-.178	.095
	P-value	.480	.332	.119	.213	.999	.204	.887	.285	.570
Appearance	ρ	-.048	-.034	.125	-.058	.250	-.039	.146	-.018	.004
	P-value	.773	.838	.454	.729	.130	.876	.382	.916	.979
Strength & Endurance	P	-.206	.184	.354*	.103	.065	.360	.138	.095	.120
	P-value	.214	.269	.029	.539	.699	.143	.408	.570	.471
Nimbleness	ρ	-.104	.134	.327*	.026	.156	-.165	.200	.011	.192
	P-value	.536	.422	.045	.878	.349	.512	.227	.949	.248

*Shows statistical significance at $p < 0.05$; **Shows statistical significance at $p < 0.01$

A statistical different between motivations and the presence of perceived barriers to PA was checked using Mann-Whitney U test (Table 29). A statistically significant difference was found for health pressures with those identifying a barrier being motivated by health pressures.

Table 29 *Mann-Whitney U test between barriers and motivations*

Variable	Barriers	
	P-value	Z
Stress Management	0.076	-1.775
Revitalisation	0.751	-0.318
Enjoyment	0.743	-0.328
Challenge	0.416	-0.814
Social Recognition	0.672	-0.424
Affiliation	0.807	-1.277
Competition	0.202	-2.548
Health Pressures	0.011*	-0.648
Ill-Health Avoidance	0.517	-0.648
Positive Health	0.914	-0.108
Weight Management	0.119	-1.561
Appearance	0.205	-1.269
Strength & Endurance	0.614	-0.505
Nimbleness	0.316	-1.002

*Shows statistical significance at $p < 0.05$

Up until this point the chapter provided an overview of the data collected through questionnaires in the pre and post retirement surveys. The results presented addressed the pre- and post-retirement results independent from each other, the difference between the two surveys were presented in the next sections of this chapter.

4. Difference between pre and post retirement

In this section comparison between the pre with the post retirement phase was presented. The response rate from the pre to post survey was 39%. There was no statistical different between those respondents and non-respondents of both surveys in PA measures, sitting behaviour, sex, education, marital status and if they had any barriers to PA. There was only a statistically

significant difference in three motivational constructs revitalisation, challenge, and affiliation with a higher mean in those who completed both surveys (Table 30).

Table 30 *Difference between respondents and non-respondent in survey*

Variable	P value Mann-Whitney U	Variable	P value Chi square
Total PA	0.512	Education	0.117
Sitting time	0.415	Sex	0.364
Vigorous PA	0.209	Marital status	
Moderate PA	0.714	Barriers	0.245
Walking PA	0.562	PA categories	0.751
Work PA	0.209		
Domestic PA	0.781		
Transport PA	0.700		
Leisure PA	0.562		
Stress Management	0.082		
Revitalisation	0.007*		
Enjoyment	0.026		
Challenge	0.009*		
Social Recognition	0.069		
Affiliation	0.014*		
Competition	0.209		
Health Pressures	0.063		
Ill-Health Avoidance	0.046		
Positive Health	0.076		
Weight Management	0.287		
Appearance	0.098		
Strength & Endurance	0.054		
Nimbleness	0.063		

*Shows statistical significance at $p < 0.05$

a) Changes in motivation and barriers

The pre and post retirement motivations were compared for each construct within the EMS-2. As the data was not normally distributed, Spearman correlation was used within the population who replied to both questionnaires. All variables were statistically correlated between pre and post except for Health Pressure and Positive Health (Table 31). Correlations ranged between 0.381 and 0.704. Subgroup analysis was carried out to evaluate whether there were differences between retired and non-retired in different motivations. In the non-retired group revitalisation,

competition, health pressure, and positive health were not statistically significant correlated (Table 31). The rest were statistically correlated, and the correlation ranged between 0.493 to 0.783. In the retired group a statistically significant correlation was found for revitalisation, enjoyment, challenge, social recognition, strength & endurance, and nimbleness. The correlation ranged between 0.452 to 0.687. The remaining constructs were not statistically significantly correlated (Table 31).

Table 31 *Correlation between Pre and Post motivation*

Variable	All participants pre and post		Retired		Not retired	
	Spearman Correlation Co-efficient	P value	Spearman Correlation Co-efficient	P value	Spearman Correlation Co-efficient	P value
Stress Management	0.456*	0.004	0.369	0.109	0.493*	0.038
Revitalisation	0.531*	0.001	0.627*	0.003	0.296	0.233
Enjoyment	0.704*	<0.001	0.687*	0.001	0.717*	0.001
Challenge	0.565*	<0.001	0.528*	0.017	0.689*	0.002
Social Recognition	0.562*	<0.001	0.551*	0.012	0.607*	0.008
Affiliation	0.471*	0.003	0.314	0.178	0.626*	0.005
Competition	0.345*	0.034	0.371	0.108	0.424	0.080
Health Pressures	0.114	0.496	0.000	1	0.199	0.427
Ill-Health Avoidance	0.381*	0.018	0.278	0.236	0.655*	0.003
Positive Health	0.195	0.241	0.178	0.452	0.207	0.410
Weight Management	0.466*	0.003	0.362	0.117	0.634*	0.005
Appearance	0.440*	0.006	0.389	0.090	0.528*	0.024
Strength & Endurance	0.601*	<0.001	0.504*	0.024	0.783*	<0.001
Nimbleness	0.521*	0.001	0.452*	0.046	0.768*	<0.001

*Shows statistical significance at $p < 0.05$

The change in motivation was assessed by checking the difference between pre and post scores for each construct (Table 32). The mean change ranged from -0.3 to 0.55. There was a mean decrease in social recognition, affiliation, competition, weight management and appearance. The

rest had a positive change. The least change was found in competition with a change of -0.01. When carrying sub-group analysis, in participants who retired there was a mean decrease in motivation within the construct of social recognition, affiliation, competition, health pressures, weight management, appearance. Those who did not retire had a decrease in motivation in the appearance construct. The mean change between the two groups was only significantly different in Ill-Health Avoidance where those who did not retire had a higher increase in this motivational construct compared to those retiring.

Table 32 *Change in motivation*

Variable	Mean change	SD	Mean change retired	SD	Mean change Not Retired	SD	Mann Whitney U test	Z (reference group retired)
Stress	.34	1.63	.44	1.82	.22	1.43	0.860	-0.176
Management								
Revitalisation	.34	1.48	.43	1.53	.24	1.47	0.965	-0.044
Enjoyment	.55	1.39	.73	1.57	.35	1.17	0.964	-0.045
Challenge	.39	1.43	.15	1.57	.67	1.26	0.311	-1.014
Social	-.12	1.11	-.40	1.22	.19	.91	0.098	-1.656
Recognition								
Affiliation	-.10	1.60	-.43	1.90	.26	1.15	0.194	-1.300
Competition	-.01	1.29	-.42	1.40	.44	.99	0.054	-1.926
Health	.21	1.94	-.25	1.96	.72	1.84	0.124	-1.539
Pressures								
Ill-Health	.42	1.67	.08	1.68	.80	1.63	0.042*	-2.038
Avoidance								
Positive	.43	1.75	.35	1.86	.51	1.67	0.320	-0.995
Health								
Weight	-.03	1.40	-.10	1.71	.04	1.00	0.089	-1.699
Management								
Appearance	-.30	1.62	-.54	1.74	-.04	1.49	0.182	-1.334
Strength &	.23	1.34	.14	1.56	.33	1.07	0.906	-0.118
Endurance								
Nimbleness	.20	1.36	.22	1.79	.17	.67	0.976	-0.030

*Shows statistical significance at $p < 0.05$

Difference in change in motivation at a population were checked using Wilcox test, as data was not normally distributed, and non-parametric test was used (Table 33). In the whole population

there was a change in motivation enjoyment only. This was not present within the subgroup analysis. In the retired subgroup no statistically significant changes were found in motivation. In the non-retired subgroup, a statistically significant change was found in the challenge domain.

Table 33 *Change in motivation at population level*

Variable	Total Population		Retired		Non-retired	
	Wilcox	Z (Post as reference)	Wilcox	Z (Post as reference)	Wilcox	Z (Post as reference)
Stress Management	0.220	-1.228	0.300	-1.036	0.377	-0.884
Revitalisation	0.300	-1.037	0.365	-0.906	0.608	-0.513
Enjoyment	0.014*	-2.467	0.059	-1.886	0.080	-1.753
Challenge	0.120	-1.555	0.755	-0.311	0.044*	-2.013
Social Recognition	0.365	-0.906	0.119	-1.561	0.505	-0.667
Affiliation	0.982	-0.023	0.338	-0.958	0.208	-1.260
Competition	0.925	-0.94	0.208	-1.259	0.076	-1.772
Health Pressures	0.674	-0.421	0.463	-0.735	0.232	-1.195
Ill-Health Avoidance	0.454	-0.748	0.483	-0.701	0.066	-1.838
Positive Health	0.188	-1.316	0.635	-0.475	0.151	-1.435
Weight Management	0.624	-0.491	0.348	-0.938	0.412	-0.820
Appearance	0.265	-1.114	0.103	-1.632	0.736	-0.337
Strength & Endurance	0.340	-0.954	0.622	-0.493	0.346	-0.942
Nimbleness	0.206	-1.265	0.485	-0.699	0.245	-1.162

*Shows statistical significance at $p < 0.05$

Those who did not retire at follow up 100% still identified barriers toward PA participation, while 50% of those who retired still identified barriers after retiring (Table 34).

Table 34 *Identification of barriers*

Retirement status	Pre-retirement Barriers	Post-retirement Barriers		
			Yes (%)	No (%)
Retired	Barriers	Yes	50	50
		No	55.6	44.4
		Total	9	9
Not Retired	Barriers	Yes	100	0
		No	40	60
		Total	11	5

b) Changes to Physical activity and Sedentary behaviour

Individual changes in PA and SB were tested using spearman correlation due to non-normal distribution of the data (Table 35). Total work PA in MET min per week was not assessed for correlation as those who retire did not participate in work PA, therefore a change was expected. The total vigorous physical activity in MET min per week was not statistically significantly correlated within the population. All other PA and sitting time domains were statistical significantly correlated between the pre and post data. The correlation ranged from 0.390 to 0.517. When carrying out subgroup analysis, a statistically significant correlation within the retired population was found for total PA, total domestic PA, and total leisure time PA in MET min per week. The correlation co-efficient ranged between 0.458 to 0.592. The remaining domains were not statistically significantly correlated. In the Non-retire population a statistically significant correlation was found within all domains except for sitting time and total vigorous PA in MET min per week. The correlation co-efficient ranged between 0.483 to 0.800.

Table 35 *Spearman correlation between pre and post retirement PA and SB*

Variable	All participants pre and post		Retired		Non-Retired	
	Spearman Correlation Co-efficient	P value	Spearman Correlation Co-efficient	P value	Spearman Correlation Co-efficient	P value
Sitting	0.390*	0.013	0.187	0.429	0.408	0.093
Total PA	0.596*	<0.001	0.592*	0.006	0.800*	<0.001
Vigorous PA	0.224	0.165	0.032	0.894	0.380	0.120
Moderate PA	0.486*	0.001	0.421	0.064	0.622*	0.006
Walking PA	0.379*	0.016	0.297	0.204	0.490*	0.039
Work PA	NA	NA	NA	NA	0.585*	0.011
Domestic PA	0.464*	0.003	0.457*	0.043	0.616*	0.007
Transport PA	0.348*	0.028	0.166	0.484	0.493*	0.038

Leisure PA	0.517*	0.001	0.458*	0.042	0.483*	0.042
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*Shows statistical significance at $p < 0.05$

Differences pre and post were also checked within the population and within the retirement subgroups (Table 36). Overall, there a statistically significant different between the two-time periods in the total PA and moderate in MET min per week. A statistically significant was found in the leisure PA in MET min per week. In the remaining domains no statistically significant changes were found. When carrying the analysis within the subgroup a significant difference was found in total moderate PA, total work PA, total domestic and total leisure time PA domain in the retired group. In the non-retired group, a statistically significant difference was found in total walk PA and total leisure time PA in MET min per week, but not in other domains.

Table 36 *Change in behaviour within the population*

Variable	Total Population		Retired		Non-retired	
	(Wilcox)	Z (Post as reference)	(Wilcox)	Z (Post as reference)	(Wilcox)	Z (Post as reference)
Sitting	0.900	-0.126	0.444	-0.764	0.406	-0.830
Total PA	0.028*	-2.195	0.117	-1.568	0.084	-1.728
Vigorous PA	0.777	-0.283	0.799	-0.254	1.00	-0.000
Moderate PA	0.031*	-2.153	0.037*	-2.091		-0.827
Walking PA	0.055	-1.917	0.546	-0.604	0.023*	-2.273
Work PA	0.053	-1.937	0.003*	-2.934	0.778	-0.282
Domestic PA	0.052	-1.941	0.028*	-2.199	0.836	-0.207
Transport PA	0.589	-0.541	0.600	-0.524	0.897	-0.129
Leisure PA	0.000*	-3.565	0.009*	-2.596	0.019*	-2.354

*Shows statistical significance at $p < 0.05$

The change within the population was checked for differences between pre and post retirement within the PA and SB domains. The mean change within the population for sitting time was -39 min per week with a median of 0 min per week. Total PA decreased by a mean of -1163.79 MET

min per week and a median of -521.40. The lowest change was in total transport with a mean increase of 107.39 MET min per week and a 0 median. When carrying out subgroup analysis the mean sitting time decreased within those who retired, -327.00 min per week, and the mean total PA, -1310.89 MET min per week. PA in the domestic domain had the sharpest rise within the retired population with a mean increase of 1262.00 MET min per week and a median of 832.50 MET min per week. There was an increase in leisure time PA in most of the retired participants. An average decrease of -435.70 MET min per week within the total work PA domain was reported. In those participants who did not retire there was an increase in sitting time an average of 226.67 min per week and median 360.00 min per week. The mean MET min per week in total work PA and total domestic PA domain decreased, while there was an increase in total transport PA and total leisure PA in MET min per week. The mean changes between the two groups were statistically significant for total work and total domestic PA in MET min per week (Table 37).

Table 37 *Change in PA and SB behaviour between the groups*

Variable	Total population				Retired				Non-Retired				Mann Whitney U test	
	Mean change	25th Percentile	Median	75th percentile	Mean change	25th Percentile	Median	75th percentile	Mean change	25th Percentile	Median	75th percentile	P value	Z (reference group retired)
Sitting	-39.00	-1020.00	.00	840.00	-327.00	-1485.00	-150.00	525.00	226.67	-780.00	360.00	840.00	0.241	-1.171
Total PA	-	-2682.00	-	1370.50	-	-3204.00	-	1270.50	-	-1311.00	221.25	1914.00	0.169	-1.374
	1163.79		521.40		1310.89		1476.00		792.98					
Vigorous PA	-363.40	.00	.00	.00	-244.00	.00	.00	.00	-	.00	.00	.00	0.698	-0.389
									483.11					
Moderate PA	149.94	-120.00	220.00	1557.50	1102.00	17.50	735.00	2737.50	-	-135.00	86.25	600.00	0.111	-1.595
									491.25					
Walking PA	440.06	-115.50	237.60	1278.75	234.96	-338.25	82.50	940.50	606.83	.00	346.50	1171.50	0.313	-1.009
Work PA	-315.00	-487.50	.00	.00	-435.70	-608.50	-192.00	.00	-	-160.00	.00	297.00	0.038*	-2.104
									250.56					
Domestic PA	178.44	-127.50	160.00	1310.00	1262.00	.00	832.50	3060.00	-	-240.00	30.00	540.00	0.035*	-2.106
									605.69					
Transport PA	107.39	-132.00	.00	280.50	27.44	-132.00	.00	429.00	208.17	-132.00	.00	264.00	0.838	-0.088
Leisure PA	255.76	.00	302.25	767.25	239.23	45.75	216.00	851.00	280.56	.00	429.00	742.50	0.838	-0.205

*Shows statistical significance at $p < 0.05$

5. Summary

This section has provided an overview of the results from the QUAN strand of the MM study. The first part presented the results from the pre-retirement data collected through the survey. The second part presented the post-retirement data. The final part looked at difference between pre- and post-retirement data collected for participants who completed both surveys. The study identified statistically significant changes in motivation for one construct between retired and non-retired participants. Statistically significant changes were identified in PA but not in SB. Statistically significant change in moderate PA in MET min per week was found in the retired group but not in the non-retired group. Changes in leisure time PA were found in both groups, whilst statistically significant changes in domestic PA was only found in the retired subgroup. The results from the QUAL strand of the study were presented next. The pre-retirement data is presented in publication format, whilst the post-retirement data was in normal format. After these meta-inferences were presented.

Section 2. Pre-retirement QUAL data: “It is easy to do nothing and easy to sit down”: perceptions of physical activity and sedentary behaviour during pre-retirement (published paper)

This section presents the pre-retirement qualitative data from the interviews which took place during the pre-retirement phase in published format, Spiteri *et al.* (2022). The need for the pre-retirement results to be presented as a standalone section was because they provided a baseline of the participants and their background stories, which were used to understand their post-retirement experiences. Mr Bob Laventure who has been advisor for this programme of research as part of this PhD was invited to support the paper due his years of industry / practical

experience and guiding on the practical application of the findings to influence policy and practice. Supplementary files part of this paper is found in the appendix. Supplementary file 1, the interview guide is available in Appendix 27; supplementary file 2 participants profile in Appendix 28; supplementary file 3 quotations in original language in Appendix 29; supplementary file 4 developed themes in Appendix 30; and supplementary file 5 interview quotations in Appendix 31.

“It is Easy to do Nothing and Easy to Sit Down”: Perceptions of Physical Activity and Sedentary Behaviors During Pre-retirement

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Abstract

This study explored the insights of old age pre-retirement employees towards physical activity and sedentary behavior. A quota sampling of 20 participants from within the Civil Service in Malta were invited to an interview. Participants who were included met the statutory requirement for retirement within the subsequent 6 months to 1 year. Semi-structured interviews were conducted using a narrative approach. Structural narrative analysis and reflective thematic analysis were used. The story structure highlighted the significance of the individual experiences on the perceptions towards future physical activity during retirement. Two themes were identified using the thematic analysis, influencers, and perceptions. Triangulation identified that sedentary behavior was not part of the narration. The transition from work to retirement is a unique and personal experience and therefore when promoting an active lifestyle, the individual experience and past behaviors must be actively considered.

Keywords

retirement, physical activity, successful aging, health behaviors, sedentary behavior

Introduction

An aging population presents challenges because of increasing morbidity and functional impairment in a greater prevalence of the population (Teater & Chonody, 2020). Physical activity (PA) is a behavior which prevents or delays functional decline and improves quality of life (Physical Activity Guidelines Advisory Committee, 2018). Sustaining PA in older age (65 years and older), even at low intensity can decrease the risks associated with premature mortality (Hupin et al., 2015). The older age group is heterogenous in terms of the physical function of individuals as well as barriers and motivators for meeting PA recommendations for health (Morgan et al., 2019). Older adults attitudes and beliefs about PA is influenced by their culture and past experiences (Katigbak et al., 2020). Life events, such as retirement transition, have an impact on PA behavior, through an interaction between the event per se and other mediators such as past PA experience (Condello et al., 2017).

The retirement transition presents an opportunity whereby people can influence their PA behavior (Barnett et al., 2012; Spiteri et al., 2019). Retirement can act as a trigger and cause an increased awareness of the aging body. This could influence PA behavior positively or negatively (Morgan et al., 2019). For example, ageistic connotations can lead to less health promoting behavior, whilst positive attitudes towards older age can motivate to increase participation in PA (Menkin et al., 2020).

The changes in PA behavior which occur when people retire indicates that there is an increase in leisure-time PA but a decrease in overall PA (Gropper et al., 2020). However, the findings are not consistent across social class and gender. Retirement is likely to result in an increase in sedentary behavior (SB) (Jones et al., 2018), especially in those who are already undertaking excessive sedentary behavior (Ter Hoeve et al., 2020). Interventions around retirement time which aimed to increase PA behavior have been inconclusive as to whether they are effective in increasing PA behavior within retiring populations (Baxter et al., 2016). One possible reason for this is that few studies have examined people's

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perceptions of PA around their retirement years (Barnett et al., 2012; Gropper et al., 2020). One study explored whether retirement influences the perceptions of PA (McDonald et al., 2015). In Italy a longitudinal study examined the experience of PA across retirement in a three year-long study (Socci et al., 2021). Using a phenomenological approach, another study looked into the meaning attached to SB during the retirement transition (Eklund et al., 2021). As older adults are a heterogeneous group, these studies identified the need to further research the meaning people attach to PA and SB when going through the retirement transition. Exploring pre-retirement perceptions may be useful to assist in developing effective interventions to promote a positive behavior change when people retire. Understanding the individual and the subjective experience of how the retirement process may influence their own PA and SB behaviors is required to gain an understanding of the multiple cognitive processes people are experiencing as they are preparing for retirement.

The aim of this study was to explore pre-retirement perceptions of PA and SB within the context of civil servants in Malta. Using a narrative approach to the study, of how people perceive PA and SB before retiring is well suited (Smith & Sparkes, 2009; Squire et al., 2008). The study was conducted as part of a longitudinal mixed method research using survey and interviews. People bring their own stories to life transitions (Hendricks, 2012), adopting a narrative approach allowed the researchers to consider these in relation to the retirement transition. The research questions for this study were a) What are the predictors of sedentary and PA behavior in people in the retirement transition? b) What are the differences in pre-retirement perceptions in people who are active or not active.

Methods

A social constructionist philosophical approach was used to frame the study (Cigdem et al., 2013). A narrative methodology was identified as suitable, to attain the aim and remain faithful to the philosophical underpinnings of the research. As retirement is a transitional process with no fixed beginning, exploring people's stories was deemed appropriate to learn how retirement might influence their behaviors. When using stories, people talk about their social interaction and this can be used to discover how meaning is constructed (Riessman, 2008). People interpret their experiences, and through an understanding of these it is possible to create a personal narrative (Atkinson, 1998).

Interview Framework

Semi-structured interviews were used to collect data. Interview questions were guided by the theoretical domain framework (TDF) (Atkins et al., 2017; McGowan et al., 2020). The TDF provides an integrative summary of possible behavioral determinants based on various behavior change theories. It allowed the researcher to develop

questions based on factors which could influence behavior, and not limit questioning to the researcher's pre-conceptual ideas. All questions within the interview were open ended; the initial question allowed the participant to direct the interview according to what was important to them (supplementary file 1). During the interviews participants were guided to use their life stories. The initial question asked about the participant's daily routine. Based on their reply further questioning took place. The interview questions were developed by KS and discussed between the researchers as they had different expertise. These were then piloted with two retiring individuals to assess their appropriateness. Due to the dual spoken languages of Maltese and English minor modifications in wording were necessary to make prompts clearer, and maintain semantic equivalence between English and Maltese (Behling & Law, 2011).

Recruitment

The participants were selected from respondents to the associated survey. These were recruited via an open call email sent by a third party to all Civil Service employees in Malta ($n = 881$), aged 60 years and older, in September 2019. They were asked to complete a survey seeking information about their employment, the anticipated date of retirement, if they were interested in participating in an interview about their retirement experience and PA behavior. For the latter purpose, the Maltese version International Physical Activity Questionnaire—long version (IPAQ-long MT) (Spiteri et al., 2021)—was used. The interview participants were selected by adopting a maximum variation method based on their interest in attending an interview, as well as ensuring a distribution across civil service grades, and on the self-reported amount of PA determined by the IPAQ-long categories (low, medium, and high) (supplementary file 2). Survey respondents who indicated willingness to participate for an interview were invited to an interview at a location and time of their convenience. No time limit was set for the interviews. Purposeful sampling was used to recruit participants, this was used to get diverse views and opinions about retirement transition. The sample had a variety of people with different PA behaviors based on IPAQ categories (low, medium, and high) and job positions (non-clerical, clerical, and management). As the interviews were being conducted as a part of a 2-year longitudinal mixed methods study and due to the risk of losing participants to drop out, 20 participants were recruited for interview. After undertaking all 20 interviews, analysis was started in chronological order, and by the 16th interview no new codes were emerging. This indicated that data saturation was achieved, therefore highlighting that no further participants beyond 20 were required.

Ethics

The participants provided their written consent to respond to the online questionnaire and once again prior to the interview, that included permissions to record and transcribe. To

maintain confidentiality and anonymity, all names reported within the study are pseudonyms whilst any description of the participants was screened to ensure that it did not allow for individual identification. Participants were also informed of their rights to withdraw from the study at any point. Ethical approval was obtained from Sheffield Hallam University Research Ethics committee reference number: ER9249191.

Data Collection

The interviews were undertaken by one researcher (KS) to ensure consistency, over a 5-month period between September 2019 and January 2020. Interviews were conducted in either the English or Maltese language depending on the preference of the participant. Throughout the interview, notes were recorded to reflect upon later, when determining the outcomes during the data analysis and interpretation. These notes were included into a comprehensive reflective diary, which included the researcher's thoughts before and after each interview.

Data Analysis

The choice of analysis in narrative methods allows for flexibility (Riessman, 2008). Due to the complex nature of social phenomena, this flexibility leads to a deeper understanding (Phoenix et al., 2010). Structural narrative analysis (Bailey et al., 2013; Riessman, 2008; Smith & Sparkes, 2009) and reflexive thematic analysis using an inductive-deductive analysis (Braun & Clarke, 2006) were used jointly to analyze the data. It was decided to analyze the interview in the original language not to change meaning during the translation process (Cigdem et al., 2013). The first step within the structural narrative analysis was to produce a narrative for each participant (Riessman, 2008; Smith & Sparkes, 2009). Each of these was considered as a standalone narrative, and an individual profile was compiled (supplementary file 2). Utilising a social constructionist interpretation of their story (Cigdem et al., 2013), with every pass through the data the story structure for each participant was developed. Discussion between KS and JXDC was done on the story structure. When examining the different stories, this led to the identification of a story structural pattern when participants were discussing their PA and sedentary behavior patterns.

The first step of reflexive thematic analysis (Braun & Clarke, 2006), was carried out during the narrative structural analysis. Developing the individual's story allowed for familiarization with the data. Once the narrative structural analysis was concluded, initial codes were identified and documented. The codes were then integrated into categories and another pass through the data was undertaken to ensure that the codes fitted the categories. These were then discussed between KS and JXDC, to develop overarching themes. A final pass through the data was done to check that the data fitted the identified themes. An audit trail was kept of the

analysis process. Figure 1 depicts the data analysis process undertaken. To obtain data analysis triangulation, the results from both analyses were compared, and checked for congruency and differences (Leech & Onwuegbuzie, 2007). This was done by contrasting the themes identified using the thematic analysis and story structure. Data analysis was facilitated using the software program NVivo11.

Rigor

Analysis triangulation is one of the methods used to improve trustworthiness of interpretation (Lauri, 2011). As PA is a complex behavior (Troiano et al., 2012) using multiple analyses on the same data can highlight different aspects of the phenomenon being studied (Phoenix et al., 2010). The use of an audit trail and reflective journal were used to improve confirmability of study results.

Findings

Quotations in the participants original language are available in [supplementary file 3](#).

The response rate to the survey was 11% ($n = 96$). Twenty participants were initially selected; one participant subsequently withdrew from the interview without giving a reason. In view of this a further respondent was selected to maintain the intended quota of 20 participants, their profile in [supplementary file 2](#). The response rate for the interview recruitment was 95%. The age of participants ranged from 60 to 63 years. Male to female distribution was equal ($n = 10$). All worked within the Maltese civil service in diverse positions: non-clerical, clerical, and management. All participants reported to be either married or living with a partner, none of them lived alone. They all chose to be interviewed at their place of work. The interview length varied between 23 and 58 minutes.

All interviews were transcribed verbatim by the researcher and incorporated tonality details and when possible, reactions from the interview notes. This was completed to assist with the interpretation of the participants' stories (Riessman,



Figure 1. Data analysis process based on the work of Bailey et al., (2013) and Braun and Clarke (2006).

2008). Prior to starting the data analysis, five interview transcripts were checked by an independent reviewer to ensure fidelity to the interviews. The transcripts were found to match the interview. 20 interviews were conducted in total, 19 in Maltese and one in English. The interviews were analyzed in the language that they were conducted to maintain semantics (Cigdem et al., 2013). Excerpts were translated into English for reporting purposes, following a discussion between KS and JXDC to ensure that the substance or general meaning was maintained. As both authors were bilingual speakers, in Maltese and English.

Structural Narrative Analysis

The structural narrative analysis approach identified patterns of how the participants regarded their future behavior patterns, with regards to PA and SB after their retirement from work (Riessman, 2008; Smith & Sparkes, 2009). A common structure was identified, which exemplified the way in which the participants were narrating their story. The story structure is presented in figure 2.

Two different narratives from participants were chosen. Both participants had similar roles, one viewed retirement as an

opportunity to remain active and the other as a time of uncertainty, with long periods of extended sitting time. The story structure with specific examples is highlighted in Table 1.

Reflective Thematic Analysis

By the end of the thematic analysis the number of nodes identified was 337. These were integrated into six main themes, under the categories of Influences and Perceptions.

Themes related to Influence:

- 1) Learned experiences
- 2) Psychosocial factors shaping the retirement transition
- 3) The discernment aspect of retirement

Themes related to Perception:

- 4) Engagement in PA
- 5) The inevitable process of aging
- 6) Cognizant SB.

The development of these themes is presented in the supplementary file 4. Quotes from the interviews to support

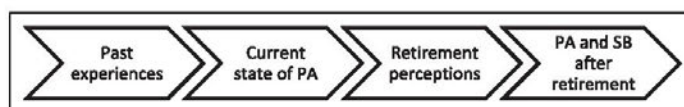


Figure 2. Story structure.

Table 1. Story Structure with Examples.

	Albert, 61-year-old Male	Sean 61-year-old Male
Past experiences	Albert works on a shift basis; this gives him ample time to be active. Since he was young Albert was always interested in sports and felt an urge to be active. He used to cycle and play football and cycled in different periods of his life. When he was not physically active, he tried to keep himself busy by doing "active" things. Either helping out with religious activities or working in the fields. His father was regularly active as well and he got this enthusiasm for activity from him. It was passed on from father to son.	Sean is a manager, working on shifts. Throughout his life he was always aware of the importance of being active. When he was young at school, he used to play football with friends, but later family and work became a greater priority than exercise. During the summer periods, as the day is longer, he attempts to go for walks when he is off duty.
Current state of activity	Being busy is what he enjoys most. At work, the sedentary nature of his work makes him nervous and he tries to move around as much as possible.	During the week he tries to include some light walking. Being knowledgeable about the importance of being active, especially in old age, he highlights the need for him to do so. At the same time, however, his belief does not place exercise on the high priority list.
Retirement perceptions	Albert views retirement as an opportunity to continue to be active and engage in different activities; even though these might not be in the form of exercise, he is certain he will remain active.	Now that retirement is approaching, he is feeling at a loss. He is experiencing a void in his life. The lack of structured work routine is making him question his purpose in life.
Perceived PA and SB behavior after retirement	Albert has many plans and is sure that he will not spend one single day sitting down.	Sean feels that retirement is like a black hole, his prospects are not positive. Most likely he will be watching TV most of the time.

Table 2. Reflective Thematic Analysis Findings.

Theme	Quotes
<p>1) Learned experiences</p> <p>When narrating their story, the participants frequently referred to their lived experiences, which influenced their views towards PA, health, and retirement. Life events shaped their approach towards PA, and how positive experiences, or a lack of them, impacted on their current PA behavior.</p> <p>Participants shared their experiences of how they recalled their own parents' experience of retirement. Overall participants used these experiences in a positive way, to have influence on the way they wanted to live their own retirement period.</p>	<p>"I lived in an era when we used to walk for our all our activities. Mummy used to take us for walks often. We used to go to school on foot... Always walking. Then it becomes part of you, you start to love walking" [Jessie]</p> <p>"He (in reference to his father who was also a civil servant) told me let me tell you Jason you get bored doing the same thing over and over again. That's it, if you do your hobby every day then when you lack the desired object you would want to do more. When you have the freedom to do whatever you want you would not want to do the object anymore." [Jason]</p>
<p>2) Psychosocial factors shaping the retirement transition</p> <p>Psychosocial influences were identified as playing a pivotal role within the retirement transition. During the interview, participants spoke about different aspects which influenced the way they approached their retirement transition, and possible life adjustments thereafter. The transition from work to retirement brought on certain anxieties. Some expressed concerns about financial issues to maintain their previous lifestyle.</p> <p>Retirement was acknowledged to be an unfamiliar event. The habitual work routine that had become customary was to be replaced by something new. Participants discussed ways in which they were consciously preparing for a new life ahead. They were planning for this by making purposeful adjustments in their mindset, for the new challenges they believed that they would encounter once they retired from work.</p> <p>Retirement was viewed as a motivation and identified as an opportunity to improve on PA behaviors. This motivation was however, balanced out by the anxieties. This interplay of emotions appears to be varied. Retirement was identified as a phase during which free time was not an issue, but motivation was needed to start incorporating PA in the routine</p> <p>Work was regarded as an important social aspect. Even though retirement was something to look forward to, it was noted that this would result in missing out on friendships, and colleagues. The thought of losing friends made the retirement transition harder for some. This was viewed as a natural consequence of retirement, losing the social aspect of work to gain retirement.</p>	<p>"(I am) 61 and intend to think what I do ... At the moment I am doing my homework. ... I work 1 day a week and get the pension and get paid for that day, I see which one is the best option. But right now my mind is wondering" [Chris]</p> <p>"Even socially if I retire from here totally I'm sure that in the morning I have to go walking with my wife at 7 in the morning she tells me lets go so if I weren't here I would go for a walk with her at 7" [Mike]</p> <p>"(...) for me when a person stops working that is one of the problems. Because your mind starts to wonder I'm done (uhm) so it's one of the problems ... Shall I continue (working) what I shall do! (.) but that what goes through your mind at times I will say stop and sometimes I will say no. That part of it (...)" [David]</p>
<p>3) Discernment aspect of retirement</p> <p>As the time for retirement approached, participants reported that they had started to take stock of their life as it had evolved until now and started to consider what they could possibly do in the next phase of their life. The life adjustments required after retirement were seen to provide new opportunities. At the same time, it was understood to be a destined change, to which they needed to adjust for. Even those who were not actively thinking about retirement, were reflecting on their life, and on what was on next.</p>	<p>"...most probably 99.9% I will restart working something completely different it is a challenge for me I like to keep myself active." [Carmen]</p>

(continued)

Table 2. (continued)

Theme	Quotes
<p>It was necessary to adapt one's life. The interruption from working within a routine, covering several hours a day needed to be filled up. It was regarded as a choice between on one hand a necessity to do something, or on the other hand do nothing. As a result of this anticipated change, it was considered necessary to plan. Whilst some developed concrete plans of what to do next, others were waiting for the post retirement period to make the necessary adaptations</p> <p>Most participants said that retirement presented an opportunity to increase their PA behavior, as they would have free time which could be used to be more active. Participants who considered themselves to have an active job, identified PA at work as an important contributor to their overall PA. Once work-related PA would stop, they considered it a challenge for them to replace the amount of PA at work with something else.</p>	<p>"...but there comes a time when you say I want to change my routine I am old and did my part. Now I want to start another life. Sooner or later you have to start!" [Chris]</p>
<p>4) Engagement in PA</p> <p>The participants' perceptions towards PA appeared to influence their attitudes, and this in turn would impact on their level of engagement. Some viewed PA as being any form of activity, a physically active engagement, whilst other viewed PA as something specifically associated to exercise.</p> <p>Depending on their point of view, participants saw themselves as either engaging or not engaging in PA. Two other perceptions of PA were the health benefits and peer support.</p> <p>Most of the participants revealed PA as something positive which could result in varied health benefits, both physical and mental. All participants, but one, had no knowledge on the recommended levels of PA. Interestingly the participant who did know, reported to have received rehabilitation for knee pain. Sufficient PA was determined by personal perceptions, centered around being tired at the end of the day or by pushing oneself to the "personal limit." Peer support was one of the aspects identified by most participants which was needed for engagement, or to get engaged in PA. Some participants acknowledged peer support to get going, and start a PA routine; others identified lack of support as the reason for their lack of PA.</p>	<p>"...religious commission, chairperson, teach catechesis, as in I was always active after school time (works as teacher). Now for the last 9 years, I have my son's daughter whom I take care of and I keep myself active with her too." [Carmen]</p> <p>"...Frank loves to walk like me. He walks more than I do actually." [Josephine]</p> <p>"...I feel stronger when I am active." [Mike]</p>
<p>5) The inevitable process of aging</p> <p>The retirement process brought about a reflection about aging in almost all participants. Two subthemes emerged: a) the change process of aging and b) self-efficacy. "Getting older" was felt to be a process of decreasing health and physical abilities.</p> <p>Growing older led to an expectation of increasing health problems, which would negatively impact on PA behavior due to a decrease in physical abilities. The physical ability to be active was considered to decrease with age, until a point when it had to stop.</p> <p>Even participants who considered themselves as active persons, reflected about the fact that PA had to stop at some point, with some hinting to a state of dependency. The recognition of aging had implications on self-efficacy. Aware of the need to adjust into a new routine, some questioned if change was still possible at their age. Changing habits was seen as a highly unlikely task. Some believed that they had enough self-determination to continue with their activity, and in doing so delay the impact of aging.</p>	<p>"No. In fact I'm going to tell you I already miss doing certain things I used to do things there (uhm) compared nowadays I slowed down and my wife tells me you are no longer the same even though you try..." [David]</p> <p>"And you start to see yourself getting older and you don't want to age and are unable to do anything..." [Carmen]</p> <p>"I mean hey, it's something which grow with you (referring to exercise). It keeps growing in you. It is very hard to then either, because we think now I'm leaving (retiring) I can start (do exercise) eee...." [Sean]</p>

(continued)

Table 2. (continued)

Theme	Quotes
<p>6) Cognizant sedentary behavior</p> <p>SB was identified as opposite to being physically active and was associated with sitting activities. It was regarded as a “harmful” behavior which had the unintended health consequences of body stiffness or mental exhaustion when at work. However, SB was also a means to unwind after a long day at work or integrated as part of a hobby. Subthemes were identified: a) the beliefs and experiences of the effects of SB. Sitting for a long period of time was regarded as intolerable. Both during recreational activities or formal meetings. The need to stand and walk around was recognized, therefore sitting for long periods was considered restrictive. Second, b) there are unintended consequences due to the nature of activities. Sitting or lack of activity was at times an unintended consequence. Certain work practices required the person to stay seated for long periods of time, with limited possibility to move around. Participants were aware of this and voiced their concerns.</p> <p>Some of these activities were used to relax and identified as a desired need or tiring when part of the work routine. C) a demeanor of SB and therefore striking a balance between being active and SB was important, and not in competition with each other.</p> <p>Engaging in SB was an easier option, being active required planning and goal setting.</p>	<p>“Work is seated for most of my day sitting down the little I get up get up let’s do it to walk a bit. I almost do it more for myself rather than for work” [Agnes]</p> <p>“...one I do in the morning and the other before bedtime. It does not interfere with each other. I need them both.” [Jessie]</p> <p>“you set goals because otherwise you end up watching television eating and instead of doing the exercise you want to do become lazier. And it is easy to do nothing and easy to sit down, easy to watch television, and very easy to eat...” [Sean]</p>

the development of the themes are present in [supplementary file 5](#) and quotes in Maltese in [supplementary file 3](#). Participants’ narratives are presented as [supplementary file 2](#) to support the developed themes. Results from the reflective thematic analysis are presented in [Table 2](#).

Analysis Triangulation

Data analysis triangulation aimed to compare the findings obtained from two different techniques to see how much they match. If they are, it can be argued that the interpretation of the findings is more likely to be correct (Lauri, 2011). Albeit the complexity of the aging processes, using different analysis techniques can explore different aspect of the data (Phoenix et al., 2010). In this case, reflective thematic analysis and structural narrative analysis were used. The former technique attempts to identify themes from the data, while the latter attempts to identify the way the story is being told by the participants. The themes identified do fit within the story structure. Past experiences were varied and possibly influenced self-efficacy and perceptions. The current state of activity and retirement perceptions reflected the person’s life story. Projected PA and SB behavior after retirement can take place through a process of discernment, whereby psychosocial factors, aging, and experiences are taken into consideration and reflected upon to project what is next. Sedentary behavior activities did not fit within the story structure identified. Whilst PA was developed over time, SB

was part of life routine. The way the two analyses merge highlights the complexity of PA behavior and the retirement transition process. The themes identified fit within different stages of the narrative structure.

Discussion

This study is one of a few which explores the pre-retirement perception of how PA and SB might change after retirement, and in the context of Maltese civil servants is completely novel to the authors knowledge. In using two types of analysis to increase the trustworthiness of the findings, past experiences and the discernment process of retirement were identified which would likely have an influence on physical activity behavior adopted once a person retires. The pre-retirement process identified in this population fits with the transitional life course concepts (Hendricks, 2012). When analyzing the story structures, experience seemed to be one of the most influential concepts that the participants reflected upon to explain and project their life after retirement. In a recent study those who were active in the past considered PA as an aspect to maintain in retirement, whilst those who were not interested in PA were found to decrease their PA behavior (Socci et al., 2021).

It has been reported that people use their previous experiences to make sense of their current situation (Grenier, 2012). The discernment aspect is the subjective experience of people making sense of their new life realities, which they are

facing. Depending on the person's experience of their PA and SB through their life, the individual predicts their future behavior. This pattern was already identified with inauspicious pre-retirement behaviors likely to continue with the same behaviors (Ter Hoeve et al., 2020). Within this current study, participants appeared to have knowledge about the beneficial effects of PA, yet this change in behavior, from being inactive to increasing one's activity levels, even though it might be desirable, was regarded as not easy to undertake. Participants found options such as watching television easier to engage in. Participants within the study identified SB similarly to those in the Sweden (Eklund et al., 2021). SB was identified as unhealthy compared to PA and led to poor health. There was a process of trying to be active and avoid SB. Unlike in the previous study participants did not associated SB with aging or retirement, possibly because participants were not yet retired. Discussing these concerns with health professionals might assist people to overcome them (Kava et al., 2020).

Reflecting on previous experience of PA may serve to build self-efficacy, which encourages the belief to be active. Believing in one's ability is a motivating factor for people to engage in PA (Spiteri et al., 2019). The social cognitive theory may be used to explain some of the patterns identified within this study (Schunk & DiBenedetto, 2020). Those who had personal processes that motivated them to be active viewed retirement as an opportunity to increase their physical activity behavior. When narrating their stories, they were quick to highlight their achievements when being active. This is part of the behavior process which includes achievement, effort, and persistence. It was acknowledged that it was not always easy to remain active, even though they strived to continue. Environmental issues were important factors for setting goals such as weight control or to remain active in older age.

By employing thematic analysis and narrative structural analysis allowed to identify patterns within the participants which allows for further exploration on larger populations. However, it has to be acknowledged that the individual experiences towards retirement differ on a very subjective level (Grenier, 2012). With the same time left towards retirement the transitional process was met at different junctures. The study highlights why interventions to improve PA around this life period are important and the need to be individualized.

During the retirement transition, people consider ways to adjust to their new life, and any interventions during this time might be opportune to promote a more active lifestyle (Barnett et al., 2012; Baxter et al., 2016). Using narrative interviewing, the study was able to identify the different resources that people make use of when planning for their retirement transition; applying a resource perspective to the retirement transition explains why people might be at different stages in their adjustment and make use of the resources available to them; whether related to family, financial, socio-economical, or organizational factors (Wang et al., 2011; Wang & Shultz, 2009). All these resources might

have a direct or indirect impact on retirement and the levels of activity in which people engage afterward. Considering these individualized factors and develop tailor made programs which consider participants needs can be effective in modifying PA behavior (Rowley et al., 2019). The research findings indicate towards the need to support individuals during the retirement transition, to help them engage in healthy behaviors. The need for peer support, through family and friends is an important factor which needs to be addressed in any intervention. Following up on person's experiencing the process of retirement can allow for the identification of possible casual factors which can predict PA and SB in later life.

Strengths and Limitations

The clear strengths of this study were the large sample size and meticulous processes by which semi-structured interviews were tested and piloted. In addition, the use of two complementary analytical approaches improved interpretation. The use of a narrative approach might have highlighted past experiences as an important aspect within retirement. However, it adds value to the person's interpretation of how their activity levels are likely to be influenced once they retire.

A diverse participant group from different educational backgrounds and PA behavior were recruited to explore different perspectives. This was able to highlight the diverse stories of participants. Different facets of the retirement transition and PA were identified by using data analysis triangulation. However, the study results cannot be generalized to other populations and is specific to Maltese civil servants. None of the participants lived alone and the retirement transition could be experienced differently by people living alone in later life.

Practical Application

The study highlights the importance of a lifelong perspective into the promotion of PA. Promoting of PA needs to be a positive experience so people can relate to it. When developing health promotion interventions for PA peer support systems need to be considered. The retirement transition can cause anxiety and people might need support with the adjustment. Education about the importance of being active and how to exercise at an older age is required. These applications are context specific due to the nature of the study. However, as identified within the study the retirement transition is an individualized process which highlights the importance of addressing the needs of the individual when promoting PA within this group.

Future Research Recommendations

The study looked at the pre-retirement influences and perceptions towards PA and SB, these might change when

people go through retirement and settle into their new life routine. More research is needed into how individuals experience retirement transition. Longitudinal studies are needed to assess this. The perceptions need to be evaluated in comparison with PA and SB measures and how these change over time together with their perceptions.

Conclusion

The study adds to the body of literature on pre-retirement perceptions on PA and SB. It was able to provide an insight of Maltese Civil Servants going through the retirement transition. It highlights the subjective nature of the transition process from work to retirement. The study was able to identify the retirement transition as an adjustment period where possible intervention could take place. Within the study, activity and PA were both linked by the participants, and interventions which focus on promoting activity might also have an indirect effect on PA behavior.

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Ethics Statement

Ethical clearance for the study was obtained from the Faculty of Health and Wellbeing ethics committee at Sheffield Hallam University, UK, committee reference number ER9249191.

Biographical Statement

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Supplemental Material

Supplemental material for this article is available online.

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Section 3. Post retirement data qualitative part

This section provides an overview of the qualitative results obtained from the QUAL strand in the MM study. The post-retirement data presented were combined with the pre-retirement data presented in the previous section to reach aim 3, objective E. Meta-inferential results and the integration of the QUAL and QUAN strands are presented in the last section of this chapter. These data have been submitted for publication the International Journal of Environmental Research and Public Health for a special issue on “Physical Activity and Health in Middle-Aged and Older Adults”. The paper is currently under peer review.

6. Post-Retirement Qualitative data

The qualitative data were obtained from the semi-structured interviews carried out pre and post retirement. A total of 20 participants were recruited in the initial phase of the interviews and these were followed up after two years. The response rate for the follow-up interviews was 19 participants, which was a 95% retention rate. The duration of the interviews ranged from 1 hour 24 minutes (the longest) to 15 minutes (the shortest). The average recorded interview length was 39 minutes. However, discussions tended to continue after the interviews were officially over and the researcher thus took notes about such extended discussion to aid in the analysis and reflection. After each interview, written reflections were recorded. All interviews and transcriptions were carried out by the lead researcher. Transcripts were carried out after each interview, with data saturation achieved after 13 interviews. However, all participants were asked to participate in the follow up interview. Data analysis of the follow-up interview was the same as that of the pre-retirement phase. A reflexive thematic analysis (Braun and Clarke, 2014)

and a structural narrative analysis (Riessman, 2008; Bailey, Montgomery and Mossey, 2013) were carried out.

a) Reflexive thematic analysis

By the end of the thematic analysis the number of nodes identified was 46. These were integrated into two main themes, with eight sub-themes (Figure 6). The first theme was “the impact of official retirement age is seemingly inexorable”. This theme had three subthemes: 1) change is inevitable, 2) retirement is a choice, and 3) retirement brings about reflections on ageing. The second theme was “the retirement plan is influenced by the transition”. This theme had five subthemes: 1) retirement results in adjustments of physical activity, 2) retirement brings about lifestyle adjustments, 3) retirement leads to the development of a new norm, 4) sedentary behaviour is influenced as an impact of retirement, and 5) an unexpected pandemic influences the retirement transition.

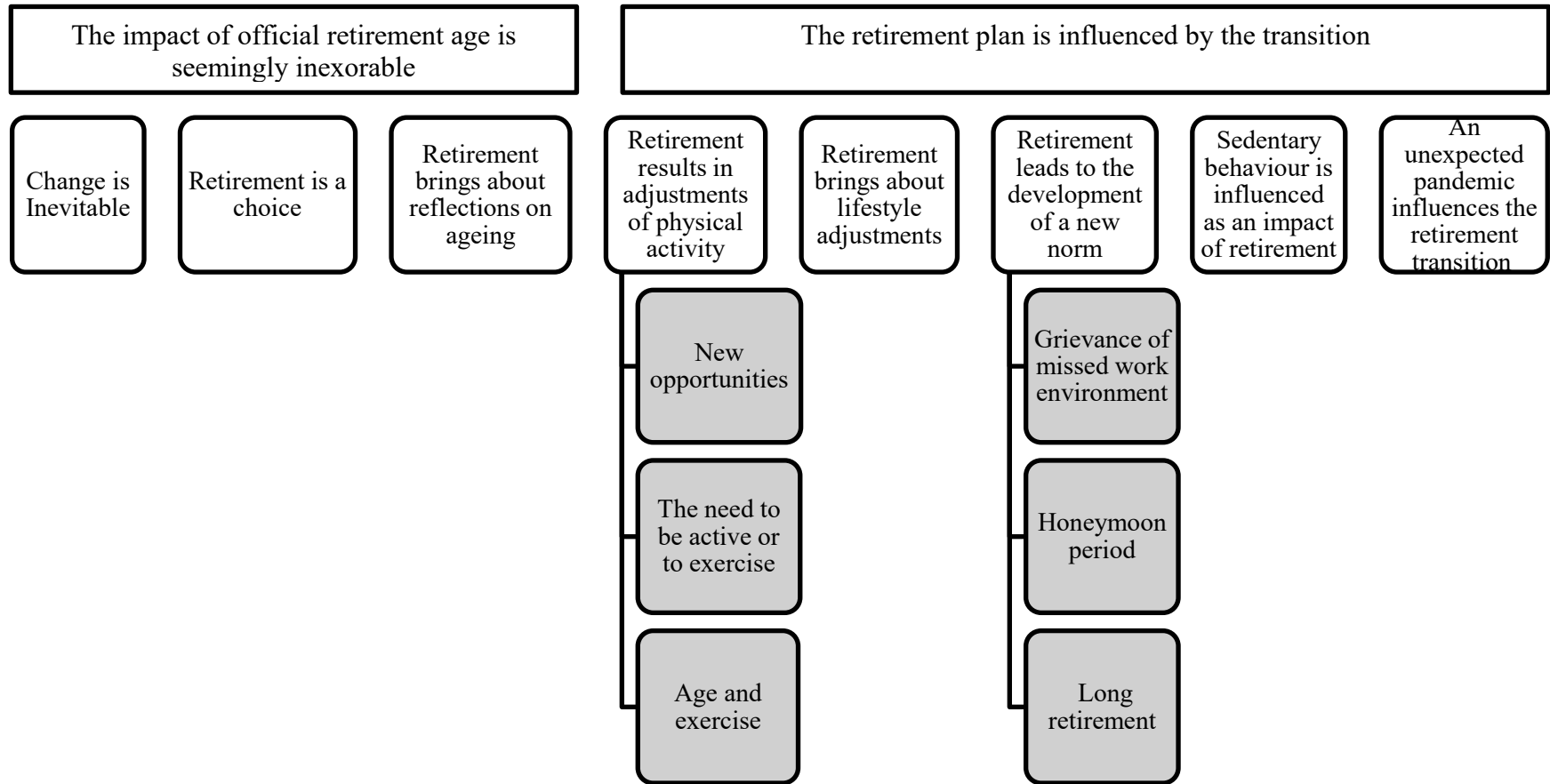


Figure 6 *Post retirement developed themes*

The first theme was “The impact of the official retirement age is seemingly inexorable”. For participants reaching the mandatory retirement age brought about changes irrespective of whether they retired or continued to work. In the follow-up interview after two years, participants who did not retire were able to articulate their retirement plans in more detail, compared to the interviews two years prior, even though some still had not chosen the day they will retire. When retirement age was reached, the person was able to decide whether to retire or not, depending on wishes and their personal commitments. The theme’s subthemes with supporting quotes, are presented in Table 38.

Table 38 *Subthemes for 'The impact of the official retirement age is seemingly inexorable'*

Subtheme	Quote in English	Original quote
<p>1) Change is Inevitable</p> <p>The retirement process presents the person with a reality by which present/past experiences will differ from present/future experiences. This is the change that takes place as a consequence of retirement. All this is inevitable, as it is part of a conscious decision leading to retirement that also brings with it a level of change in physical activity and sedentary behaviour, a consequence of which life adjustments are made.</p>	<p><i>"...during the day you try [your best] ...understood. For example, my wife still works, and the children still live with us, so I try to help with the housework. Then, you must take on certain responsibilities. For example, do some housework, errands and things like that. Some hobbies. Maybe I'll stay in the garage and do some work there, things like that. Are you understanding me? It fills the day like this. Day by day."</i> Chris</p> <p><i>"..It's a new beginning. I enjoyed what I had, but now it's time for a change. And it is not easy 'cause you have to think [about what to do]. But I was preparing myself. I think, when I spoke with you, I already had a plan of things. And, in fact, I didn't do [as she was busy with other things]. A lot of it was fear that I was not going to be able to adjust. I'm going to have to, too much time on my hands and I'm gonna get bored. And if Lilly is bored, uh, and uh [that's a problem]. So yes, uhm, it's still there..."</i> - Lilly</p>	<p><i>"...Il-ġurnata, ifhimni, tipprova tagħmel [li tista]. Jien, perkażu, il mara għadha taħdem u t-tfal għadhom [jgħixu] miegħi, allura nipprova ngħin naqra fix xogħol tad-dar. Imbagħad trid tieħu ċertu responsabbiltajiet int, tifhimni? Perkażu, naqra xogħol tad dar, naqra qadi u affarijiet hekk. Naqra hobbies. Forsi noqgħod nilgħab naqra fill garaxx u affarijiet hekk. Qed tifhimni? Timliha hekk il ġurnata. Ġurnata b'ġurnata."</i> – Chris</p> <p><i>"..It's a new beginning. I enjoyed what I had, but now it's time for a change. And it is not easy 'cause you have to think [about what to do]. But I was preparing myself. I think, when I spoke with you, I already had a plan of things. And, in fact, I didn't do [as she was busy with other things]. A lot of it was fear that I was not going to be able to adjust. I'm going to have to, too much time on my hands and I'm gonna get bored. And if Lilly is bored, uh, and uh [that's a problem]. So yes, uhm, it's still there..."</i> - Lilly</p>
<p>2) Retirement is a choice</p> <p>As the person reaches retirement age, a shift in a locus of power was noted. It ostensibly results in the control of one's decisions, the decision to retire being the individual's. It is the legitimisation of retirement that offers the person</p>	<p><i>"...I had an opportunity to receive the pension and stay on. I said I'll take it [the opportunity] because it won't come again, I don't have any difficulties as a security guard, I said. And I said, yes, I'll do it, so it's been two years since, now. But up to a point I was determined to start the PRL [pre-</i></p>	<p><i>"...Kelli din l okkażjoni [opportunita] li nircievi il-penzjoni u nibqa' [naħdem]. Ghidt, issa, din neħoda għax mhux se terġa tigi. Tbatija ma għandix bħala security guard, ha ngħid hekk. U għidt, ehe, għidt nagħmilhom mela dawn is-sentejn jien, la niflaħ nagħmilhom. Pero sa hemmhekk, u kont determinat li nibda il PRL, iġifieri, għax hawn</i></p>

the power of control based on an implicit right (legitimising the process), therefore making the decision to cease employment (and hence retire) or to continue working a personal choice. There are different factors that will influence this decision and on which the influence of this decision would have an impact, including physical activity and sedentary behaviour. Indeed, those who decided to continue working reported that the legitimisation of their decision to continue working, coupled with their experience, gave them an added advantage to manage their lifestyle and handle situations in a different way.

3) Retirement brings about reflections on ageing. Retirement allowed time for reflection, including on ageing, as persons now had the opportunity to reflect, as they found themselves having ample alone time. They reflected on their physical and mental abilities, and how these seemingly declined in comparison to when they were younger. As a result of this reflection, retirees took different decisions, and not

retirement leave], as some do not take it to get the allowance because we have [we are entitled to] an allowance.” - Jason

“...I asked for a transfer and was accepted, but then I asked myself where I was going [with life]. I said I'm leaving now [retiring]. It's my time” - Chris

“emm before I took the decision to retire, because I took the decision to retired, even though James [the husband] has been telling me to leave, leave, leave.” - Agnes

“...I can't say that I still have the health of a 30-year-old, at 64, I have my limitations but I don't let them keep me from doing things that make me feel happy. There are people who want to go for a run for example, I love to go for a walk, a run takes my breath away, hehe” – Carmen

“...because I'm always thinking. I think about the things I used to do before. You get used to a routine in your life. You have periods in life, like having seasons. [giving an analogy] I am currently doing this. It's time for potatoes for example, so I focus on

min ma jiddux biex jiehu l-allowance, ghax ahna ghandna [intitolati ghal] allowance.” – Jason

“U jien kont tlabt ghal transfer, imma ghidt fejn ser inmur. Ghidt issa nitlaq il-barra la gie iż-żmien tiegħi.” – Chris

“emm qabel ma hadt d deċiżjoni li ha nirtira, ghax jien hadt d deċiżjoni, ghalkemm, James kien ilu jghidli itlaq, itlaq, itlaq” - Agnes

“Ifhimni, ma nistax nghid li jiena ghad ghandi sahha ta 30 sena. Ta' 64, igifieri, ghandi l-limitations, imma ma nhallijomx iżommuni milli nagħmel affarijiet li nhossni kuntenta bihom. Hawn min irid imur ġirja, per eżempju. Jiena nhobb inmur nimxi, heqq, ġirja taqtagħli nifsi, hehe.” – Carmen

“...ghax mohhi fuq xiex se jahseb? Jahseb fuq l-affarijiet li kont nagħmel qabel, qed tifhem? Tidra rutina f'hajtek, int. Inti ghandek perjodu taż-żmien [perjodi differenti f'hajtek]. Ghandek staġuni, wkoll, ha nghid hekk. Bhalissa, qed nagħmel dil-

everyone opted to engage in healthy behaviours.

potatoes. If it's snowing, you will be thinking about snow. I have permission to sail my boat from May to September but it is not allowed to go on a boat during this period. It's like you have a stages [in life]. Until now I'm still living these experiences, but always with difficulty” – Jason

“I'm feeling tired I don't have that energy like before, I tell myself I can't even imagine now how I did all that work, going up and down [walking from one place to another during work] and working, because I used to do a lot.” - Jessie

ħaġa. Ġie żmien il-patata, per eżempju, allura moħħok jikkonċenta fuq il-patata. Jekk ġie żmien is-silġ, inti jkun moħħok fuq is-silġ. Jekk ġie imbagħad [żmien] li għandi permess inniżżel id-dgħajsa minn Mejju sa Settembru, moħħi ħa jmur fuq id-dgħajsa f'dak il-perjodu taż-żmien. Fhimt? Qisek għandek stage, stage, ħa ngħid hekk. Sa issa, għadni qed nagħmilhom [l-affarijiet tiegħi], imma bit-tbatija, dejjem.” – Jason

“Qed inħossni għajjiena u m'għandix dik l-energija bħal qabel, ngħid lanqas nimmaginani issa nagħmel dak ix-xogħol tiela u nieżla min isfel [għal fuq] u qadi [li kont nagħmel].” - Jessie

The second theme was: “The retirement plan is influenced by the transition”. Retirement plans develop during the retirement transition, as persons focus on their intentions once they reach retirement. When nearing the retirement age, it was found that some people had fixed plans whilst others did not. Once the decision to retire was consciously taken, any plans for physical activity and sedentary activities were reflected upon and understood to be influenced by a number of factors, including: specific circumstances e.g., if one’s partner was working or not, if children were living at home or not, finances, and self-health; experiences e.g., culture of exercise participation, physical-activity involvement and impact of retirement experiences by significant others; and intentions e.g., working in fields, meeting with friends, and starting exercising. The COVID-19 pandemic was an important aspect, and was regarded as an unexpected interloper in these persons’ retirement plans, for which sudden and unexpected adjustments had to be made. In dealing with the retirement transition, participants used their varied resources to adapt to the new situation. Some participants highlighted the difficulty in adjusting to this. This theme and its subthemes, with supporting quotes, are presented in Table 39.

Table 39 *Subthemes for 'The retirement plan is influenced by the transition'*

Subtheme	Translated quote	Original quotes
1) Retirement leads to adjustments of physical activity As a consequence of unavoidable changes consistent with retirement, people took to new situations by adapting, including adjustments to their physical activity patterns. These were found to be influenced by the persons' considerations on a) new opportunities, b) the need to remain 'active' or to exercise, and c) age vs exercise.		
a) New opportunities - retirement resulted in different perceptions towards new opportunities to be physically active that were in turn influenced by preconceptions on what physical activity really was. The adjustment to being more physically active was at times unexpected, e.g. spending more time on domestic activities, whilst other adjustments were part of the person's plan e.g. start going for a walk regularly. Going into retirement brought about opportunities for a person to be physically active in different physical activity domains (domestic, transport and leisure).	<p>"[talking about gardening] <i>This year, I struggled and suffered, and I only have trees. I have eleven trees in the inner part [of the garden, and somewhat sheltered] and another ten on the outer part [exposed to the elements], as well as five olive trees. I have never watered the five olive trees because it is impossible [too much work]. How much water can I carry? I'll water four trees one day [and water others another day], because you cannot do everything at once. With this heat, it becomes too much. Even if you go in the early evening, it is still too hot. The heat is tremendous.</i>" – Albert</p> <p>"Yes, even for shopping, I don't take the car and go shopping. I prefer going on foot when I only have to shop for a few items. The grocer's is four blocks away, so it is a good walk. I don't like to use the car when I can go on foot." - Jessie</p>	<p>"<i>Din is sena, thabatt u batejt, qed nghidlek. Jiena, b'kollox, sigar ghandi hdax gewwa u ghaxra ohra barra, barra iz-zebbugiet. Ghandi hames zebbugiet qatt ma tajthom bela ilma. Mela jista jkun? Kemm ha ngorr ilma? U mbaghad, jekk nghid, per eżempju, ha naghmel [nsaqqi] erba' sigriet illum, ghax ma jistax ikun taghmel kollox [f'daqqa]. Fis-shana, issir žibel, u jekk tmur fil-ghaxija kmieni [biex minghalik tiffranka s-shana], xorta issir žibel. Is-shana hija tremenda.</i>" - Albert</p> <p>"<i>Anki x-xiri, jien tghidlix naqbad il-karozza u nmur nixtri. Ghal affarijiet žghar, inmur bil mixi, alavolja ghandi erba' blokok sew u l-bogħod il-grocer. Ma nfittixx li naqbad il-karozza jekk nista' nmur bil mixi.</i>" - Jessie</p>

b) The need to be active or to exercise - Engaging in activities with a purpose was something which all participants sought, whether in retirement or having continued working after their retirement age. Participants reported the need to engage in activities that kept them busy, mentally and physically. Retirement brought with it a certain lack of purpose, which participants felt the need to address with meaningful activities. Because they found themselves with more free time, and as they wanted to fill their day, some used this as a motivation to increase their exercise participation or engage more in domestic activities whilst others engaged in sedentary activities.

“At the moment, I am working on a few projects. For example, I have some paint and I am painting weather vanes now, green and white. If you want to order one [let me know]. So far, I've done two, the first to pass the time but now I am taking it more seriously, so this one is harder work. There are no [written] instructions on how to do these, so I'm watching YouTube videos instead. The videos are not instructional but you just see completed weather vanes in operation. Then, I try to figure out how they work. I am designing one with a man and woman on a see-saw.” – Albert

“I go for a walk for half an hour or 45 minutes. If I can't do half an hour straight, I go 20 minutes at one point of the day and 20 minutes later. But I want to walk, even if I cannot go out that day and stay home, I'll go up on the roof to hang up the laundry and, then, I'll walk around the roof. I want those 20 minutes of walking, free from chores. Then I'll go back to continue. Hehe” - Carmen

“Issa, bħalissa, qed naħdem fuq xi proġetti. Għandi xi żebgħa u qed nagħmel il-pinnuri. Bdejt niżbogħ wieħed aħdar u abjad il-bierah. Jekk trid tordna xi wieħed [għidli]. S'issa, għamilt tnejn, wieħed normali biex ngħaddi ż-żmien u iehor kien fih naqra aktar xogħol. Imma ċ-ċuċata li m'hemmx instructions jew hekk. Jien qed nara fuq YouTube. Narahom jaħdmu [il-pinnuri], imbagħad inkisser moħħi biex nara kif se naħdem, għax ma jgħidlekx [jagħtik struzzjonijiet] biċċa biċċa. Issa qed nagħmel pinnur b'raġel u mara fuq see-saw.” – Albert

“Inmur mixja nofs siegħa, tlett kwarti, ċertu ħin hekk. Jekk ma nistax nagħmilha nofs siegħa straight, inmur 20 minutes u 20 minutes. Imma rrid nimxija, imqar jekk ġod-dar. Nitla' fuq il-bejt, noqgħod nonxor, noqgħod indur mal bejt, irridhom dawk it-20 minutes li jiena free. Imbagħad nerga nmur inkompli l-faċendi. Hehe” - Carmen

c) Age and exercise – retirement, as well as increased exercise behaviour, brought about reflections on ageing and the ageing body. When engaging in exercise, participants were conscious and sensitive to their ageing

“The drive to exercise has to come from within, and time for exercise you have, but you need the physical ability to exercise. You are not as healthy as before. You don't feel the same way. You

“L-ewwel nett, id-drive trid tiġi minnek li tagħmel l-eżerċizzju. Ċans [ħin] hemm, imma trid tkun trid, u jrid ikollok is-saħħa. Issa, tgħidli, xi naqra aches l-hawn u l-hemm jibdew gejjin. Jew naqra

bodies. They were aware of the need to exercise but, at the same time, they found that it was taking them longer to recover when engaging in exercise activities. Although this did not stop them from exercising, it made them adjust the manner in which they performed exercise.

get some aches here and there. They start coming. Either your knees or somewhere else. So your ability to exercise will not remain the same. You can modify i.e., you can modify it [the exercise you do] but your strength and energy will not remain the same as they used to be. Maybe you do not notice much change just one year after you retire but, as more time passes, you start to realise that you are no longer as adventurous as you used to be. Where, before, you used to get to there, today you get only to here.” - Sean

“I still have life commitments. I still don't have those freedoms [which other retirees do]. I'm still healthy, so I can't [refuse to help my children], I have no excuse for not doing anything.” - Chris

rkubtejk jew naqra hekk. Qed tifhimni? Allura l'abilita tieghek tal-eżerċizzju ma tibqax l-istess. Tista' timmodifika, ta, igifieri, imma s-saħħa u l-enerġija li kien ikollok qabel ma jibqgħux l-istess. F'sena, mhux se tmur daqshekk lura, imma, mbaġhad, iktar ma jgħaddi ż-żmien, tibda tgħid, tirrealizza li naqqast dik in naqra. Ma tkunx għadek avventuruz daqs kemm kont. Qed tifhimni? Fejn qabel kont tasal sa hemm, illum tasal s'hawn.” - Sean

“Xorta għadni bil-commitments [tal-ħajja]. Għadni m'inix b'dik iċ-ċerta liberta [tal-irtirar], qed tifhem? La saħħti għadha ttini, allura ma nistax [ngħid le lit tfal]. Ma għandix skuża illi ma nista' nagħmel xejn, qed tifhem?” - Chris

2) Retirement brings about lifestyle adjustments
Retirement led to lifestyle changes (food, consumption, finance management, time for self, smoking, being lazy) which could influence the health of individuals and therefore their physical activity and sedentary behaviours patterns. There were reported changes to food consumption, specifically the consumption of healthier meals as well as eating more frequently. A

“Before, I used to tell him [my husband], to do something and we would do it, by car if not on foot. He used to get up and do it. Now, he procrastinates.” - Josette

“So, when I won't be working anymore, I will have more time to organise my day at my own pace. I will have more time

“Qabel, kont ngħidlu [lir-raġel], per eżempju, biex jaqgħmel xi ħaġa, anki jekk bil-karozza, u kien jaqbad u jaqgħmilha. Issa sar jittratieni.” - Josette

“Allura, x'hin għallinqas mhux ser inkun xogħol, iżjed għandi ċans li nqassam l-affarijiet bil-mod. Għandi aktar ċans

change in the management of finances was also reported with people willing to spend money more freely on health or leisure activities. This was linked to their life expectancy, with them perceiving having less time to enjoy their financial gains. Retirement itself as well as for those who continued to work post-retirement age, provided the opportunity for time to be dedicated to oneself and to do things which they enjoyed. It was also reported that retirement resulted in an increase in the consumption of cigarettes. A lack of structure to daily activities when compared to the work routine brought with it more hours sitting down doing less activities. This was perceived as being lazy.

3) Retirement leads to the development of a new norm

Adjusting to retirement leading to a new norm was reported to be characterised by three influences: a) the grievance of missing the work environment b) a honeymoon period, and c) a long retirement.

a) A common theme emerging with participants who decided to retire was their grievance about missing their work environment, especially the social interactions at work. The specific impact of the COVID-19 pandemic seemed to play an even greater role in this grievance as maintaining meaningful connections with work colleagues after retirement was more difficult. Retirees missed their work colleagues and the social aspect of work. This was highlighted as an important aspect

for myself, and more time to go swimming.” – Antoinette

“...maybe I'm eating more now. I've gained weight, somehow. I am not sure how. I have ended up in the kitchen the whole time, because we eat in the middle of the day and in the evening, and I nibble occasional snacks, too.” - Jessie

ghalija nnifsi. Ghandi aktar çans li nitlaq lejn il-baħar.” – Antoinette

“B’xi mod, tellajt il-weight. Forsi qed niekol iktar. Ma nafx kif. Spiċċajt fil kċina il-ħin kollu għax nieklu f’nofs in-nhar u fil għaxija. U nkompli nnaqqar, ukoll, imma mhux daqshekk.” - Jessie

“Oh, I miss colleagues. I miss the children I used to work with. I really do. To me, it was rewarding. Maybe it is not that special, being an LSE [learning support educator], but, you know, everyone’s got a role, and I had a lot of job satisfaction, seeing improvements in children and making connections with children and staff. I miss the staff as well, but not that much, because I am not sitting around all day thinking about the past. I’m doing other things now, so my

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of working, yet, at the same time they were conscious, that, once the decision of retirement was taken, they did not want to go back to working.

mind is occupied. I still miss work sometimes but I don't look back. I don't want to go back to that, although I miss it. I miss my work. I miss the children and I miss the colleagues as well, but not that much. I am not sitting around telling myself how much I wish I stayed working. No, no, no, no. That, I don't say. Certainly not.” – Lilly

“...I was proud of my work, so I miss that. Nothing more, not because I used to meet friends. I only miss about two of my colleagues out of two dozen, but mostly I miss the satisfaction my work brought, because it is satisfying to help people. That is what I miss.” - Claire

b) The initial part of the retirement was defined as a honeymoon period. Participants described this as being a period of long leave or vacation. The duration of this honeymoon period varied amongst the participants, yet it was always described as being a happy period of retirement. During this time participants either engaged in activities which they had planned to do in advance, or decided to rest by taking it easy, relaxing, and being more sedentary.

“I retired, but there were still things I needed to do and settle, especially in the first few months. There are finances, paperwork and some projects I had always wanted to work on but never had the time for. So I had things to do, but also more free time to do them. If I suddenly decided I wanted to do something, I could just go and do it. There is nothing hindering me. I have been freer to meet my daughter.” - Agnes

“The first day I was so happy that I left. I didn't have anything to do. I did not

mind is occupied. I still miss work sometimes but I don't look back. I don't want to go back to that, although I miss it. I miss my work. I miss the children and I miss the colleagues as well, but not that much. I am not sitting around telling myself how much I wish I stayed working. No, no, no, no. That, I don't say. Certainly not.” – Lilly

“Ifhem, il-pride tax-xoghol tieghi, dik kienet fuq kollox. Xejn iktar ma nimmissja, mhux ghax niltaqa mal hbieb. Mill-kollegi, tnejn nimmissja minn żewġ tużżani. Nimmissja tnejn minnhom, imma l iktar is-sodisfazzjon illi ngħin lin-nies. Dak nimmissja.” – Claire

“Ifhem, l'ewwel ftit xhur wara l-irtirar, xorta se nagħmel rutina l'istess. Faċendi, ridt nagħmel ċertu affarijiet li qatt ma għamilt, u npoġġi l-affarijiet f'pothom... Tissetilja ċertu karti, trid tagħmilhom, imma tkun iktar free. Jekk fettili naqbad u tlaqt nixtri, ma hemm xejn x'ixekkilni. U iktar free li nmur għand it-tifla.” – Agnes

“Lewwel ġurnata, kont ferħan li tlaqt mix-xoħol. Ma kellix x'nagħmel, ma

c) As the honeymoon period weaned off, retirees started to grasp that this would be their new life. This brought about anxieties as well as a conscious effort to attempt to fill up the day with various activities.

4) Sedentary behaviour is influenced as an impact of retirement
The morning was identified as the time of day when retirees reported trying to be more active. Sedentary behaviours were more attributed to the afternoon. Activities with a

know where to start, what I was going to do. I watched television. Yes, now I can watch television. The first two days, three, television movies, my son got me Netflix. After a week, I started feeling restless. I increased my food intake. I stopped reading and ate more. After about a fortnight of watching television, I found myself eating a plate of pasta at half past eight in the morning. How good is that! But I cannot go on like this. I'm going to become the size of a mule if I keep going on [eating] like this." - Albert

"I didn't know what to do at first so I started working around the house a lot. Then, my grandson [was born]. It was a new thing having him. But, then, it [retirement] hit me. I started to feel empty, bored and sad with all that free time. The day was not satisfying enough. The last few days, I do not even have the appetite to get up. Before, I used to get up in the morning and go for a walk. Now, I don't have it in me. I don't have the will. I don't have the strength to get up anymore." - Agnes

"I start to see myself strangely, because I eat and read, then I watch some animal documentary on television or something like that, or I watch the BBC, and maybe I snooze for a quarter of an hour. Then I

kontx naf minn fejn ha nibda, u qbadt nara it-television. Iva, issa ghandi cans nara it-television. L-ewwel jumejn, rajt tliet television films. It-tifel gabli Netflix. Wara gimgha, bdejt nixba u zidt fl'ikel. Wara xi hmistax, ghidt kemm ha ndum nara t-television? Zidt fl'ikel ergajt. F'it-tmienja u nofs ta' filghodu, habib tieghi, platt ghagin. Mmm, kemm huwa tajjeb l-ghagin fit-tmienja u nofs ta' filghodu. Ma nistax nibqa sejjer hekk, imma. Jien se nsir daqs baghal jekk nibqa sejjer hekk." - Albert

"Ma kontx naf x'se nagħmel u inflejt bid dar, u imbagħad, gie it-tifel [twieled], u tkun happy bit-tifel, xi haġa ġdida... Imma, issa, f'daqqa waħda, it hit me. U kont qed inhossni vojta, boring, u ma kinitx satifsying iktar il-ġurnata. Dan l'ahħar, lanqas aptit nqum mhu qed ikolli, fejn is-soltu kont inqum filghodu halli nimxi. Mhux qed ikolli dik il-volja, mhux qed ikolli dik is-saħħa li nqum." - Agnes

"Dak il-ħin, nibda narani stramb, għax jiena niekol naqra, imbagħad nara naqra television, xi dokumentarju tal-annimali jew hekk, jew naqra BBC, u forsi tmur għajni bija xi kwarta. X'ħin

specific purpose such as performing desk jobs maintenance activities, or using the computer were carried out while sitting, as well as activities without little purpose, such as watching television when there was nothing better to do. Those who retired from a primarily sedentary job noted that, on retirement, they carried out domestic type of activities and, as a consequence sat less when compared to their previous work routine.

wake up, prepare a flask of coffee and go and play with the dog.” - Albert

nistenbaħ, nibda nipprepara u nqum inčekcek mal-kelb u nagħmel Thermos kafe.” – Albert

“My exercise routine remained the same. Maybe it got worse. Instead of finding more time for it, sometimes I get lazier. Now, I have all the time I need for it but I keep putting exercise off. I keep thinking of increasing my exercise, so the desire is there, but my will seems to have left me.” - Sean

“L-istess baqa l-eżerċizzju, jekk ma traskurajt naqra. Flok insib ħin aktar għalih, kultant aktar nitgħażzen. Issa, tgħid, għandi l-ħin kollu tiegħi. Tibda taħseb li ħa żżid l-eżerċizzju. L-inizzjativa hemm baqgħet, imma r-rieda hallejta warajja.” – Sean

“...When I feel I'm sitting down too much at the computer or whatever, I'll put the music on... put the blinds down, and I dance.” - Lilly

“...When I feel I'm sitting down too much at the computer or whatever, I'll put the music on... put the blinds down, and I dance.” - Lilly

5) An unexpected pandemic influences the retirement transition

The retirement transition period examined was between 2019 and 2022, and therefore was influenced by the COVID-19 pandemic, which was unplanned and impactful. The adjustments to the type of physical activities and sedentary behaviours, as noted by the retirees, was not only impacted by retirement, but also by COVID-19. Some retirees pushed their retirement day forward, as COVID-19 adjustments made their employment terms more favourable to stay on; while others

“I think, before I stopped, I was thinking that, maybe two days a week, I will visit the day centre [as a part-time work]. But, as things turned out [because of COVID-19], I did not succeed. Today, I do not consider that as an option anymore.” – Claire

“Jien naħseb... qabel ma waqaft naħdem, kont ngħid forsi nmur xi żewg mornings hekk, go xi home qrib. Imma kif ġew l-affarijiet [bil-COVID-19], ma rnexxitlix. Illum, ma ngħidx ħa nmur, igifieri. Le, le ma nmurx. Illum daqshekk. Mhux ħa ngħid ħa nmur hemm.” – Claire

“When I started working from home [because of COVID-19], I started walking more. In the morning, I used to

“Aktar kont nimxi meta kont naħdem mid-dar, għax ma kontx niġi l'hawn. Allura, filgħodu, kont inqum kmieni biex

terminated their employment, even though they were considering a work extension prior to the outbreak. The pandemic had some influence on the amount of physical activity and sedentary behaviour patterns, which were short lived. Those inclined towards exercising claimed to have found that the pandemic provided an opportunity to increase their outdoor activities. The restrictions imposed on social interactions also provided an opportunity to retirees to discover the outdoors with less traffic in the streets. Those who were less motivated towards exercise, or who enjoyed exercising within a social environment, identified the COVID-19 restrictions as limiting their exercise participation. The lack of social interaction provided an opportunity for some to engage in new hobbies that they had not considered before.

get up early to avoid meeting anyone. I used to walk every day. Every day. Seven days a week. When I used to come to the office before the pandemic, I did not have any walk routine. I am a bit fixated about my car, so I am reluctant to park it somewhere unsheltered to walk part of the way to work. Having a managerial position helped with that, because I have a reserved spot in the parking lot, so it was easy for me to have the habit of using the car instead of walking.” - Mike

ma niltaqa ma hadd. Kont nimxi kuljum pracett. Kuljum. Sebgħa t'ijiem [fil-ġimgħa]. Kont naħdem mid-dar, ma kellix il-problema li niġi hawn kmieni biex nipparkja. Jien, peress li parti mil-management, ituni permess nipparkja fil garaxx, u jien iffissat fuq il-karozza. Allura irrid insib parking tajjeb għalija. Ma nħallijiex fin nofs il-karozza. Irrid insibha hemm [allura nispiċċa ma nimxix].” - Mike

b) Structural narrative analysis

The story structure was developed based on the analysis of four narrated stories. The analysis of the story structure was not limited to the post-retirement interviews, but examined the participants' retirement stories, as narrated by them throughout the two interviews. Two males and two females were selected, as they were considered good narrators and used detailed short stories to highlight their retirement experience in relation to PA and SB. The common story structure identified is presented in Figure 7. A detailed account, as interpreted by the researcher for two males is presented in Table 40, and, in Table 41, for two females. Supporting quotations are presented in Appendix 32.



Figure 7 *Structural narrative analysis story*

Table 40 *Structural narrative analysis, male examples*

	Albert	Sean
Reaching retirement age	<p>Albert considers himself an active person. He is involved at his workplace and has a sense of belonging. At the same time, he is looking forward to retiring someday soon, due to difficulties at work. He has two routines, a workday routine, and a non-workday routine, as he works on a shift basis. His work is mostly sedentary, and he finds it tiring due to his long hours. The lack of movement in his work is one of the things which makes it tiring, according to him. On his off day, he tries to be active by involving himself in different social activities, to keep himself busy. He links his business with exercise, and considers himself very active. He used to train regularly when he was younger. This seems to give him the conviction that he can still be active. He still engages with different exercise activities, such as swimming and walking (although with less intensity than when he was younger). He attributes part of the decrease in activity to him being older. As he is getting older, he is thinking about his retirement and considering different retirement options.</p>	<p>Sean is planning on retiring but he is still undecided when to retire, because he is still evaluating his options. Sean finds having a daily routine important. He tries to be active at work, even though his work is sedentary. When possible, he tries to avoid long sitting periods and carries out walking activities at work. On his non-workdays, Sean considers himself a hands-on person. He tries to carry out DIY (do it yourself) activities and tries to be as active as possible, and limit sitting time. He watches television to relax. For him, there is a distinction between physical activity and exercise. He tries to be active but dissociates himself from what he considers exercise culture (going to the gym, carrying exercise). Sean finds it difficult to integrate exercise into his daily routine. He lacks motivation for it and does not prioritise it. However, when exercise is part of a social event, he is willing to participate. According to Sean, exercise is something which you learn to do when you are young, and then it becomes part of you. It is difficult to include it when you are old.</p>
Retirement plan	<p>Albert wanted to retire to get rid of his work. It was too much for him to handle. Retirement was an opportunity. He has a plan about what to do when he retires to keep himself busy. He plans to go out, meet new friends and continue to practise his hobbies.</p>	<p>Sean views retirement as a challenging step, as he is still unsure what to expect and what to do in his free time.</p>
Retirement decision	<p>The decision to retire has been taken.</p>	<p>Retirement was the next step for Sean, as his friends were retiring, and other members of staff were as old as his</p>

children. He has been working for 40 years. He felt it was time.

Retirement	<p>On retiring, the initial days were like a holiday. He watched television and ate excessively, with minimal PA, until he realised that this will be his retired life, and so decided to get into a new routine. Even though Albert was happy with his retirement, it was not easy for him to fill his time. He was always active, but filling all the free time in retirement was difficult for him. He was planning on spending more time at his favourite social club and making new friends but, due to the COVID-19 situation, he had to cancel his plans. Meanwhile, a new opportunity came up when his family got a new pet dog, which became his best friend. This helped him become active again, and he started going to the fields often, spending time with the dog. Sporadically, he goes out for long walks with the dog. Since retiring, Albert has noticed that he is finding himself thinking more, and has become more worried about things, since he is less busy. Being busy during the morning is very important for him. He finds that having initiative is important, so he tries to find things to do and be active as much as possible. His role in the family has also changed. He has taken up more house chores because his wife is still working.</p>	<p>He has found the initial period of retirement challenging and is still adjusting to it. The initial period was described as a long holiday but, then, there was the realisation that his work routine is no longer there. This made him take up a new role within his family. He has increased his domestic work and other DIY activities. However, the lack of motivation for exercise has continued and actually increased further. His exercise participation has continued to decrease. COVID-19 made retirement more difficult for Sean. He was planning to do voluntary work but was unable to. This made it more difficult for him to find purpose in his daily routine. In addition, social exercise activities were restricted during lockdowns, which could have resulted in him participating in less exercise. For Sean, retirement is a period in which he has more time to reflect, due to fewer work-related distractions.</p>
Adjustment	<p>Albert feels he has settled in his new routine and is happy with the way things are. He does not wish to go to his previous plan of spending a lot of time at the social club. Albert feels he is doing enough PA, as his weight is stable.</p>	<p>Retirement made him more aware about his ageing body and his physical abilities. His physical ability has been decreasing with age but, up until retirement, he had not noticed it that much, because he was always busy at work. Now that he lacks purpose, he is feeling this further.</p>

Table 41 *Structural narrative analysis, female examples*

	Lilly	Claire
Reaching retirement age	<p>Lilly enjoyed her work, but she thought it impeded her from exercising. There was too much to do every day to fit in exercise as well. When she was younger, this was not such a problem because she was very energetic, but it has become harder as she aged. Now, if she has a lot to do in a day, she feels stressed. She attributes this to her ageing body. She feels her body is getting older, and her energy levels are lower and the recovery period after exertion is longer than before. Exercise has been part of her life since she was young. She has particular memories of exercising in her 20s and 30s, when she started exercising regularly. She used to be quick on her feet and it has always been in her to be active. She defines herself as someone who needs to be challenged and involved in various activities, so exercising forms part of that. Comparing herself to colleagues and other people she knows, she thinks she is more active and involved than them. She sees exercise as a way of keeping physically and mentally active. It is integral to her life.</p>	<p>Claire is an active person. She plans to retire soon but has no fixed date yet. She engages routinely with physical activity and was planning her retirement activities. She is planning purposeful physical activity in the fields that her family owns. She will be taking care of animals and the environment. Occasionally, she engages in long periods of exercise by going on hikes with her family and/or friends. She first started hiking when she was young. She recalls her early hikes with great enthusiasm and a sense of achievement. Her passion for hiking has not diminished.</p>
Retirement plan	<p>Lilly was planning to retire within the next six months. She has been planning for retirement for the past ten years.</p>	<p>She expects retirement to be a busy period in her life, full of activities she enjoys. Exercise and being physically active feature within her retirement plan.</p>
Retirement decision	<p>With the COVID-19 pandemic looming near her retirement, Lilly decided to continue in employment, as they were asked to work from home.</p>	<p>N/A</p>

	<p>this provided her with the right opportunity to sort of start rehearsing for retirement, because she could get used to being at home for most of the day. She had the time to be more active and was able to better organise her day. She felt that her retirement started without her having to retire.</p>	
Retirement	<p>Even though retirement was something she looked forward to, it still brought fear with it. The change into something new was a challenge. Work provided a routine and motivation to be active. Being retired resulted in difficulty getting motivated.</p>	<p>Upon retirement, the situation changed completely from what she was expecting. Due to family reasons, she took up the role of main carer for her mother. At the same time, the COVID-19 situation developed. She developed her own bubble inside her home, with media being her source of information about whether life on the outside is safe. While trapped inside, she developed a fear of her physical abilities getting worse, due to her lack of activity. She therefore started engaging in a new exercise routine. This was based on her previous knowledge on how important exercise is to be healthy. Once the family and COVID-19 situation settled, she returned to her previous retirement plan. She is now engaging in being physically active in the family's fields and exercising. However, she is now realising the influence of ageing on her body. She has noticed that her walking speed has been slowly decreasing.</p>
Adjustment	<p>She developed her own way of keeping motivated and coping with change. Her day became less stressful and she had more time to exercise. COVID-19 emptied the streets so it was an excellent opportunity to exercise outdoors. However, now, health problems have started kicking in, which are limiting her ability to exercise. She needed surgery after developing hand problems. These make exercise harder. She admitted that she is spending more time sitting</p>	<p>Retirement was a positive experience for her. It was an awaited change which required adjustment. Her physical activity levels have fluctuated since retiring, due to the pandemic and family situation.</p>

compared to before. Even though she is actively carrying out purposeful, mentally stimulating activities, these are all done while sitting.

c) Changes in physical Activity and sedentary behaviour with retirement

The change process within the QUAL strand was identified by comparing the themes and the story structures at pre and post retirement. These changes were checked separately for the reflexive thematic analysis and the structural narrative analysis.

i. Reflexive thematic analysis

Analysis from the pre- and post- retirement data collection, analysed using reflexive thematic analysis, was checked for changes in the participants' perceptions of PA, SB and retirement. This was done to present a longitudinal analysis of the data set and to identify possible influences of change. The results of this analysis are presented in Table 42.

Table 42 *Pre-and post-retirement reflexive thematic analysis*

Pre-retirement theme/s	Post-retirement theme/s	Analysis
The discernment aspect of retirement.	Change is inevitable.	During the pre-retirement period, participants were considering the change which retirement was going to bring with it. There was a process of contemplation about what to do in the next phase of life, and the adaptation which needed to be done. They identified retirement as an opportunity to increase their PA behaviour. However, when people retired, they found the changes required to shift from a work routine to a retiree routine challenging. The adjustment required within the daily routine, need to fill all the time they used to spend at work with other activities, was the least thought about in the pre-retirement period.
The discernment aspect of retirement + Learned experiences.	Retirement is a choice.	The choice to retire is perceived to be an autonomous one which an individual makes based on personal circumstances. This choice seems to be based on experience and the results of the pre-retirement contemplative period. Based on perceptions of what retirement represented, participants consciously or unconsciously set their retirement-day target. However, this was part of the contemplation process in which they evaluated their life circumstances and the possible family and financial situation they will find themselves in. Through balancing these expectations with the actual life situation, participants took a conscious choice to retire. This conscious decision was not identified two years prior, even though participants were thinking of retiring. In effect, 35% of the participants decided to extend their working years by more than two years.
The inevitable process of ageing.	Retirement brings about reflections about ageing.	A theme which was importantly identified by the participants in the pre-and post-retirement period was the ageing process. In the pre-retirement period, participants were becoming more aware of their ageing bodies, but they were still distracted by their work routine. The concept of, and perceptions on, ageing had started to kick in as a result of the retirement transition. However, once they retired, there was a heightened reflection on ageing, as they had more time for themselves. The participants felt that reflections about ageing after retirement made them change their outlook towards life.

Engagement in PA and Learned experiences.	Retirement results in adjustments of physical activity.	An adjustment in the amount of PA participants engaged in was similar to their pre-retirement perceptions. This perceived change seems to be dependent on their previous level of engagement with PA and their positive experiences when exercising. Based on their personal definition of PA, participants perceived a change in their PA engagement. This was also influenced by their previous PA and sitting time at their workplace.
	Retirement brings about lifestyle adjustments.	Lifestyle adjustments which participants claimed had happened once they retired had not been identified in the pre-retirement period. Some of the lifestyle adjustments were due to financial constraints which had caused participants anxiety in the pre-retirement period. However, once they retired, they settled into a new financial routine without any mentioned concerns. The lifestyle adjustments identified by the participants have been carried out due to the increased free time identified when they retired. As a result of them having more free time, they adjusted their lifestyle accordingly. Changes identified were a change in smoking patterns, cooking, and food intake. Participants claimed to cook healthier meals and try alternative food, as they had more time. Others ate more due to easy food access during the day. These changes were not identified in their pre-retirement plan and were described as something unexpected by participants.
The discernment aspect of retirement + Psychosocial factors shaping the retirement transition + Learned experiences.	Retirement leads to the development of a new norm.	All participants, those who retired and those expecting to retire, were planning for their new norm. The adjustment process varied from their pre-retirement plan which was based on experience, and psychosocial factors. However, it was a common expectation that they needed to adjust to their new reality. The development of a new norm was present in the identified pre-retirement themes. It was an expected change of retirement.
Cognisant SB.	Sedentary behaviour is influenced as an impact of retirement.	The approach to SB seems to be impacted by going through retirement. In the pre-retirement period, participants were more aware and mindful of their sedentary activities. They tried to reach a balance between their PA and SB. This balance was not identified or present when participants

Engagement in PA.	An unexpected pandemic influences the retirement transition.	<p>retired. In the pre-retirement period, SB was associated with relaxation periods or attributed to the nature of work. Post-retirement, afternoons were associated with sitting activities or watching TV, as they had nothing better to do. The importance of being active was still present, as participants tried to be active during their day, but there seemed to be less effort to avoid SB</p> <p>Certain life situations, such as ill health of a family member or a global pandemic, are unexpected events within the retirement transition, which participants had to adjust to. The pandemic influenced social participation. In the pre-retirement period, participants mentioned the importance of peer support to engage in PA. Without that peer support during the COVID-19 pandemic, the amount of PA engagement could have been negatively influenced.</p>
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ii. Story structure

The structural narrative analysis for the pre-retirement interviews focused on the pre-retirement perceptions of retirement. To understand the influence of the retirement on PA and SB interviews from the two data collection points for each individual were considered. Structural narrative analysis for the longitudinal stories (pre- and post- retirement) was only considered for participants who had retired. The story structure identified interesting differences between the pre- and post- retirement period. Comparing PA and exercise participation seemed to be part of the participants' current state of activity and experience, which continued in the post-retirement period, as they went through the retirement transition. PA patterns after retirement were influenced and adjusted, but were linked back to past experiences and activity patterns pre-retirement. SB does not feature within the pre-retirement story line but was part of the adjustment process. It was part of the adjustment towards retirement. Table 43 highlights the changes identified and presented above.

Table 43 *Changes observed in the reflexive thematic analysis and the structural narrative analysis*

Reflexive thematic analysis			Structural narrative analysis		
Pre-retirement themes	Post-retirement themes	Change	Pre-retirement story structure	Post-retirement story structure	Change
The discernment aspect of retirement (new opportunities, adaptation of your life)	Change is Inevitable	<i>Least thought about aspect in the pre-retirement period is the inevitable change.</i>	Past experiences	Reaching retirement age	<i>The perceived change in PA</i>
The discernment aspect of retirement + Learned experiences	Retirement is a choice	<i>Choice is made as part of life experience and the discernment process, until an actual decision is taken to retire.</i>	Current state of activity	Retirement plan	<i>experience of the participants was similar to their perceived PA within the pre-retirement phase.</i>
The inevitable process of ageing (self-efficacy, the change process of ageing)	Retirement brings about reflections about ageing	<i>Retirement heightened the reflections on ageing.</i>	Retirement perceptions	Retirement decision	<i>Perceived changes in SB seem to be less dependent on pre-retirement perceptions and more dependent on the adjustment phase.</i>
Engagement in PA (peer support, alternative points of views, health benefits)	Retirement results in adjustments of physical activity	<i>Adjustment in PA were based on type of PA engagement during the pre-retirement period, and PA experience.</i>	Perceived PA and SB behaviour after retirement	Retirement	
Learned experiences	Retirement brings about lifestyle adjustments	<i>Few of these lifestyle adjustments such as management of finances, cigarettes, food, and lack of structure. were talked about, or considered in the pre-retirement phase.</i>		Adjustment	
The discernment aspect of retirement (new opportunities, adaptation of your life)	Retirement leads to the development of a new norm	<i>New norm was developed based on previous experiences, psychosocial factors and the discernment carried out pre-retirement.</i>			

Psychosocial factors
shaping the retirement
transition

Learned experiences

Cognizant SB (Easy option,
Balance between PA and
SB)

Sedentary behaviours
are influenced as an
impact of retirement

*SB were an easier option than
more purposeful activities.
Balance between PA and SB not
considered after retirement.*

Engagement in PA (peer
support)

An unexpected
pandemic influences
the retirement
transition

*Only peer support from family
members was mentioned in the
uptake of PA.*

d) Summary

This section has provided an overview of the results from the QUAL strand within the MM research study, which explored the predictors of change of PA and SB during the retirement transition. The pre-retirement results were compared to the post-retirement results. The story structure identified PA as being part of the participants' story line, which was based on experiences. SB was dependent on the adjustment process during the retirement period and was not considered as part of retirement in the pre-retirement period. Using reflexive thematic analysis highlighted that fluctuations in the daily routine which occurred due to retirement were the changes least thought about by participants. Retirement heightened reflections on ageing and the retirement day was a conscious choice for retiring participants. The adjustment process during retirement resulted in the development of a new norm which included other lifestyle factors not limited to PA and SB. A summary of the results is presented in Table 43.

Section 4. Data Integration

This section presents the integration of the exploratory sequential MM design used as part of the longitudinal study. Integration is a requirement for a MM study and therefore the results from the previous sections of this chapter are being merged, and meta-inferences undertaken to give insight into how PA and SB are influenced during the retirement transition. As the amount of data collected is extensive, the inferences from the QUAL and QUAN strands are being presented using a joint display in a tabular format with a traffic light system, and as a flowchart with integrated results.

Figure 8 on the next page presents the exploratory sequential MM design used for the study which explains how the data was collected and collated for the integration.

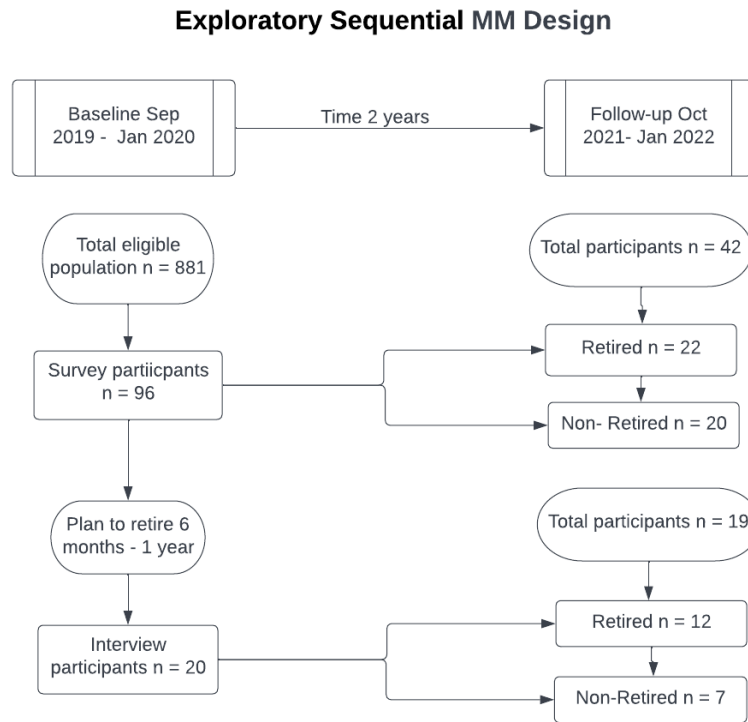


Figure 8 *Diagrammatic representation of the adopted MM design*

Integrated results from the QUAN and QUAL strand are presented as meta-inferences. The meta-inferences uses data from the reflexive thematic analysis, structural thematic analysis, and inferential statistics (Figure 9). The meta-inferences were an interpretation of the how the results from the different strands merge together to obtain a deeper understanding of the phenomena under study. This MM study identified six meta-inferences when integrating the different data. Three meta-inferences agreed, one was in dissonance, while two showed diffractions. These are presented in Table 44.

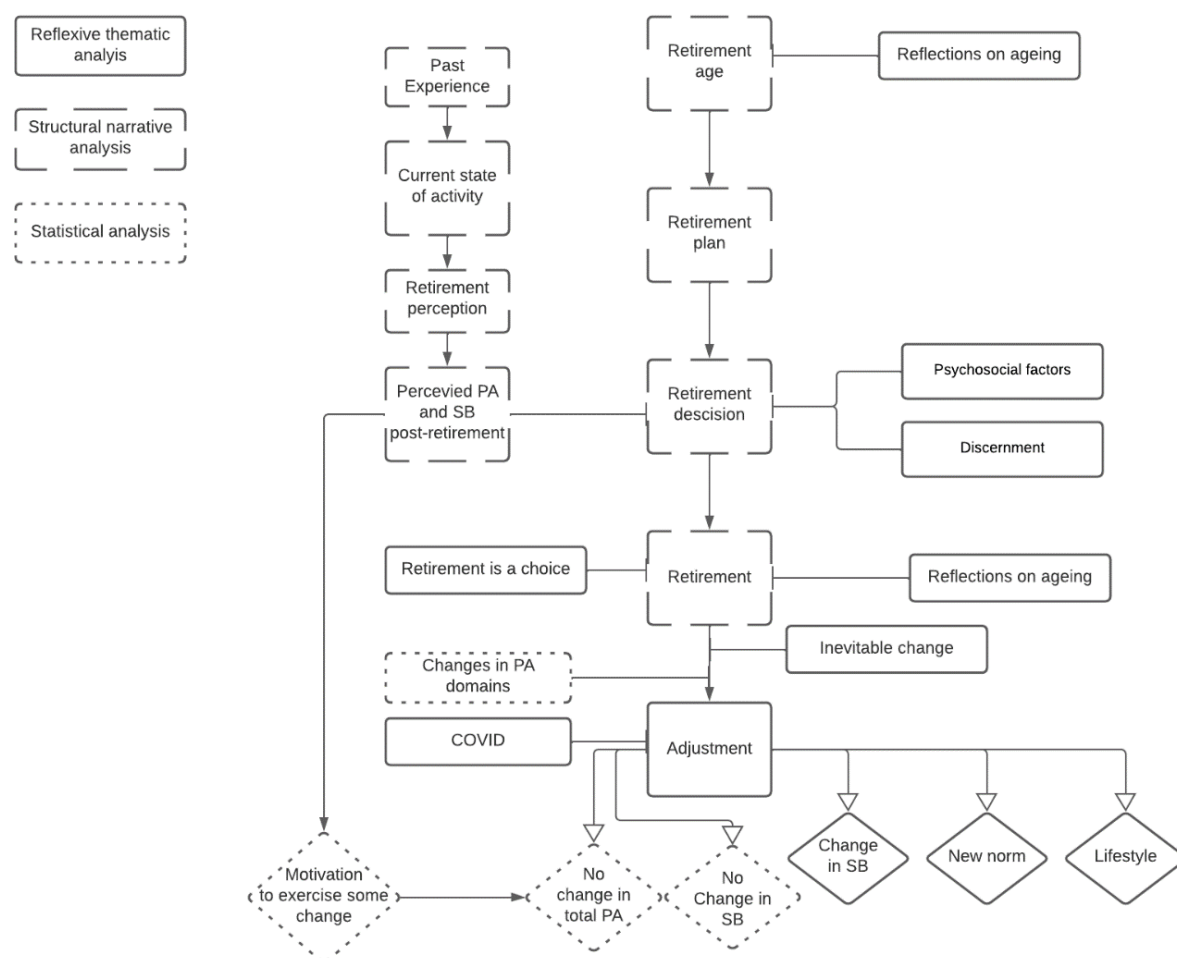


Figure 9 *Integration of results from the QUAL and QUAN strands*

Table 44 *Meta-inferences*

Type of Meta-inference	Meta-Inference	QUAL	QUAN
Agreement	a. Change in PA behaviour	The inevitable change is identified with retirement.	Statistical difference in domestic and Work PA in retired vs non-retired persons.
	b. PA engagement is influenced by past PA	PA habits are part of the participants' story.	Engagement in leisure time PA correlated with pre- and post-retirement behaviour; Differences presented themselves in retired and non-retired individuals; No difference in motivation pre- and post-retirement.
	c. Adjusting PA behaviour	New norm with retirement.	Difference in moderate PA behaviour.
Dissonance*	d. Influence of retirement on leisure time PA	COVID pandemic could influence leisure PA engagement.	Leisure time PA engagement was different in the two groups but increased according to previous patterns.
Diffraction^	e. Changes in activity	New norm with retirement.	No difference in total PA pre- and post-retirement.
	f. Differences in sitting time	Retired participants claimed that they were sitting more.	Sitting time remained constant in the retirees but increased in those still employed.

*Refers to data which was not consistent; ^Refers to differences stemming from philosophical approaches.

- a. Change in PA behaviour: The QUAN data demonstrated a statistically significant difference in domestic and work PA in retired participants but not in those who remained employed. This was identified as an inevitable change by participants who experienced retirement during the interviews. This change is highlighted by participants claiming to actively seek to occupy their empty time with other activities. Both strands confirm this change.

- b. PA engagement is influenced by past PA: There was a mean difference in leisure time PA in all the population. A statistically significant correlation was found when comparing total PA behaviour pre- and post-retirement for all participants. This fits within the participants' stories, in which they projected their current state of PA into their retirement. Other factors that could have influenced changes in leisure time may be attributed to the particularity of the data being collected during a pandemic, ageing or psychosocial factors, such as the perceived ability to carry out exercise.
- c. Adjusting PA behaviour: Retired individuals had a statistically significant difference in their moderate PA behaviour. This could be attributed to an increase in PA behaviour in the domestic domain. During the interviews, participants who retired claimed to develop a new norm in their daily activity, which resulted in moderate intensity PA.
- d. Influence of retirement on leisure time PA: The influence of retirement on leisure time PA could be limited. Participants claimed that the COVID-19 pandemic had an impact on their lifestyle. Some of the differences identified were independent of the retirement transition. The pandemic had an impact on the participants' retirement transition. The difference in leisure time PA was present in both groups. However, the difference was dependent on the participants' experience of PA, confirmed by the correlation pre- and post-retirement. The change in leisure time PA might not have occurred in the non-retired individuals if it were not for the COVID-19 lockdown.
- e. Changes in activity: Individuals who retired developed a new norm of activity however, there was no change in the total PA and in sitting time. The change seems to be in the type of activity but not in the length of time PA is carried out.
- f. Differences in sitting time: Participants claimed that they increased their sitting time compared to when they were working. However, there seemed to be no difference in sitting time in the retired group. An increase in sitting time was only observed in those still in employment.

The meta-inferences were presented in table format in Table 45, using the traffic light system to show level of agreement.

Table 45 *Integration of results*

			STRUCTURAL NARRATIVE ANALYSIS (QUAL)						
Pre-retirement			Past experiences	Current state of activity	Retirement perceptions	Perception of PA and SB after retirement			
		Post-Retirement	Reaching retirement age	Retirement plan	Retirement decision	Retirement	Adjustment		
REFLEXIVE THEMATIC ANALYSIS (QUAL)	Learned experiences	Change is Inevitable						No change in total PA	
	Psychosocial factors shaping the retirement transition	Retirement is a choice	Change in PA behaviour					Increase in Domestic PA with retirement	
	The discernment aspect of retirement	Retirement brings about reflections about ageing	PA engagement influenced by past PA					Transport PA and Leisure PA were not influenced	
	Engagement in PA	Retirement results in adjustments of physical activity	Adjusting PA behaviour					Work related PA stopped	
	The inevitable process of ageing	Retirement brings about lifestyle adjustments	Influence of retirement on leisure time PA					Motivation is constant with minor changes	
	Cognisant SB	Retirement leads to the development of a new norm	Changes in activity					Moderate PA intensity was higher in retired	
		Sedentary behaviours are influenced as an impact of retirement	Differences in sitting time					SB behaviour was not influenced but was higher in the non-retired	
	An unexpected pandemic has influence on the retirement transition						Barriers are influenced by the retirement transition		
								PRE/POST RETIREMENT INFERENTIAL STATISTICS (QUAN)	

PRE/POST RETIREMENT INFERENTIAL STATISTICS (QUAN)

The programme of research as part of this PhD was not limited to the MM study but included other studies which were used to support the MM study and its conclusions. The discussion chapter generalises the results from the body of work and how, all together, the studies achieved the aims and objectives to answer the research question. Even though the studies were independent of the MM study, they still fit within the dialectical philosophy adopted. This integration of the body of work is represented in Table 46.

Table 46 *Integration of all studies*

Study	Strand	Contribution	Quality measures
Literature systematic review	QUAN + QUAL	Generalisability of findings, identify knowledge gaps	CASP checklist, inclusion of qualitative and quantitative data, and analysis based on theoretical framework (TDF)
HIS data	QUAN	Generalisability of findings to national population	Statistical analysis based on theoretical basis
Psychometric testing	QUAN	Reliability and validity (EMI-2) of used tools	Various analyses of reliability, concurrent validity (EMI-2)
	QUAN	Does a change occur in PA and SB	Use of valid and reliable tool, prospective design
MM study	QUAL	Perceptions and influences on PA and SB	Triangulation of data analysis, engagement with participants, follow-up, philosophically grounded, contextual description, audit trail, reflective diary
MM study	Integration	Meta-inferences	Truthfulness, Applicability, Consistency, Neutrality

7. Summary

This section has presented the integration of the results from the QUAL and QUAN strands in diagram and tabular formats, as well as provided a narrative description of how the results were integrated. Six meta-inferences were presented, three which agreed, one which raised dissonance, and two meta-inferences which diffracted. The next chapter discusses the findings from the body of work in relation to the relevant literature.

Chapter 6 Discussion

This chapter discusses how the programme of research as part of this PhD answered the research questions and aims presented in Chapter 1. Initially the research questions are presented, together with an overview of how they were to be addressed. The main findings from the different studies were discussed in view of the research gaps present in the literature, which were presented in Chapter 2. It discusses the strengths and limitations of the body of work undertaken. The chapter then leads into the conclusion.

1. Research Questions and Key findings

The research questions for the PhD were: Does the retirement transition influence PA and SB in Maltese civil servants? and How can the retirement transition influence these health behaviours? Three aims were set 1. to identify prevalence and trends of PA and SB in the Maltese population pre- and post-retirement; 2. to identify changes in PA and SB resulting with retirement in Maltese civil servants; 3. to identify predictors of any changes in PA and SB with the retirement transition in Maltese civil servants.

The first aim was reached through a secondary analysis of the Health Interview Survey (HIS) in Malta, with data provided from 2002-2014. The main findings were that, throughout the years, people were undertaking more moderate PA intensity behaviour, but there was a decrease in total PA measured as MET minutes per week. Employed persons, compared to those who had retired had higher mean vigorous behaviour in MET minutes per week. There was a trend for retirees having higher walking MET minutes per week, but this was not statistically significant. Multilevel analysis found that employed have slightly lower total PA compared to the retired (OR CI -0.16– -0.02).

The second and third aims were addressed through the MM study, which identified that there was a change in PA domains in civil servants who retired. There was an increase of PA in the domestic domain, which resulted in an increase in moderate intensity PA behaviour. There was no difference in the total PA behaviour in the retired and non-retired population but a difference in the total population. Sitting time was the same in retirees but increased in those still in employment. Leisure PA behaviour increased in both groups. The proportion of people identifying barriers to exercise (such as being too busy) decreased in retired individuals. Those who previously reported barriers towards exercise participation did not report these barriers anymore, whilst those in employment still reported barriers to exercise. Results for motivation towards exercise were not constant across the population which might indicate that there might be some changes. The possible predictors for a change in PA were the need to adjust into a new routine, past PA behaviour, the ability to adjust to circumstances and the expectations of SB for retirement.

The study contributes to research about PA and SB during the retirement transition. The three research gaps identified were the need to integrate changes in PA and SB with the retirement transition, the need to evaluate PA and SB in conjunction, and the national knowledge on retirement in Malta. Gropper *et al.* (2020) identified the need to include controls when examining the influence of life events on PA. The MM study was longitudinal, and participants experienced the same work policies (as they were all government employees), and the same national events – (such as a global pandemic) which controlled for possible confounders. Simultaneously, part of the population under study experienced retirement whilst others continued to work. Brug & Chinapaw (2015) identified the need to include the perception of older adults on SB, which was

included in this study. The main findings from the programme of research as part of the PhD were:

- Translated tools have similar psychometric properties as the original tools.
- There are differences in barriers and motivation between 50-64 years and 65-70 years.
- Maltese civil servants who experienced retired did not have a statistical change in their total PA measured in MET min per week and total sitting time measured in hours per week.
- People who retired carried out more domestic PA compared to when they were in employment, which resulted in higher moderate PA behaviour.
- People who underwent retirement found it difficult to adjust into their new routine, and this could be used as an entry point for possible future health promotion interventions.
- People perceived that their sitting time increased with retirement in the qualitative interviews, but this was not seen in the quantitative data.
- Past PA behaviour were important predictors of future PA behaviour, but not for SB.
- There is a heightened reflection on ageing when nearing retirement, which increases after retirement.
- At follow-up individuals who retired and non-retired individuals carried similar total PA (MET min per week), whilst those in employment had higher sitting time per week compared to those who retired.
- Retirement can reduce barriers towards PA.
- There were minimal changes in intrinsic motivation with retirement.

2. Retirement transition

Although studies have examined the retirement transition and its influences on PA and SB, an identified knowledge gap was that these studies do not consider the experience of retirees (Barnett, Guell and Ogilvie, 2012). This study provided insight into the retirement experience and how this could influence PA and SB of people experiencing the retirement transition, as it examined both behaviours simultaneously instead of individually, as other researchers have done

(McDonald *et al.*, 2015; Eklund *et al.*, 2021; Socci *et al.*, 2021). This analytic focus on the participants' perceptions and their behaviours, motivations and barriers, embedded in a dialectical MM design where data was integrated, to delve into a deeper understanding of how the retirement transition might impact PA and SB, is an original contribution to knowledge. Similar to the findings of Van Dyck *et al.* (2017), it was found that the meaning of SB changes with retirement. Van Dyck *et al.* (2017) recruited participants who were recently retired, and looked at SB and PA. They concluded that there was a change in SB which was dependent on their previous PA behaviour. In this study the meaning of what SB is, and represents, changed from a behaviour which participants tried to avoid, to a behaviour which was integrated with retirement. This showed how meaning changes when a person retires.

The perception that retirement was a long vacation, and SB was part of being in retirement was also present in a Swedish study (Eklund *et al.*, 2021), in which participants were older compared to the current study. This honeymoon period of retirement being a long vacation was identified by the participants, but it only lasted for a short period, until they started to adjust into their new lifestyle pattern. This was a different finding from Eklund *et al.*, (2021), whose participants felt that retirement was a long vacation not limited to a short period post-retirement. As the retirement transition does not have fixed entry and exit points, it is not to be excluded that, as people get older, perceptions of a long vacation might re-appear in retirees. However, this would require longer follow-ups with multiple data collection points. Unlike in the study by Van Dyck *et al.* (2017), the participants felt that their SB increased, however, when measured using IPAQ-long this was not found to be the case. A possible explanation is the under reporting of sedentary time in older persons when using self-reported measures (Copeland *et al.*, 2017). Sitting time in this study was comparable to findings by Harvey *et al.* (2015) in a systematic review, with an

average of five hours per day in older persons when using self-reported measures. This finding demonstrated that the translated version of the IPAQ-long questionnaire into the Maltese language has similar validity to the version in other languages. Its reliability was already shown in one of the studies carried out (Spiteri, Grafton, *et al.*, 2021). Another possible explanation for participants to feel they are sitting for longer periods, is the perception of not being busy, which participants themselves expressed. Participants needed to substitute work time with new activities was of concern for participants. As identified through the IPAQ-long, domestic PA increased in retirees. Such PA was being used to fill part of the work time. However, the need to be busy was a challenge for most of the participants.

It is rational to think that retirement brings about a change in routine, however this change was not of concern for participants in the pre-retirement period. A normal work week involves approximately 40-hours of time commitment, and this needs to be substituted with other activities throughout the week. Even though people were aware of this, and they started planning for their retirement by making short- and long-term goals, when the actual retirement happened, this change was challenging to manage. This was part of the adjustment process, settling into a new norm of activity patterns. During this adjustment period, people were developing new roles as part of their adjustment process. This was in line with the adjustment theories of retirement (Wang and Shi, 2014a). Role theories state that, as people exit the work force they need to adjust to new roles as dictated by society's perceptions of a retiree. Continuity theory explains the desire to develop new roles by viewing older persons as using internal and external factors to have continuity in their lives. In this case, as people reached their retirement age, they started making short- and long-term plans, to have continuity in their lives. When they took the decision

to retire, they needed to adapt to their new role of being retirees. This role change is an entry point for possible behaviour-change interventions (McBride, Emmons and Lipkus, 2003).

Retirement as part of the decision-making process was explained by different theories, the most prominent being the role theory, and the rational choice theory. Using the structural narrative analysis, this study identified this point in the retirement transition. The pensionable age is a social construct which signals that participants should start to intensify their planning for retirement and plan on whether to extend their working period or retire. Based on their retirement plan participants rationalised their choices. In the pre-retirement phase, this was identified in the discernment aspect of retirement, with participants evaluating their options whether to retire or not. It seems that this rationalisation continues even after retirement. This is espoused by such findings from participants who retired and re-started working, who mentioned financial, family, and personal values as reasons for restarting their employment career. The story structure based on the structural narrative analysis fit with the rational choice theory of retirement. Participants took the decisions on whether to retire or not based on their family situation, resources, personal values, and competences (Wang and Shi, 2014a).

Participants highlighted that, to fill up their free time they were taking up new roles which were pre-determined or identified as new opportunities. In the current cohort under study, the amount of PA which took place at work before their retirement was low (mean of 436 MET minutes per week). So, the type of PA at work was either non-existent and therefore sedentary or of such low intensity that it was not captured by the IPAQ-long. This change from work to retirement could have been more challenging for such participants as, during their work time they used to spend a considerable amount of time sitting. Therefore, the fact that most of their activity at work was sedentary and their perceived PA and SB behaviour were influenced, might explain why they

found the inevitable change from work to retirement challenging to adjust to. Being not busy in retirement made them aware of their sitting behaviour which in pre-retirement they were trying to avoid.

3. Physical activity and sedentary behaviour

Based on the data collected through the IPAQ-long questionnaires there were no differences in total PA behaviour and sitting time in the retired and non-retired. This does not imply that there was no change in the type of activity, but that the volume of the behaviours remained the same. At a population level, there was a difference in total PA behaviour and no difference in sitting time. At the same time retired individuals carried out more total PA than the non-retired, whilst those still in employment carried out more SB than the retired. These findings are comparable with the findings from other research showing, that retirement might influence PA behaviour however, there might be other factors which could be more important (Condello *et al.*, 2017). Factors which were not considered as part of this current study such as the environment (Carlin *et al.*, 2017) and fitness levels (Aleksavska *et al.*, 2019) might contribute to changes in PA behaviour around the retirement transition. The findings support that intrinsic motivation and history of PA (Cortis *et al.*, 2017) might be important moderators towards PA when going through retirement.

In the qualitative interviews, participants predicted that their post-retirement PA behaviours were dependent on their past PA experiences. Motivation towards engagement in exercise did not differ throughout the two years. There were minor differences which were not consistent and theoretically did not fit. During the pre-retirement phase, motivation was consistently correlated with total PA, similar to the content validation of the translated version of the EMI-2, and similar

to Cortis *et al.*'s (2017) findings that PA is correlated with intrinsic motivation. However, post-retirement, these correlations were not found, which might be due to the small sample size or an influence of the pandemic on motivation. The impact of the COVID-19 pandemic on exercise motivation has been found to be varied (Andersson *et al.*, 2021) and, therefore, based on the data collected, no conclusion can be made, as only data on intrinsic motivation were collated.

The lack of differences in total PA could be attributed to the low PA engaged in during work, which was offset by an increase in domestic and leisure time PA. The fact that SB did not differ with retirement it would mean that SB at work was transferred to SB while doing other activities, as the increase in domestic PA was not enough to offset the 40-hour week. It was remarked by participants that they had to fill their morning, and that they did not want to be sedentary and end up watching TV. In the pre-retirement phase, participants were aware of their long stretches of time being sedentary and working in a seated position. They attempted to offset this by breaking the sitting activity pattern and being active when possible. After retirement SB patterns became less stringent for participants. Compernelle *et al.* (2020) had found that older persons who were older than most of the current population, lacked knowledge and awareness of SB. However, the latter cohort was knowledgeable on SB and tried to avoid it. However, long term with the impact of ageing, awareness on avoiding SB might become less important and the habitual nature of sitting might kick in.

Participants were settling into a new norm with less structure. They claimed that they were active doing housework, but at the same time perceived that they were less active and reported similar sedentary times to when they were still employed. A possible reason for the identified discrepancies could be the intensity of PA. In the IPAQ-long, participants' domestic activities are considered a moderate type of intensity. Participants claimed that they carried out any type of

domestic activity, housework or working in fields, at a slower pace than they used to, due to less work pressure. This could result in PA being carried out at a lower intensity, which is being calculated due to intensities having pre-determined METs (Troiano *et al.*, 2012, 2014). Having used a device-based measure in conjunction with self-reported measures would have provided useful data to identify different intensities at which the activities were carried out.

The programme of research adds to the body of knowledge on the importance of a lifelong need for engagement in PA. Those participants who were not accustomed to exercise did not take up any new exercise. In making their adjustment, participants used their experiences to build expectations and adjust to their new reality. This was confirmed with a difference in leisure time PA behaviour and a correlation between pre and post data collection in the population. This showed that those who changed their leisure time PA were accustomed to engaging in leisure time PA previously. In addition, this difference was present in all the population and not limited to those who underwent retirement. As highlighted in the pre-retirement phase, positive experiences, especially once from a younger age, were mentioned. These positive experiences seemingly make people want to engage in exercise after retirement (Hamer, Kivimaki and Steptoe, 2012). Providing a positive experience of exercise at retirement could potentially influence levels of engagement, as people found it challenging to adjust to the inevitable change. Having a positive experience of exercise was identified within the systematic review as a motivator to engaging in PA.

4. Motivators and Barriers

Motivation to exercise was consistent, as there was no statistically significant difference between the two time-points, however, whilst the pre- and post- motivation were correlated significantly,

when carrying out sub-group analysis within the retired group, half of the motivational factors were uncorrelated. This shows that retirement could have influenced motivation towards exercising. In the interviews, participants who had retired expressed concerns about ageing, more so than those who continued to work and then during the pre-retirement phase. Appearance, weight management, affiliation and ill-health avoidance were not correlated in the retired group, pre- and post- retirement. This could be an influence on the effect of ageing on the motivation towards exercising. In developing the EMI-2 tool, Quindry *et al.* (2011) were able to identify change in intrinsic motivation with age. The lack of correlation might be an indication of this change.

Guided by the work of Brittain *et al.* (2012) and Gyurcsik *et al.* (2009), this study used open ended questions to measure barriers towards exercise. These questions were able to capture differences in barriers within the studied population. Puggina *et al.* (2018) found that work can act as a barrier towards PA behaviour. In the pre-retirement phase, more barriers were identified, as all the population was still employed, and work and being too busy were two of the most cited barriers. These findings were similar to those found in the systematic review, in which people in employment expressed that being too busy, work commitments, and lack of energy are barriers to PA engagement. Participants who experienced retirement reported fewer barriers, while people still in employment reported similar barriers. Cortis *et al.* (2017), had found that identifying barriers towards exercise does not relate to PA behaviour.

5. Retirement in Malta

In comparison to the general outlook of the Maltese population, the current participants were found to engage in more PA. The results from the HIS had reported that 50% of the participants

had low PA behaviour (Spiteri, Xerri de Caro, *et al.*, 2021). In the MM study population only 29% had low PA behaviour. However, the percentage of people with moderate PA behaviour was similar. These differences might be due to the latter study using the IPAQ-long compared to the IPAQ-short used in the HIS. The latter was found to have larger variations due to lack of domain specific prompts (Kim, Park and Kang, 2012). A higher proportion of participants reached high PA behaviours in the MM study. Another possible explanation for this difference may lie in the finding that more participants in this MM study had a higher level of education: 52.6% compared to 8.8% in the HIS study. Education was positively correlated with PA behaviour (Bauman *et al.*, 2012) and leisure time PA (O'Donoghue *et al.*, 2018).

Both studies found that retired individuals have higher PA participation than employed participants. However, this difference was moderated (lowered) (Bauman *et al.*, 2002) in the HIS due to the presence of chronic disease and activity limitation. At the population level, the HIS includes participants with varying degree of ability to participate in PA, and included older age groups up to the age of 74. In the MM study, the participants were younger, the maximum age being 65, and recently retired, unlike in the HIS data set.

6. Theoretical domain framework

The MM study was guided by the theoretical domain framework (TDF). It was used to develop the interview guide and to analyse results within the systematic review. It was applied in this section to present the results of the programme of work, to make it useful in developing an intervention for pre-retirement participants. The MM study found that participants had a lack of knowledge, and this was also identified in the literature in the systematic review, where people were unaware of the amount of PA they needed to undertake, which acted as a barrier. Those

who were aware of the importance of exercise to keep healthy tried to engage. Results show that participants were aware of the harmful effects of sitting for longer periods of time and tried to avoid it. Skills and beliefs about capabilities were aspects which were related to PA participation. Those who were accustomed to exercising, or being physically active throughout their life attempted to continue being physically active during the retirement transition. This is in agreement with previous research showing that engaging in PA throughout life predicts future behaviour (Hendricks, 2012; Ter Hoeve *et al.*, 2020). Reinforcement was a contributor highlighted by most participants. An example is having a supporting friend who get involved in the exercise routine and motivates them. Beliefs about consequences were present in some individuals. Knowing the importance of engaging in exercise encouraged some people to engage in it. The intention to carry out PA was linked with beliefs about consequences, but intent was not present on its own.

The construct of ‘environmental context and resources’ within the TDF were not considered important to engage in PA by participants. Walking and engagement in daily activities were considered enough and free from cost. This finding is similar to Hobbs *et al.*'s (2013) systematic review on interventions in older persons. The authors found that the mode of delivering exercise was not important for older persons, as it could be done in a group or walking individually. Participants in the study mentioned the need for a companion to motivate them to exercise but not groups. Resources were seen to be required for specific PA behaviour, such as going to the gym, but not to engage in PA.

Barriers mentioned were in the behaviour regulation domain, as people found it difficult to get into a routine of PA. Lack of beliefs about capabilities was at times heightened with retirement due to increased reflections on ageing. There was an emotional state which could have acted as a

barrier, with some participants finding it difficult to adjust to retirement. Another possible barrier identified was social influences. Reaching retirement age brought about reflections about ageing which heightened at retirement. This could have a negative impact on perceived ability to participate in PA. Katigbak *et al.* (2020) had found that the level of PA engagement by older persons is influenced by culture. If retirement age is synonymous with aspects of ageing this will influence exercise participation (Morgan *et al.*, 2019). In the pre- and post- retirement surveys participants mentioned barriers which were not identified in interview. Environmental factors such as weather conditions were identified as a barrier to exercise participation. The impact of weather conditions on PA participation was also identified in a review by Carlin *et al.* (2017).

Results from the longitudinal study were comparable to the findings within the systematic review about barriers and motivators. Like the systematic review, no criteria fit within ‘Memory, attention, and decision processes’. The intrinsic motivations to carry out exercise did not differ with the retirement transition when using the EMI-2. In studies identified in the systematic review, there was a difference in intrinsic motivation in people in the age groups 50-59 and 60-69 years which was limited to constructs of appearance and stress management. In this current study, this difference was not identified, possibly because the age group of participants was already over the age of 60 years. This might confirm that retirement does not influence motivation to exercise. However, it was identified that the retirement transition might, as in the pre-retirement phase led participants to start feeling aged when near retirement age, and this can be a possible influence on certain intrinsic motivations, such as appearance. In the pre-retirement phase, participants had already started to adjust to their retirement life, therefore, they could still have a level of stress, but this was not measured within the study.

Framing the research within the TDF allows other researcher to use the findings within other health promotion models. Physical literacy is a new area of interest in promoting health behaviours in older persons (Jones *et al.*, 2018). Aerobic type of PA was the most cited example of PA participants mentioned during the interviews. This could show lack of knowledge on the importance of other type of PA such a strength and balance training, which contribute towards the health of the older person. Participants in the study showed lack of knowledge on what type of activities are recommended for their age. This indicates lack of physical literacy. The findings from this study can be used in Jones *et al.* (2018) model of physical literacy which uses an ecological model in order to promote healthy behaviour in older persons.

7. Education, Physical Activity and Sedentary Behaviour

The study found variations in PA and SB to be linked with levels of education. These findings were similar to others (Chastin *et al.*, 2015), in that people with a higher education tend to spend more time sitting compared to those with a lower education level, due to the nature of their employment being managerial as opposed to skilled. This difference was not present at the second data collection point, which included retired and employed individuals. Subgroup analysis within the employed group was not carried out due to the small sample size.

Interestingly, people with a higher education level engaged in more PA in the transport domain compared to those with a lower education level. This difference persisted even post-retirement. Based on a systematic review, Marielle *et al.* (2012) had found that there are inconsistencies in how transport PA is correlated with education, and these associations vary by age and country. Given that there is no national literature on transport PA, these results cannot be compared especially because transport PA varies by city structure, due to the impact of the built environment (Mitáš *et al.*, 2019).

There was no difference in total PA or other PA domains with education. This was unlike other studies which found that education correlated with PA participation (Aleksavska *et al.*, 2020). However, post-retirement, those in the higher education category performed more vigorous type of PA behaviour. This might be due to differences within a subgroup of the retired (S. A. Jones *et al.*, 2018) or due to changes in PA secondary to the COVID-19 pandemic restrictions (Andersson *et al.*, 2021).

8. Strengths

A key strength of this body of work is the MM approach adopted within the study, which was guided by a dialectical philosophical stance. This approach is novel when exploring PA and SB during the retirement transition. It emphasised the rigour and trustworthiness of a qualitative study, and validity and reliability of the quantitative methods of the longitudinal observational study, together with the quality of a MM approach. This philosophical approach allowed the use of data analysis triangulation within the qualitative strand of the study and integration in the MM study. As the two strands were considered independent of each other, but integrated at different points of the study design, rigour within the qualitative strand could be developed without impacting the quantitative strand of the study. This resulted in an understanding of the behaviours of PA and SB during the retirement transition.

The whole MM study adopted a longitudinal design to address the research question. The qualitative strand of the study was able to explore the retirement transition as experienced by the participants. As the retirement transition does not have a defined beginning or end, and some of the participants who intended to retire decided to prolong their active employment, exploring how their PA and SB were influenced in this transition provided an understanding of the

transition itself, and did not limit the findings to the retirement day per se. The study identified influences within PA, SB, motivations, and barriers that merged with the participants' perspectives. However, as the study was limited to two data collection periods, it was unable to measure trends and whether the changes identified are sustained or temporary. Being able to follow participants during a global pandemic gives further value to the study, as it was able to explore how the COVID-19 pandemic influenced the retirement transition. If a cross-sectional design had been adopted, this would not have been possible.

The large sample size within the qualitative strand of the study, with a high retention rate at follow-ups, gives strength to the study conclusion. In total, the study participants sat for 39 interviews with a 95% retention rate. Comments from participants when setting up follow-up appointments highlighted the level of engagement participants had. The post-retirement interviews were longer than the initial interviews, as participants were willing to share their experiences with the researcher. This shows the level of trust built with the participants. Such trust makes the research more robust because trust helps in the procurement of honest and truthful accounts of experiences. The prompted use of personal stories within the interview process assisted participants in sharing their experience.

As Malta is a bilingual country, the participants were provided with a Maltese or English version of the survey, based on preference. The questionnaires were translated using the IPAQ guidelines for translation, which were based on the WHO guidelines. Carrying out cognitive interviews on the translated versions ensured that the translations conveyed the same meaning as intended in the original questionnaires. The reliability of these questionnaires was assessed on a broad sample of individuals with different age groups and educational backgrounds. Providing the

participants with the ability to reply in their preferred language could have improved the response rate.

When choosing to answer a questionnaire, participants mostly chose the English language, however, during the verbal interview, the Maltese language was used by the majority. To avoid changing the linguistic meaning of any words, it was decided that analysis of the interviews will be carried out in the original language. Some authors have described the interpretation of the same interview in a different language as a double hermeneutic process, as the interpretation changes with language (Bauer and Gaskell, 2003). The local supervisor had experience with qualitative research, so the opportunity to discuss findings in the language that the interviews were carried out added value to the interpretation. Carrying out discussions on interpreting interviews is helpful to achieve a deeper meaning of how participants develop meaning through their experience. However, when discussing how interviews should be interpreted, there is a risk of a power struggle, with the opinion of the most senior person not being questioned. The fact that there was a previous good working relationship with the local supervisor, and that the discussion was held in an open manner, minimised this risk. This adds value to the interpretation of the interview results.

9. Limitations

One of the main limitations of this study was the low response rate for the initial requests to enrol in the MM study, and the drop out at follow-up. The response rate was 14% and, though comparable to similar studies that have used emails to recruit participants, this fell below the expectations hoped for, and certainly does not reflect on the effort that was put into the recruitment process. As the public sector within the civil service is very broad, including armed

forces, education, health, financial services, and EU matters, recruiting participants by email was deemed the best way to approach all possible participants. Having to be contacted through a third party to manage requests for participation within the public service probably contributed towards the low recruitment rate. Reminders for participation were sent on three occasions to improve recruitment, and personal contact with different heads of departments to recruit participants was made. Throughout the two-year period, emails were sent to participants at Christmas to wish them well and to maintain engagement. However, the retention rate was less than half of the participants. The retention rate within longitudinal studies varies, depending on the number of follow-ups and years needed to complete the study, the type of study, and if incentives are offered. Due to the COVID-19 pandemic, participants were receiving various emails for participating in different studies during the follow-up period, and this is likely to have also contributed towards the low response, as a consequence of participation fatigue.

As PA is carried out in different domains, self-reported measures had to be used to collect data on PA carried out during leisure, transport, domestic and work activities. This makes the questionnaire long. In addition, the broad construct of PA behaviour, motivation and barriers are also vast concepts. This resulted in the questionnaire being long, and limited the completion rate of those who were recruited for the study. Buying device-based tools for the study was not possible due to lack of funding, therefore, only self-report measures could be used.

Another limitation of the study was the measurement of SB, which can occur for different purposes, such as work, leisure, or transport. The IPAQ-long measures sitting behaviour for transport, and general sitting behaviour throughout the day. Other studies show that there is under reporting of SB when using single questions, as this limit recall of the SB undertaken by the participants. However, including a longer questionnaire on SB might have further

discouraged participation. During the reliability testing of the questionnaires, which acted as a piloting phase for the MM study, barriers towards PA were to be measured using the EBBS scale. However, participants in the reliability study complained that the questionnaire was too long. The structured questionnaire was changed into an open-ended question about barriers to limit the number of questions asked. This approach was also proposed by other authors, as discussed previously.

Not to include device-based measures for PA and SB was another of the limitations of the study. Psychometric properties of self-reported tools result in over reporting of PA and under reporting of SB, compared to device-based measures. However, self-reported measures were found to have good reliability over time. The aim of the study was not to measure the exact amount of PA and SB within the population, but to compare it across time. The IPAQ-long has good reliability and was still considered appropriate to reach the aim of the study, considering the financial limitations.

The measurement of motivation was through the EMI-2. There was no gold standard within the literature which recommends the use of a specific tool. The EMI-2 is based on the self-determination theory. The tool measures motivation towards exercise and not PA. This could mean that motivations might be different for PA which is carried out within the PA domains. However, based on the systematic review carried in the initial phase, the EMI-2 was the most frequently used tool to assess motivations within older persons, therefore, using it made it easier to compare with other studies.

10. Future research recommendations

The research recommendations below are based on the body of work undertaken as part of this PhD as well as further research gaps identified:

- Although no significant difference in the amount of SB is reported between pre- and post-retirement activities, participants claimed in the interviews that they tended to be more sedentary post-retirement. Future research should investigate the patterns of SB both pre- and post-retirement in order to understand any differences. The measurement of SB should be based on device-based measures together with self-reported measures to identify how SB changes from employee to retiree.
- This research project provides the foundations for the development of a retirement programme to promote PA and encourage a reduction in SB in people going through the retirement transition in Malta. The transition from work to retirement provides an opportunity for interventions to occur that will influence behaviours in a positive manner.
- The individuals participating in the interviews showed a lack of awareness of the different types of PA and the recommended amount for their age group. In a retirement programme, physical literacy should be targeted for people to be mindful of what type of physical activity is available and beneficial to them.
- This research study measured PA participation using the IPAQ which limits the measurement to aerobic activity. Another aspect of the PA guidelines for older persons is balance, coordination, and strength training. Future research should measure if this type of activity is impacted during the retirement transition.
- The study considered participants at different stages of their retirement transition. As theorised in the resource-based dynamic model, the retirement transition does not stop immediately after retirement, but is an adjustment process that takes time. Longitudinal studies are required to assess how the retirement transition might continue to influence PA and SB of individuals over a period longer than two years.

- Given the importance of promoting PA and reducing SB in old age, the study should be replicated on a national level to consider other macro factors such as work policy and bridge employment opportunities, and how these could influence PA and SB.
- As Malta is a small island state, it would be interesting to explore if the retirement transition is experienced in a similar way in other countries. Studies in states of similar size and wealth to Malta could be carried out and compared to studies in countries which are much larger and have different levels of income, to see if there are any trends related to size and/or wealth such as the UK. As identified in the literature review, few studies looked at the retirement transition in a longitudinal manner, and at PA and SB concurrently. Replicating the study in other countries could assist in the development of a retirement tool kit which can be used in various employment sectors.

11. Summary

This chapter has discussed the main study findings from the programme of research within comparison to relevant and pertinent literature. It presented the knowledge gaps addressed on the topic of retirement transition and how this was integrated with the health behaviours of PA and SB. The chapter then discussed the difference in barriers and motivators during the retirement transition. This was followed by the transferability of the research findings within the national context. Finally, the results were discussed with respect of the TDF which is a practical way of how study results can be used within various behaviour theories. This leads into the next chapter, which presents the conclusions and practical applications of the study findings.

Chapter 7 Conclusion and Practical Application

This final chapter presents ways in which the knowledge developed can be enacted on in practical terms for clinicians, health promotion and exercise specialists. A reflection on the PhD journey and the impact the findings are having are presented, followed by a conclusion.

1. Practical application

This body of work functions as a foundation for the development of a retirement intervention, and the practical applications are based around this recommendation; Figure 10 presents a diagrammatic representation of this. This investigation found that people start anticipating retirement life before deciding to retire. During this period, people start planning for activities that will take place after retirement. Starting to adapt new PA patterns at this stage of the retirement transition can be beneficial to promote PA behaviour after retirement. However, participants based much of their post-retirement PA and exercise on past experiences of exercise, and not only on their current PA behaviour. The positive experiences identified by participants can be confounders for self-efficacy in exercising. Past experiences of exercise, especially for those who feel they reached a certain level of achievement, was noted to influence the person's recognition that exercising at an old age is a possibility. People's knowledge about the amount of recommended daily activity was based on their perceived tiredness rather than actual guidelines, highlighting lack of knowledge in the area.

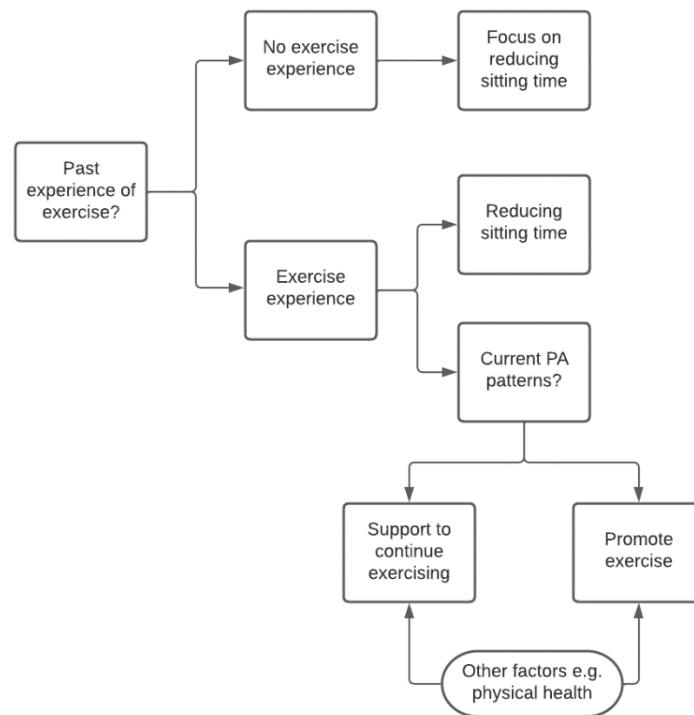


Figure 10 *Practical application of findings*

The person's perceptions towards PA must be included in any intervention. Recent literature has identified low intensity physical activity behaviour, such as doing domestic activities, as beneficial and able to limit sedentary time. This type of PA was perceived favourably by participants in the pre-retirement period and, yet, when retired, participants found it difficult to adjust to this 'new' type of activity. Intervention that specifically targets low intensity activity should be merged with aspects of active ageing that include low intensity PA, and these types of interventions should be coherent with people's belief systems, especially for those who do not consider PA as part of their natural habitude. The psychosocial implications of retirement, the interplay between retirement and ageing, and how this might impact the motivation of participants to exercise, are possible influencers.

On retirement, people start adjusting as they either want to be or feel active. Interventions to reduce sitting time might be easier to implement at the early stages. However, it is not yet clear whether intervention to reduce sitting time in community dwelling individuals are effective. What works to reduce SB is still in the early stages of development and as yet most studies do not show much change (Chastin *et al.*, 2021). During the pre-retirement period, there is an awareness of the need to reduce sitting time and, yet, during the post-retirement period, sitting time was regarded to be part of the retirement process. Concurrently, an effort was being made to try and be active. Interventions which assist retired people to adjust into a routine which includes PA, that fits their perception and reduces sedentary activity, can be effective. Considering that there is a dearth of knowledge on the ill effects of prolonged sitting, cognitive efforts are necessary to reduce it. Unlike PA behaviour, SB was not found to be part of the participants' story, so retirees may be less subject to influencing future SB behaviour by considering past experiences. People wanted to be active and feel physically active whilst adapting to a new routine. Supporting the development of a routine which involves less sedentary time and preferred PA can be attempted during retirement interventions.

Any intervention which is targeting a behaviour change during the retirement transition must address the retirement process, starting at the pre-retirement phase when people are considering their retirement. There are also psychosocial issues, such as finances, that are considered more important to people than the need for PA or exercise. These health behaviours are often considered of secondary importance and, yet, changes in their PA engagement and patterns will inevitably happen as a consequence of retirement. For example, people found that they had more free time, so they noted a change in their cooking behaviour, or they started to smoke more. These changes were not planned for in the pre-retirement phase but became apparent during the

adjustment period. Any intervention needs to consider the retirement transition and not focus solely on health behaviours.

2. Impact

The motive for this PhD was to develop an understanding of the retirement process in order to determine national policies that would and could influence PA and SB behaviour. This research has provided the basis for the creation and development of a national policy that intervenes, not at one specific point in a person's lifetime, but throughout a specifically defined period of time that we call the retirement transition, and that may already be implemented via the Employee Support Programme within the Civil Service in Malta, to support retiring civil servants in their retirement transition. The results of this research set an excellent starting point to evaluate the findings of this study across other employment sectors in Malta. The data, published in a peer reviewed journal, from the health interview survey (Spiteri, Xerri de Caro, *et al.*, 2021) will serve as a solid foundation for further evaluation of longitudinal trends, moving forward.

The translations of the internationally adopted self-reported questionnaires IPAQ-long, EMI-2 and EBBS, also published in peer reviewed journals, now provide researchers with a culturally adapted tool in the Maltese language that brings confidence in reliability (IPAQ-long, EMI-2, EBBS) and validity (EBBS, EMI-2). This will serve to increase the value and impact of local research. In fact, the IPAQ-MT translation is currently being used by the Department of Health Promotion and Disease Prevention in the Ministry of Health, within an international project on the promotion of PA within the community through health professionals. In addition, the translated EBBS is a regular tool in undergraduate research studies.

Internationally, the research published during the course of this PhD has already been used to inform motivation and behaviour change material within '*Later Life Training*' (<https://laterlifetraining.co.uk/>) programmes. By the time of the submission of this PhD thesis, our publication Barriers and Motivators of Physical Activity Participation in Middle-Aged and Older Adults-A Systematic Review had already been cited at least 71 times (Google Scholar).

3. First Person Reflection

The PhD journey started from a passion for research and an interest in finding opportunities to improve practice. Prior to starting this long journey, I had the opportunity to carry out some research, but it lacked the insight and the understanding of the research process. My knowledge was limited to the use of tools and statistics, but the reason why was missing. The knowledge and skills obtained through these past years were focused on building this gap. The journey was an enjoyable one and the experiences, positive and negative, were used to build my tool kit to be able to guide other students and use in my everyday life. Prior to starting this degree, I had little experience and appreciation of the qualitative aspect of research. My inclination was towards using a pragmatic approach which, in hindsight, would not have given enough importance to the qualitative aspect. However, as part of the learning process, I have cultured an appreciation on the importance of this research approach, and I am intrigued to use it further in my future research endeavours. Shifting from a pragmatic to a dialectic ideology of knowledge development was more in line with my beliefs and my way of practising within my work environment.

Throughout these past six years, the research carried out contributed to new knowledge which, in a way, exceeded my initial expectations. The knowledge generated is having an impact on my

practice, and this has made the journey more rewarding. Through all the reading and experiences shared with my supervisors and advisor, I strongly believe I was able to reach the level required to have the licence to practise as an independent researcher which justifies the bestowing of the award of PhD. However, in working toward this licence, I acquired a greater appreciation of the need to work in teams and network with different experts across different disciplines. Being a part-time student and working remotely from the host institution made the PhD journey feel lonelier. Sharing experiences with other peers has taught me that the journey is stressful for everyone but, at the same time, this is what makes you learn and grow because, when you are dealing with a difficult situation or stuck within research, you need to find solutions, which might not be straight forward. So, feeling lonely and under pressure is beneficial for the growth process.

This PhD was undertaken in the middle of a pandemic, which in a way was a unique learning opportunity. The main study happened directly in the middle, so it was able to capture experiences which would have never been possible and hopefully not reproducible within my lifetime. The pandemic was stressful due an increase in my workload in my full-time employment, in addition to creating uncertainties for data collection. However, dealing with unexpected circumstances is what researchers do. When dealing with human beings, situations change, and that is captured in the research process.

A final reflection of the PhD is an analogy with my passion for running. I started this pastime by participating in a five-kilometre race and enjoyed it, so I decided to prepare for ten km, and then for the half-marathon. It is a progression similar to that of research. It started with a small dissertation, went into a Pg. Dip, to a Masters, to a research project, PhD and, hopefully, to much

more exciting projects and studies in the future. I hope to be an inspiration for other students, as my supervisors were to me.

4. Conclusion

This study was a MM sequential design which examined how the retirement transition influences PA and SB in Maltese civil servants. Two strands were used to answer the research question, a quantitative strand made up of a two-year cohort study and a qualitative strand made up of a two-year narrative study. In addition to undertaking the MM study, other studies were carried out to support the implementation of the MM study: 1) a national study on PA and retirement using secondary data analysis, 2) a systematic review on barriers and motivators around retirement age, 3) a translation with psychometric testing of the two tools used for data collection, the IPAQ-long and EMI-2.

The findings from this study can be used to develop interventions around the retirement transition. This makes the study specific to the life event of retirement. The study highlighted the need to consider retirement from a holistic perspective and not limit it to specific health behaviours. Due to the adjustment nature of retirement, it could potentially be used to influence other health behaviours within one intervention however, this goes beyond the scope of this study. Retirement can be used as an opportunity to implement positive behavioural change within Maltese civil servants. It has the attributes of teachable moments which need to be used by health professionals.

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Appendix

Appendix 1. Questionnaire (Maltese)

Informazzjoni demografika

1. Isem u kunjom: _____
2. Data tat- twelid (dd/mm/yyyy): _____
3. Dettalji fejn nistgħu nikkuntattjawk fi żmien sentejn (email, mobile jew telephone):

4. L- għola edukazzjoni li għandek:
Primarja ☐ Sekondarja ☐ Post-sekondarja ☐ Terzjarja ☐
5. Stat ċivili:
Single ☐ Mizzewweg ☐ Armel/a ☐ Toqghod mas sieheb/a ☐
6. Sess:
Raġel ☐ Mara ☐
7. Grade or Scale at work within the civil service:

8. Qed tippjana li tirtira sa l aħħar tas- sena 2020?
Le ☐ Forsi ☐ Iwa ☐
9. Tkun interessat/a tippartecipa f'intervista dwar l- esperjenza tiegħek tal irtirar?
Iwa ☐ Le ☐
10. Tixtieq tirċievi kopja tar-riżultati?
Iwa ☐ Le ☐

Fil- mistoqsijiet li gejjin aħna interessati dwar l-attivitajiet fiżiċi li tagħmel bħala parti mill-ħajja tiegħek ta 'kuljum. Il-mistoqsijiet se jitolbuk dwar kemm qattajt hin tkun fiżikament attiv dan **l-aħħar 7 ijiem**. Jekk jogħġbok wieġeb kull mistoqsija anki jekk tikkunsidra lilek innifsek persuna mhux attiva. Aħseb fuq l-attivitajiet li għamilt fuq ix-xogħol, bħala parti mix xogħol ġol-dar u fil- gnien jew fil-bitha, biex tmur minn post għall-iehor, u attivita fiżika fil-hin liberu tiegħek bħala rikreazzjoni, l-eżerċizzju jew l-isport.

Aħseb dwar l-attivitajiet iebsin/vigorużi u moderati **kollha** li għamilt fl-aħħar 7 ijiem. Aktivitajiet fiżiċi iebsin/vigorużi qed jirreferu għall- attivitajiet li jiehdu sforz fiżiku iebes u jġieghluk tieħu n-nifs ħafna aktar iebsa min-normal. Eżempju ta' attivita' fizika iebsa/vigoruża jinkludi: ġirja mgħaggla, għawm veloci u logħob sportiv.

Attivitajiet moderati jirreferu għall- attivitajiet li jiehdu sforz fiżiku moderat u jġieghluk tieħu n-nifs ftit aktar diffiċli min-normal. Eżempji ta' attivita' fizika moderata jinkludi: mixja mgħaggla, għawm, żfin u ġardinaġġ.

L-1 PARTI: ATTIVITÀ FIŻIKA RELATATA MAX-XOGHOL

L-ewwel parti hi dwar ix-xogħol tiegħek. Dan jinkludi xogħlijiet bi ħlas, xogħol fl-għalqa, xogħol volontarju, xogħol waqt xi kors, u kwalunkwe xogħol ieħor bla ħlas li ġieli għamilt barra minn darek. Tinkludix xogħol bla ħlas li forsi tagħmel fid-dar, bħal xogħol tad-dar, manutenzjoni ġenerali u li tieħu ħsieb il-familja. Ikun hemm mistoqsijiet dwar dan f'partijiet oħra tal-kwestjonarju .

1. Bħalissa inti għandek xogħol jew tagħmel xi xogħol bla ħlas barra mid-dar tiegħek?

☐ Iva

☐ Le →

Aqbeż għat-2 PARTI: IT-TRASPORT

Il-mistoqsijiet li jmiss huma dwar l-attività fiżika kollha li wettaqt **fl-aħħar 7 ijiem** bħala parti mix-xogħol tiegħek bil-ħlas jew mingħajr ħlas. Tinkludix l-ivvjaġġar lejn ix-xogħol u lura.

2. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika **iebsa/vigoruża**, bħal terfa' xi haġa tqila, thaffer, xogħol ta' kostruzzjoni jew titla' t-taraġ **bħala parti mix-xogħol tiegħek**? Aħseb biss f'dawk l-attivitajiet fiżiċi li domt tagħmilhom minn tal-inqas 10 minuti kull darba.

_____ **ijiem fil-ġimgħa**

☐ L-ebda attività fiżika iebsa waqt ix-xogħol → ***Aqbeż għal mistoqsija nru.4***

3. Bejn wieħed u ieħor f'ġurnata minnhom kemm għaddejt hin tagħmel din l-attività fiżika **iebsa/vigoruża** bħala parti minn xogħlok?

_____ **sighat kuljum**

_____ **minuti kuljum**

4. Għal darb'ohra aħseb biss f'dawk l-attivitajiet fiżiċi li domt tagħmilhom minn tal-inqas 10 minuti kull darba. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika **moderata**, bħal iġġorr xi haġa mhux tqila, **bħala parti minn xogħlok**? Jekk joġġbok tinkludix il-mixi.

_____ **ijiem fil-ġimgħa**

L-ebda attività fiżika moderata waqt ix-xogħol ☐ → *Aqbeż għal mistoqsija nru. 6*

5. Bejn wieħed u ieħor f'għurnata minnhom kemm għaddejt hin tagħmel din l-attività fiżika **moderata** bħala parti minn xogħlok?

_____ **sighat kuljum**
_____ **minuti kuljum**

6. Matul **l-aħħar 7 ijiem**, kemm-il darba **mxejt** għal minn tal-inqas 10 minuti kontinwi **bħala parti minn xogħlok**? Jekk jogħġbok tgħoddx il-mixi li mxejt biex tasal sax-xogħol u lura.

_____ **ijiem fil-ġimgħa**

☐ L-ebda mixi waqt ix-xogħol → *Aqbeż għat-2 PARTI: IT-TRASPORT*

7. Bejn wieħed u ieħor f'għurnata minnhom kemm għaddejt hin **timxi** bħala parti mix-xogħol tiegħek?

_____ **sighat kuljum**
_____ **minuti kuljum**

IT-2 PARTI: L-ATTIVITÀ FIŻIKA WAQT IT-TRASPORT

Il-mistoqsijiet li ġejjin huma dwar kif ivvjagġajt minn post għal ieħor, fosthom lejn il-post tax-xogħol, xi ħanut, biex toħroġ u l-bqija.

8. Matul **l-aħħar 7 ijiem**, kemm-il darba **vvjaġġajt b'vettura motorizzata** eżempju karozza tal-linja, karozza jew mutur?

_____ **ijiem fil-ġimgħa**

☐ Ma vvjaġġajtx b'vettura motorizzata → *Aqbeż għal mistoqsija nru. 10*

9. Bejn wieħed u ieħor f'għurnata minnhom kemm għaddejt hin **tivvjaġġa** eżempju b'karozza tal-linja, karozza, mutur jew xi tip ieħor ta' vettura motorizzata?

_____ **sighat kuljum**
_____ **minuti kuljum**

Issa aħseb biss fis-**sewqan tar-rota** jew bil-**mixi** li forsi għamilt biex tivvjaġġa lejn ix-xogħol u lura, jew biex tagħmel il-qadi, jew biex tmur minn post għal ieħor.

10. Matul **l-aħħar 7 ijiem**, kemm-il darba **soqt ir-rota** minn tal-inqas 10 minuti kull darba biex tmur **minn post għal ieħor**?

_____ **ijiem fil-ġimgħa**

☐ Ma soqtx ir-rota biex mort minn post għal iehor ➡ **Aqbeż għal mistoqsija nru. 12**

11. Bejn wiehed u iehor f'gurnata minnhom kemm qattajt hin **issuq ir-rota** minn post għal iehor?

_____ **sighat kuljum**
_____ **minuti kuljum**

12. Matul **l-ahhar 7 ijiem**, kemm-il darba **mxejt mill-inqas 10 minuti** kull darba biex tmur minn post għal iehor?

_____ **ijiem fil-gimgha**

☐ Ma mxejtx biex mort minn post għal iehor ➡ **Aqbeż għat-3 PARTI: XOGHOL TAD-DAR, MANUTENZJONI TAD-DAR U KURA TAL-FAMILJA**

13. Bejn wiehed u iehor f'gurnata **minnhom** kemm qattajt hin **timxi** minn post għal iehor?

_____ **sighat kuljum**
_____ **minuti kuljum**

IT-3 PARTI: XOGHOL TAD-DAR, MANUTENZJONI TAD-DAR U KURA TAL-FAMILJA

Din il-parti hija dwar xi attivitajiet fiżiċi li forsi għamilt **fl-ahhar 7 ijiem** fid-dar tiegħek, bħal xi xogħol tad-dar, xogħol fil-ġnien jew fuq barra, xogħol ta' manutenzjoni ġenerali u kura tal-familja.

14. Aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt li mill-inqas għamilt 10 minuti kontinwi. Matul **l-ahhar 7 ijiem**, **fil-ġnien jew fil-bitha** kemm-il darba wettaqt xi attività fiżika iebsa/vigorusa, eżempju terfa' xi haġa tqila, jew tħaffer **fil-ġnien jew fil-bitha**?

_____ **ijiem fil-gimgha**

☐ L-ebda attività iebsa fil-ġnien jew fil-bitha ➡ **Aqbeż għal mistoqsija nru. 16**

15. Bejn wiehed u iehor f'gurnata minnhom kemm qattajt hin tagħmel xi attività fiżika **iebsa/vigorusa** eżempju fil-ġnien jew fil-bitha?

_____ **sighat kuljum**
_____ **minuti kuljum**

16. Aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt mill-inqas 10 minuti kull darba. Matul **l-ahhar 7 ijiem**, kemm-il darba wettaqt xi attività **moderata fil-ġnien jew il-bitha** bħal eżempju iġġorr xi haġa hafifa, tiknes, taħsel il-ħġieġ jew tnaddaf **il-ġnien jew il-bitha**?

_____ **ijiem fil-ġimgha**

☐

L-ebda attività moderata fil-ġnien jew fil-bitha ➡ ***Aqbeż għal mistoqsija nru. 18***

17. Bejn wiehded u ieħor f'ġurnata waħda kemm qattajt hin tagħmel xi attività fiżika **moderata** fil-ġnien jew fil-bitha?

_____ **sighat kuljum**

_____ **minuti kuljum**

18. Aħseb biss f'dawk l-attivitàjiet fiżiċi li wettaqt mill-inqas 10 minuti kull darba. Matul **l-ahħar 7 ijiem** kemm-il darba għamilt xi attività **moderata fid-dar** bħal eżempju iġġorr xi haġa ħafifa, taħsel il-ħġieġ, toġħrok l-art jew tiknes?

_____ **ijiem fil-ġimgha**

☐

L-ebda attività moderata fid-dar ➡ ***Aqbeż għar-4 PARTI: ATTIVITÀ FIŻIKA BĦALA RIKREAZZJONI, SPORT JEW GHALL-GOST***

19. Bejn wiehded u ieħor minnhom kemm qattajt hin tagħmel xi attività fiżika **moderata** fid-dar?

_____ **sighat kuljum**

_____ **minuti kuljum**

IR-4 PARTI: ATTIVITÀ FIŻIKA BĦALA RIKREAZZJONI, SPORT JEW GHALL-GOST

Din il-parti hija dwar l-attivitàjiet fiżiċi kollha li wettaqt matul **l-ahħar 7 ijiem** sempliċiment bħala rikreazzjoni, sport, eżerċizzju jew għall-gost. Jekk jogħġbok tinkludix attivitàjiet li diġà semmejt qabel.

20. Appartli l mixi li semmejt diġà, matul **l-ahħar 7 ijiem** kemm-il darba **mxejt** mill-inqas 10 minuti kontinwi **fil-hin liberu tiegħek** eżempju mixja għal gost?

_____ **ijiem fil-ġimgha**

☐

L-ebda mixi fil-hin liberu ➡ ***Aqbeż għal mistoqsija nru. 22***

21. Bejn wiehded u ieħor meta mort **timxi** fil-hin liberu tiegħek f'ġurnata minnhom kemm qattajt hin?

_____ **sighat kuljum**

_____ **minuti kuljum**

22. Aħseb biss dwar dawk l-attivitajiet fiżiċi li wettaqt mill-inqas 10 minuti kontinwi. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika **iebsa/vigorosa** eżempju ‘aerobics’, ġiri, issuq ir-rota tgħaġġel HIT, jew tgħum tgħaġġel **fil-hin liberu tiegħek**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività fiżika iebsa fil-hin liberu ➔ **Aqbeż għal mistoqsija nru. 24**

23. Bejn wiehded u ieħor f'ġurnata waħda kemm qattajt hin tagħmel xi attività fiżika **iebsa** fil-hin liberu tiegħek?

_____ **sighat kuljum**

_____ **minuti kuljum**

24. Aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt mill-inqas 10 minuti kontinwi. Matul **l-aħħar 7 ijiem**, kemm-il darba għamilt xi attività fiżika **moderata** bħal issuq ir-rota b'ritmu regolari, tgħum b'ritmu regolari jew tilgħab it-tennis tnejn kontra tnejn **fil-hin liberu tiegħek**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività moderata fil-hin liberu ➔ **Aqbeż għall-5 PARTI: HIN BILQIEGHDA**

25. Bejn wiehded u ieħor f'ġurnata waħda kemm qattajt hin tagħmel xi attività fiżika **moderata** fil-hin liberu tiegħek?

_____ **sighat kuljum**

_____ **sighat kuljum**

IL-5 PARTI: HIN BILQIEGHDA

L-aħħar mistoqsijiet huma dwar il-hin li tqatta' bilqieghda waqt ix-xogħol, id-dar, waqt xi kors u waqt il-hin liberu. Dan jista' jinkludi l-hin li tqatta' quddiem xi skrivanija, iżżur il-ħbieb, taqra, jew tara t-televisin bilqieghda jew mimdud. Tinkludix il-hin li tqatta' bilqieghda f'xi vettura motorizzata eżempju karożza jekk diġà semmejtu qabel.

26. Matul **l-aħħar 7 ijiem**, bejn wiehded u ieħor kemm qattajt hin **bilqieghda** f'ġurnata **tax-xogħol (weekday)**?

_____ **sighat kuljum**

_____ **minuti kuljum**

27. Matul **l-aħħar 7 ijiem**, bejn wiehded u ieħor kemm qattajt hin **bilqieghda** f'ġurnata **fi tmiem il-ġimgħa (weekend)**?

_____ **sighat kuljum**

_____ **minuti kuljum**

Tista 'taħseb f'xi **ostakli** (fatturi li għamluha diffiċli għalik biex tagħel l-attività fiżika li kellek ppjanajt) li għamilha diffiċli għalik li tiddeċiedi li tkun attiv kif ippjanat?

Iwa ☐ Le ☐

29. Jekk jogħġbok nizzel l-barriera/ i tiegħek. Kun speċifiku hafna meta tittajpja l-barriera/i tiegħek

Fil-paġni li ġejjin hawn numru ta' raġunijiet li n-nies jagħtu meta jkunu mistoqsijin għaliex jagħmlu l-eżerċizzju. Kemm jekk int bħalissa qed tagħmel l-eżerċizzju b'mod regolari u kemm jekk le. Jekk jogħġbok aqra kull raġuni sew u, mmarka billi tagħmel marka man-numru t-tajjeb, kull raġuni hix vera għalik personalment, jew jekk kinitx tkun vera għalik personalment li kieku kont tagħmel l-eżerċizzju. Jekk xi raġuni assolutament ma tarahiex tghodd għalik, aghmel ċirku madwar in-numru 0. Jekk xi raġuni taraha tassew tghodd għalik, aghmel ċirku madwar in-numru 5. Jekk xi raġuni taraha tghodd għalik sa ċertu punt, aghmel ċirku madwar il-1, it-2, it-3 jew l-4. Skont kemm tqisha li tirrifletti r-raġuni għaliex tagħmel l-eżerċizzju jew kont tagħmlu kieku kont tista'. Nixtiequ nkunu nafu għaliex int personalment tagħżel li tagħmel l-eżerċizzju jew għandek mnejn tagħżel li tagħmel l-eżerċizzju, u mhux jekk taħsibx li r-raġunijiet mogħtija huma tajbin għal kwalunkwe individwu biex jagħmel l-eżerċizzju.

Jien nagħmel l-eżerċizzju (jew kont nagħmlu, kieku kont nista') ...	Assolutament ma tghoddx għalija					Tghodd hafna għalija
Biex nibqa' rqiġ	0	1	2	3	4	5
Biex nevita l-mard	0	1	2	3	4	5
Għax jgħinni nhossni tajjeb	0	1	2	3	4	5
Biex nidher iżgħar	0	1	2	3	4	5
Biex nuri lill-oħrajn x'kapaċi nagħmel	0	1	2	3	4	5
Għax jagħtini l-ispazju biex nahseb	0	1	2	3	4	5
Biex gismi ikun b'saħħtu	0	1	2	3	4	5
Biex nissahhaħ	0	1	2	3	4	5
Għax niehu gost bis-sensazzjoni tal-eżerċizzju	0	1	2	3	4	5
Biex inqatta' l-hin mal-ħbieb	0	1	2	3	4	5
Għax it-tabib tani l-parir li nagħmel l-eżerċizzju	0	1	2	3	4	5

Għax niehu gost nipprova nirbah f'attivitajiet fiżiċi	0	1	2	3	4	5
Biex nibqa' jew insir aġli (ħafif).	0	1	2	3	4	5
Biex ikolli miri li nixtieq nilhaq	0	1	2	3	4	5
Biex nonqos fil-piż	0	1	2	3	4	5
Biex nevita problemi ta' saħħa	0	1	2	3	4	5
Għax l-eżerċizzju nħossu jagħtini l-enerġija	0	1	2	3	4	5
Biex nidher tajjeb	0	1	2	3	4	5
Biex inqabbel l-abbiltajiet/kapaċitajiet tiegħi ma' tal-ohrajn	0	1	2	3	4	5
Għax jgħinni nnaqqas it-tensjoni	0	1	2	3	4	5
Biex niehu ħsieb saħħti	0	1	2	3	4	5
Biex inżid fija s-sens ta' reżistenza (endurance)	0	1	2	3	4	5
Għax l-eżerċizzju fih innifsu nsibu ta' sodisfazzjon	0	1	2	3	4	5
Biex ingawdi l-aspetti soċjali tal-eżerċizzju	0	1	2	3	4	5
Biex nippreveni xi marda li tigri fil-familja tiegħi	0	1	2	3	4	5
Għax niehu gost nikkompeti	0	1	2	3	4	5
Biex inżomm ruhi flessibbli	0	1	2	3	4	5
Għax jagħtini sfidi personali x'niffaccja	0	1	2	3	4	5
Biex jgħinni nikkontrolla l-piż	0	1	2	3	4	5
Biex nevita l-mard tal-qalb	0	1	2	3	4	5
Biex ingib l-enerġija lura	0	1	2	3	4	5
Biex nidher aħjar	0	1	2	3	4	5
Biex dak li rnexxieli nwettaq jigi rikonoxxut	0	1	2	3	4	5
Biex jgħinni nimmaniġġja l-istress	0	1	2	3	4	5
Biex inħossni iktar b'saħħti	0	1	2	3	4	5
Biex inkun niflaħ iktar (stronger)	0	1	2	3	4	5
Għax l-esperjenza nnifisha li nagħmel l-eżerċizzju tagħtini gost	0	1	2	3	4	5
Biex niehu gost inkun attiv ma' persuni ohra	0	1	2	3	4	5

Biex jgħinni nirkupra minn xi mard jew korrimment	0	1	2	3	4	5
Għax niehu gost bil-kompetizzjoni fiżika	0	1	2	3	4	5
Biex nibqa' jew insir flessibbli	0	1	2	3	4	5
Biex niżviluppa l-hiliet personali	0	1	2	3	4	5
Għax l-eżerċizzju jgħinni naħraq il-kaloriji	0	1	2	3	4	5
Biex nidher iktar attraenti	0	1	2	3	4	5
Biex jirnexxili nagħmel affarijiet li l-oħrajn mhumieħ kapaċi jagħmlu	0	1	2	3	4	5
Biex inneħħi t-tensjoni	0	1	2	3	4	5
Biex niżviluppa l-muskoli tiegħi	0	1	2	3	4	5
Għax inħossni fl-aqwa tiegħi meta nagħmel l-eżerċizzju	0	1	2	3	4	5
Biex nagħmel hbieb godda	0	1	2	3	4	5
Għax l-attivitajiet fiżiċi joghġbuni, speċjalment meta jkunu kompetittivi	0	1	2	3	4	5
Biex inqis lili nnifsi skont l-istandards personali tiegħi	0	1	2	3	4	5

Grazzi tal-partecipazzjoni tiegħek

Appendix 2. Interview guide pre-retirement (English)

Introduction key components

- Thank the participant for their time
- Present name: Karl Spiteri, I am PhD student at Coventry and this interview is being conducted as part of this research.
- Present purpose: The aim of this interview is to understand your experience of retirement and how this might influence your physical activity behaviour.
- Consent form provided
- Confidentiality and anonymity: As read in the consent form all data is strictly confidential. It is up to you to decide if there will be questions which you do not feel comfortable answering. There is no correct or wrong answer. All experiences are valuable and unique, that is why your thoughts are a valid contribution to the study and topic. It is important to answer honestly, we do not want you to be active, all levels of physical activity are equally important.
- Duration: varies depending on how much you want to share from your experience, take as much time as you wish. It usually takes about 30 to 60 minutes. If this is not a good time we can reschedule.
- How interview will be conducted: I will be asking you questions about the topic and then you can take your time and answer. If you want to share life stories to describe your personal experience it would be helpful to understand the context. After the end of the interview, I will be transcribing the interview and will send it over so you have the opportunity to check that it was done correctly and truthfully.
- Ask if participant has any questions?

Remark: During the interview we will use exercise and PA interchangeably. PA is defined as: any form of activity requiring you to move including sport, structured exercise, recreational exercise, occupational or transport purposes, domestic activities, gardening and ‘Do-It- Yourself’ (DIY) home improvement work.

Sedentary behaviour refers to any form of activity in sitting or reclined such as reading, watching tv, playing bingo and using the computer.

Testing of record equipment

Verbal confirmation that consent form has been signed and consent to record provided.

Participant introduction

- When are you expecting to retire?

Topic prompts and guide

I am interested in your experience of being physically active. There is no correct or wrong answer. All experiences are valuable and unique, that is why your thoughts are a valid contribution to the study and topic.

1. Can you describe your daily routine weekend and weekday? (Including your sedentary activities).
2. Do you feel that there was any change to your PA pattern in the past 2 years? What do you attribute this change to?
3. What makes you postpone retiring?
4. Do you feel you do enough PA? Why so?
5. Since nearing retiring were there things that interfered with your physical activity plans?
6. What gives you the motivation to be a physically active person? Or what stops you from being physically active?
7. Has COVID influenced your retirement planning? If so, how?
8. Has COVID influenced your PA pattern? If so, how?

Optional questions:

- Has there been a change in your motivation toward PA since nearing retiring?
 - How did your significant others (family or friends) influence you during this period?
9. Would you like to add something else?

Closing key component

- Small summary of what was said
- Additional comments
- Next steps – release of information into study
- Thank you for your time

Appendix 3. Interview guide post-retirement (English)

Interview guide post-retirement

Introduction key components

- Thank the participant for their time
- Present name: Karl Spiteri, I am PhD student at CU and this interview is being conducted as part of this research.
- Present purpose: The aim of this interview is to understand your experience of retirement and how this might influence your physical activity levels.
- Consent form provided
- Confidentiality and anonymity: As read in the consent form all data is strictly confidential. It is up to you to decide if there will be questions which you do not feel comfortable answering. There is no correct or wrong answer. All experiences are valuable and unique, that is why your thoughts are a valid contribution to the study and topic. It is important to answer honestly, we do not want you to be active, all levels of activity are equally important.
- Duration: varies depending on how much you want to share from your experience, take as much time as you wish. It usually takes about 30 to 60 minutes. If this is not a good time we can reschedule.
- How interview will be conducted: I will be asking you questions about the topic and then you can take your time and answer. If you want to share life stories to describe your personal experience it would be helpful to understand the context. After the end of the interview, I will be transcribing the interview and will send it over so you have the opportunity to check that it was done correctly and truthfully.
- Ask if participant has any questions?

Remark: During the interview we will use exercise and PA interchangeably. PA is defined as: any form of activity requiring you to move including sport, structured exercise, recreational exercise, occupational or transport purposes, domestic activities, gardening and ‘Do-It- Yourself’ (DIY) home improvement work.

Sedentary behaviour refers to any form of activity in sitting or reclined such as reading, watching tv, playing bingo and using the computer.

Testing of record equipment

Verbal confirmation that consent form has been signed and consent to record provided.

Participant introduction

- How long have you been working within the public service? (In case of new participant)
- What position do you hold? (In case of new participant)
- How long have you been retired for?

Topic prompts and guide

I am interested in your experience of being physically active during your retirement period. There is no correct or wrong answer. All experiences are valuable and unique, that is why your thoughts are a valid contribution to the study and topic.

1. Can you describe to me how was your retirement experience?
2. Has retirement met your expectations?
3. What helped you with adjusting for retirement?
4. Can you describe your daily routine weekday and weekend from when you wake to when you go to sleep? (Including your sedentary activities).
5. Do you feel that there was any change to your PA pattern since you retired?
6. Do you feel you do enough PA? Why so?
7. Since retiring were there any interferences with your physical activity plans?
8. What gives you the motivation to be a physically active person? Or what stops you from being physically active?
9. Has COVID influenced your retirement plan? If so, how?
10. Has COVID influenced your PA pattern? If so, how?

Optional questions:

- Has retirement influence your ability to be physically active?
- Has your routine changed with retirement?
- Did retirement influence the way you organise PA?
- Has there been a change in your motivation toward PA since retiring?
- What about Resources like money or access to facilities or equipment for physical activity, how this influences your physical activity?
- How did your significant others (family or friends) influence you during this period?

11. Would you like to add something else?

Closing key component

- Small summary of what was said
- Additional comments
- Next steps – release of information into study
- Thank you for your time

Appendix 4. Interview guide second interview pre-retirement (English)

Introduction key components

- Thank the participant for their time
- Present name: Karl Spiteri, I am PhD student at Coventry and this interview is being conducted as part of this research.
- Present purpose: The aim of this interview is to understand your experience of retirement and how this might influence your physical activity behaviour.
- Consent form provided
- Confidentiality and anonymity: As read in the consent form all data is strictly confidential. It is up to you to decide if there will be questions which you do not feel comfortable answering. There is no correct or wrong answer. All experiences are valuable and unique, that is why your thoughts are a valid contribution to the study and topic. It is important to answer honestly, we do not want you to be active, all levels of physical activity are equally important.
- Duration: varies depending on how much you want to share from your experience, take as much time as you wish. It usually takes about 30 to 60 minutes. If this is not a good time we can reschedule.
- How interview will be conducted: I will be asking you questions about the topic and then you can take your time and answer. If you want to share life stories to describe your personal experience it would be helpful to understand the context. After the end of the interview, I will be transcribing the interview and will send it over so you have the opportunity to check that it was done correctly and truthfully.
- Ask if participant has any questions?

Remark: During the interview we will use exercise and PA interchangeably. PA is defined as: any form of activity requiring you to move including sport, structured exercise, recreational exercise, occupational or transport purposes, domestic activities, gardening and ‘Do-It- Yourself’ (DIY) home improvement work.

Sedentary behaviour refers to any form of activity in sitting or reclined such as reading, watching tv, playing bingo and using the computer.

Testing of record equipment

Verbal confirmation that consent form has been signed and consent to record provided.

Participant introduction

- When are you expecting to retire?

Topic prompts and guide

I am interested in your experience of being physically active. There is no correct or wrong answer. All experiences are valuable and unique, that is why your thoughts are a valid contribution to the study and topic.

1. Can you describe your daily routine weekend and weekday? (Including your sedentary activities).
2. Do you feel that there was any change to your PA pattern in the past 2 years? What do you attribute this change to?
3. What makes you postpone retiring?
4. Do you feel you do enough PA? Why so?
5. Since nearing retiring were there things that interfered with your physical activity plans?
6. What gives you the motivation to be a physically active person? Or what stops you from being physically active?
7. Has COVID influenced your retirement planning? If so, how?
8. Has COVID influenced your PA pattern? If so, how?

Optional questions:

- Has there been a change in your motivation toward PA since nearing retiring?
 - How did your significant others (family or friends) influence you during this period?.
9. Would you like to add something else?

Closing key component

- Small summary of what was said
- Additional comments
- Next steps – release of information into study
- Thank you for your time

Appendix 5. Interview guide pre-retirement (Maltese)

Gwida għall-intervisti qabel l-irtirar

Introduzzjoni

- Nirringrazzja lill-partecipant għall-hin tiegħu
- Preżenta lilek nnifsek
- Għan ta l interview: L-għan ta 'din l-intervista huwa li nifhem l-esperjenza tiegħek ta' rtirar u kif dan jista 'jinfluwenzak fil-livelli ta' attività fizika.
- Formola tal-kunsens provduta
- Kunfidenzjalità u anonimità: Kif qrajna fil-formola tal-kunsens l intervista hija strettament kunfidenzjali. Tista' tiddeċiedi li jekk hemm xi mistoqsijiet li ma tħossokx komdu tirrispondi ma għandekx obligu li twieġeb.
- Tul tal intervista: din tvarja skont kemm trid taqsam mill-esperjenza tiegħek, tiegħu hin kemm tixtieq inti. Is-soltu jieħdu madwar 30 sa 60 minuta.
- Kif se ssir l-intervista: Jiena se nistaqsik mistoqsijiet dwar is-suġġett u bil l-hin tiegħek twieġeb. Jekk trid taqsam stejjer ta 'hajja biex tiddekrivi l-esperjenza personali tiegħek ikun utli li tifhem il-kuntest. Wara t-tmiem tal-intervista jien se nittraskrivi l-intervista u se nibgħatha sabiex ikollok l-opportunità li tivverifika li sar b'mod korrett u veritier.
- Waqt l interview se nkun qed nieħu xi noti għal xi mistoqsijiet jew affarijiet li ma nkunx fhimt.
- Għandek xi mistoqsijiet?

Rimarka: Matul l intervista ahna se nużaw eżerċizzju u attività fizika bl istess mod. B'attività fizika se nfisru: kwalunkwe forma ta 'attività li tehtieg li tiċċaqlaq inkluż sport, eżerċizzju strutturat, eżerċizzju rikreattiv, skop ta' xogħol jew trasport, attivitajiet domestiċi, ġardinaġġ u xogħol "Do-It-Yourself" (DIY).

Ittestjar ta 'apparat tar-reġistrazzjoni

Konferma verbali li l-formola ta 'kunsens giet iffirmata u l-kunsens għar-rekord ipprovdut.

Introduzzjoni

- Kemm ilek taħdem fis-servizz pubbliku?
- Liema pożizzjoni żżomm?
- Meta taħseb li tirtira?

Gwida

Jiena interessat fl-esperjenza tiegħek meta tagħmel l attività fizika. M'hemm l-ebda risposta korretta jew hażina. L-esperjenzi kollha huma prezzjużi u uniċi, hu għalhekk li l-ħsibijiet tiegħek huma ta' kontribuzzjoni valida għall-istudju u s-suġġett.

1. Tista 'tiddekrivi r-rutina tiegħek ta' kuljum minn meta tqum sa meta tmur torqod? (Inklużi l-attivitajiet sedentarji tiegħek).
2. Thoss li tagħmel biżżejjed attivita fizika? Għaliex?
3. Meta nsemmi persuna attiva fizika x jigi f'moħħi?
4. X'ittik l-motivazzjoni biex tkun (to be) persuna fizikament attiva? Jew Dak li jagħtik il-motivazzjoni (what gives you) biex tkun persuna fizikament attiva?
5. Hemm xi affarijiet li iwaqfuk milli tkun fizikament attiv kemm tixtieq?
6. Kien hemm xi avvenimenti f'hajja li influwenza l- attivita fisika tiegħek?
7. Taħseb li l-irtirar se jkollu xi impatt fuq il-livell ta attivita fizika li tagħmel? B'liema mod?
8. Hemm affarijiet li jistu jinterferixxu mal-pjan tiegħek għall-attivita fizika wara l-irtirar?

Optional

- Taħseb li l-irtirar jista jinfluwenza l-abbiltà tiegħek li tkun attiv fizikament?
 - Kif tara li r-rutina attwali tiegħek tista tinbiddel mal-irtirar?
 - Taħseb li l-irtirar se jgħinek torganizza l-attivita fizika tiegħek?
 - Taħseb li l-motivazzjoni tiegħek lejn l attivita fizika tista tinbiddel wara l-irtirar? Jekk iva, b'liema mod se tinbidel?
 - Xi ngħidu dwar ir-Rizorsi bħall-flus jew l-aċċess għal faċilitajiet jew equipment għall-attività fizika, taħseb li dawn jistu jinfluwenza l-attività fizika tiegħek?
 - L ambjet kif jinfluwenza l- attivita fizika tiegħek?
 - Kif taħseb se jinfluwenzaw il familjari jew ħbieb matul dan il-perjodu?
9. Tixtieq iżżid xi haġa oħra?

Għeluq

- Sommarju żgħir ta 'dak li ntqal
- Kummenti addizzjonali
- Il-passi li jmiss - ir-rilaxx tal-informazzjoni fl-istudju
- Grazzi

Appendix 6. Interview guide post-retirement (Maltese)

Gwida għall-intervisti irtirata

Introduzzjoni

- Nirringrazzja lill-partecipant għall-ħin tiegħu
- Preżenta lillek nnifsek
- Għan ta l interview: L-għan ta 'din l-intervista huwa li nifhem l-esperjenza tiegħek ta' rtirar u kif dan jista 'jinfluwenzak fil-livelli ta' attività fizika.
- Formola tal-kunsens provduta
- Kunfidenzjalità u anonimità: Kif qrajna fil-formola tal-kunsens l intervista hija strettament kunfidenzjali. Tista' tiddeċiedi li jekk hemm xi mistoqsijiet li ma tħossokx komdu tirrispondi ma għandekx obligu li twieġeb.
- Tul tal intervista: din tvarja skont kemm trid taqsam mill-esperjenza tiegħek, tiegħu ħin kemm tixtieq inti. Is-soltu jieħdu madwar 30 sa 60 minuta.
- Kif se ssir l-intervista: Jiena se nistaqsik mistoqsijiet dwar is-sugġett u bil l-ħin tiegħek twieġeb. Jekk trid taqsam stejjer ta 'hajja biex tiddekrivi l-esperjenza personali tiegħek ikun utli li tifhem il-kuntest. Wara t-tmiem tal-intervista jien se nittraskrivi l-intervista u se nibgħatha sabiex ikollok l-opportunità li tivverifika li sar b'mod korrett u veritier..
- Waqt l interview se nkun qed niehu xi noti għal xi mistoqsijiet jew affarijiet li ma nkunx fhimt.
- Għandek xi mistoqsijiet?

Rimarka: Matul l intervista ahna se nużaw eżerċizzju u attività fizika bl istess mod. B'attività fizika se nfisru: kwalunkwe forma ta 'attività li tehtieg li tiċċaqlaq inkluż sport, eżerċizzju strutturat, eżerċizzju rikreattiv, skop ta' xogħol jew trasport, attivitajiet domestiċi, ġardinaġġ u xogħol "Do-It-Yourself" (DIY).

Ittestjar ta 'apparat tar-reġistrazzjoni

Konferma verbali li l-formola ta 'kunsens giet iffirmata u l-kunsens għar-rekord ipprovdut.

Introduzzjoni

- Kemm ilek taħdem fis-servizz pubbliku? (new participant)
- Liema pożizzjoni żżomm? (new participant)
- Meta irtirjat?

Gwida

Jiena interessat fl-esperjenza tiegħek meta tagħmel l attivita fizika. M'hemm l-ebda risposta korretta jew hażina. L-esperjenzi kollha huma prezzjużi u uniċi, hu għalhekk li l-ħsibijiet tiegħek huma ta' kontribuzzjoni valida għall-istudju u s-suġġett.

1. Tista 'tiddeskrivini kif kienet l-esperjenza tal-irtirar tiegħek?
2. Ihaqt l-aspettattivi tiegħek meta irtirajt?
3. X'għenek biex tirranġa għall-irtirar?
4. Tista 'tiddeskrivi r-rutina tiegħek ta' kuljum matul il-ġimgħa u t-tmiem il-ġimgħa minn meta tqum sa meta tmur torqod? (Inkluzi l-attivitajiet sedentarji tiegħek).
5. Thoss li kien hemm xi bidla fl attivita fizika tiegħek minn meta rtirajt?
6. Thoss li tagħmel biżżejjed attivita fizika? Għaliex?
7. Minn meta rtira kien hemm xi affarijiet li interferenzi fil-pjanijiet ta 'attività fizika tiegħek?
8. X'jagħtik il-motivazzjoni biex tkun persuna fizikament attiva? Jew dak li jwaqqfek milli tkun fizikament attiv?
9. Il-COVID influwenza l-pjan tal-irtirar tiegħek? Jekk iva, kif?
10. Il-COVID influwenza l attivita fizika tiegħek? Jekk iva, kif?

Optional questions:

- L-irtirar influwenza l-ħila tiegħek li tkun fizikament attiv?
- Ir-rutina tiegħek inbidlet bl-irtirar?
- L-irtirar influwenza l-mod kif torganizza l-attivitati fizika?
- Kien hemm bidla fil-motivazzjoni tiegħek lejn l attivita fizika minn mindu irtirajt?
- Xi ngħidu dwar Riżorsi bħal flus jew aċċess għal faċilitajiet jew tagħmir għal attività fizika, kif dan jinfluwenza l-attività fizika tiegħek?
- Familja jew ħbieb influwenzawk matul dan il-perjodu?

11. Tixtieq iżżid xi haġa oħra?

Għeluq

- Sommarju żgħir ta 'dak li ntqal
- Kummenti addizzjonali
- Il-passi li jmiss - ir-rilaxx tal-informazzjoni fl-istudju
- Grazzi

Appendix 7. Interview guide second interview pre-retirement (Maltese)

Gwida għall-intervisti persuna mhux irtirata

Introduzzjoni

- Nirringrazzja lill-partecipant għall-hin tiegħu
- Preżenta lillek nnifsek
- Għan ta l interview: L-għan ta 'din l-intervista huwa li nifhem l-esperjenza tiegħek ta' rtirar u kif dan jista 'jinfluwenzak fil-livelli ta' attività fizika.
- Formola tal-kunsens provduta
- Kunfidenzjalità u anonimità: Kif qrajna fil-formola tal-kunsens l intervista hija strettament kunfidenzjali. Tista' tiddeċiedi li jekk hemm xi mistoqsijiet li ma tħossokx komdu tirrispondi ma għandekx obligu li twieġeb.
- Tul tal intervista: din tvarja skont kemm trid taqşam mill-esperjenza tiegħek, tiegħu hin kemm tixtieq inti. Is-soltu jieħdu madwar 30 sa 60 minuta.
- Kif se ssir l-intervista: Jiena se nistaqsi mistoqsijiet dwar is-suġġett u bil l-hin tiegħek twieġeb. Jekk trid taqşam stejjer ta 'hajja biex tiddekrivi l-esperjenza personali tiegħek ikun utli li tifhem il-kuntest. Wara t-tmiem tal-intervista jien se nittraskrivi l-intervista u se nibgħatha sabiex ikollok l-opportunità li tivverifika li sar b'mod korrett u veritier..
- Waqt l interview se nkun qed niehu xi noti għal xi mistoqsijiet jew affarijiet li ma nkunx fhimt.
- Għandek xi mistoqsijiet?

Rimarka: Matul l intervista ahna se nużaw eżerċizzju u attività fizika bl istess mod. B'attività fizika se nfisru: kwalunkwe forma ta 'attività li tehtieg li tiċċaqlaq inkluż sport, eżerċizzju strutturat, eżerċizzju rikreattiv, skop ta' xogħol jew trasport, attivitajiet domestiċi, ġardinaġġ u xogħol "Do-It-Yourself" (DIY).

Ittestjar ta 'apparat tar-reġistrazzjoni

Konferma verbali li l-formola ta 'kunsens giet iffirmata u l-kunsens għar-rekord ipprovdut.

Gwida

Jiena interessat fl-esperjenza tiegħek meta tagħmel l attività fizika. M'hemm l-ebda risposta korretta jew ħażina. L-esperjenzi kollha huma prezjużi u uniċi, hu għalhekk li l-ħsibijiet tiegħek huma ta' kontribuzzjoni valida għall-istudju u s-suġġett.

Meta bi hsiebek irtira?

1. Tista 'tiddekrivi r-rutina tiegħek ta' kuljum matul il-ġimġha u t-tmiem il-ġimġha minn meta tqum sa meta tmur torqod? (Inkluzi l-attivitajiet sedentarji tiegħek).

2. Thoss li kien hemm xi bidla fl attivita fizika tieghek fl-aħħar sentejn? Għal xiex tattribwixxi din il-bidla?
3. X'giegħlek tipposponi l-irtirar?
4. Thoss li tagħmel biżżejjed attivita fizika? Għaliex?
5. Meta tersa lejn l irtirar kien hemm affarijiet li jinterferixxu mal-pjanijiet ta 'attività fizika tieghek?
6. X'jagħtik il-motivazzjoni biex tkun persuna fizikament attiva? Jew dak li jwaqqfek milli tkun fizikament attiv?
7. Il-COVID influwenza l-pjan tal-irtirar tieghek? Jekk iva, kif?
8. Il-COVID influwenza l attivita fizika tieghek? Jekk iva, kif?

Optional questions:

- Kien hemm bidla fil-motivazzjoni tieghek lejn l attivita fizika meta wasalt biex tirtira?
- Il-familja jew il-ħbieb kif influwenzawk matul dan il-perjodu?
- 9. Tixtieq iżżid xi haġa oħra?

Għeluq

- Sommarju żgħir ta 'dak li ntqal
- Kummenti addizzjonali
- Il-passi li jmiss - ir-rilaxx tal-informazzjoni fl-istudju
- Grazzi

Appendix 8. Participants information sheet survey – MM study

Participant Information Sheet

Title: Changes in Physical Activity and Sedentary Behaviour in Maltese Civil Servants and Predictors of Change.

Dear Participant,

- Are you aged 60 plus?
- Work within the civil service?
- Feel comfortable answering a questionnaire in Maltese or English language?

Then I would like to invite you to take part in this study ‘Changes in Physical Activity and Sedentary Behaviour in Maltese Civil Servants and Predictors of Change’. This will be looking into physical activity, barrier and motivators to exercise in people working within the civil service who are approaching retirement. This research looks at how physical activity changes with time. By participating in this research, you will be providing information which in the future can be used to support retirement programs to promote well-being.

What will I be required to do? What you need to do is answer a questionnaire and 2 years later I will be contacting you again to re-answer the same questionnaire. The second time will be used to check for changes during the 2-year period. The questionnaire will take about 20-30 minutes to complete each time.

Do I have to take part? It is up to you to decide if you want to take part. A copy of the information provided here is yours to keep along with the consent form if you do decide to take part. You can still decide to withdraw at any time without giving a reason or you can decide not to answer a particular question.

Where will this take place? You can answer the questionnaire via email or through paper depending on what is most convenient for you.

Are there any possible risks or disadvantaged in taking part? There are no known risks by participating in this study.

What are the possible benefits of taking part? The results of this study will be used to push for the development of a retirement course for civil servants.

Will anyone be able to connect me with what is recorded and reported? All the data being collected will be stored in an anonymous way. Your identity and the response to the questionnaire will be kept separate. During ethics review the University ensures that the data collected is dealt with in a secure way to protect the confidentiality of participants.

Who will be responsible for all of the information when this study is over? The researcher is responsible for your personal data.

Who will have access to it? Only the researcher will have access to your personal information. The raw data will be accessible to the supervisor team of the study.

What will happen to the information when this study is over? Your personal information will be kept until the end of the study, for about 2 years. After that any personally identifying information will be discarded. The unidentified data will be kept for a 10-year period. This data might be used by the researcher to carry out further research on the subject. The findings from this study will be used for the PhD thesis and for possible publication and presentation at scientific conferences.

How can I find out about the results of the study? If you are interested in the results of these, I can send you a summary of the results.

If you require further information or have any queries during the study period or want to seek further clarification, I would like to invite you to contact me on the details below. I appreciate your participation in this study and thank you in advance for your assistance. Your participation is very much appreciated as it can help me in completing my studies.

Further questions? you can contact the researcher on the below details.

Karl Spiteri

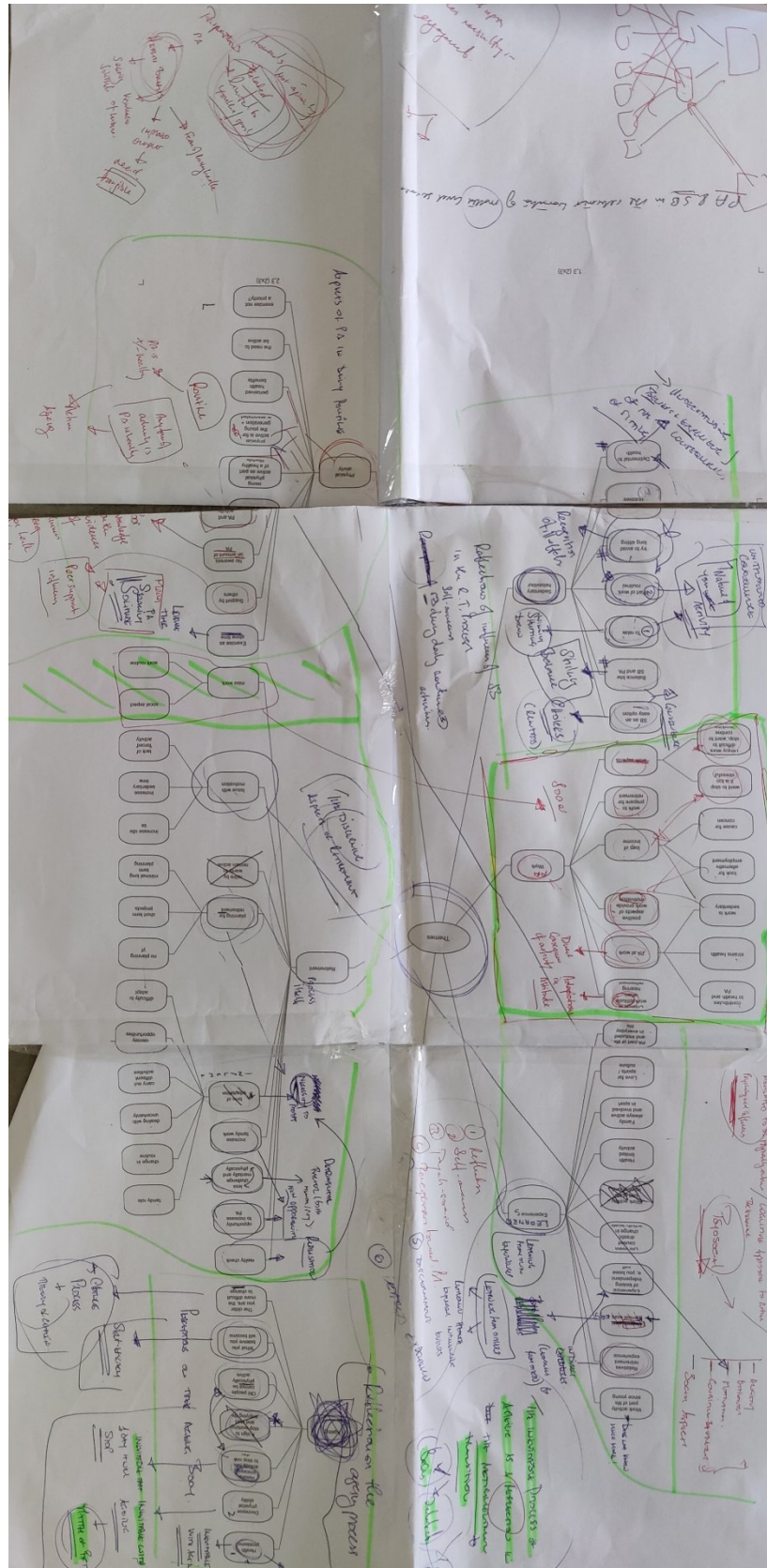
XXXXXXXXXX

Legal basis for research for studies The University of Sheffield Hallam undertakes research as part of its function for the community under its legal status. Data protection allows us to use personal data for research with appropriate safeguards in place under the legal basis of **public tasks that are in the public interest**. All University research is reviewed to ensure that participants are treated appropriately, and their rights respected. This study was approved by UREC with Converis number ER9249191. Further information at <https://www.shu.ac.uk/research/ethics-integrity-and-practice>

<p>You should contact the Data Protection Officer if:</p> <ul style="list-style-type: none"> • you have a query about how your data is used by the University • you would like to report a data security breach (e.g., if you think your personal data has been lost or disclosed inappropriately) • you would like to complain about how the University has used your personal data <p>DPO@shu.ac.uk</p>	<p>You should contact the Head of Research Ethics (Professor Ann Macaskill) if</p> <ul style="list-style-type: none"> • you have concerns with how the research was undertaken or how you were treated <p>a.macaskill@shu.ac.uk</p>
<p>Postal address: Sheffield Hallam University, Howard Street, Sheffield S1 1WBT Telephone: 0114 225 5555</p>	

Appendix 9. Transcripts with notes and themes development

<p>more he is not P active <</p> <p>more work < felt for more < energy <</p> <p>energy < by 9 < work, to feel < more, less stimulation < needs positive <</p>	<p>nahsila hallejta fil garage nadifa. Hriqt ghamlet dik il ffit xita labra (.) allura mhix [u ghal dan l istudja qed nassumi li huwa attivita (.) igifieri jien inhobb nahsila jien il karoza mhux se nohodha jaslullil qed tifimni.</p> <p>K: ok igifieri bl istandards tieghek thoss li int attiv bizzejjed jew le?</p> <p>P: em bl istandards tiegħi inhosni li kont attiv bizzejjed, imma ma ghadnix attiv daqs kemm kont u mhux tajjeb għax nhoss lil gismi jittgħazzen.</p> <p>K: ok (...)</p> <p>P: igifieri kieku jien bqajt kif kont immur qabel nimxi hekk all right imma jien ma inhosnix daqshekk attiv. Irraguni ha ngħidlek x'inhi. Ir- raguni (.) it should be a psychological thing u::m inqum u per eżempju qabel veru kont ngħajja nitkisser (.) imma aktar ma nitkisser aktar nahdem. Inhosni aktar fit aktar b'sahhti. Llum li waqaft naghmel dak ix xogħol il bicca xogħol kbira waqaft (.) jew weak mhux qed nithaddet (.) dan sa lulju kont għaddejja gas down (.) igifieri sa l ahhar ta Lulju kont qed ingorr it terapin li kelli fil bitha li domt erbgha xhur. Illum inhosni eee izjed titgħazzen (.) igifieri nitgħazzen (.) ma iffisix li mhux attiv imma mhux attiv daqs kemm kont. U inhosni aktar b sahhti meta inkun attiv. U dik hija xi haga għal qalbi u għal mohhi illi irid noqgħod attent għax mil Lulju l hawn hekk Lulju Awwissu l hawn dawn it tlett xhur (.) ma kontx qiegħed sewwa. Dawn it tlett xhur ma kontx qegħed sew (.) igifieri biex it tabib jgħidlek tmurx tghum wahdek (....) hija tinkwetani jien (.) igifieri jien nitla ma hajt imkahlal (.) taf (.) qed tifhem igifieri dik (.) ma nistax inkun aktar attiv irrid nara kif se nghamel biex inkun aktar attiv u il gym irrid mmur u qisni qed nibzgha. Qed tifhimni (.) ma nafx nimxi kuljum wahdi niddejjaq, nimxi u igifieri u il mara thobb timxi filghodu. Bhalissa igifieri il mara titlaq fis 7 sat 8 u nofs id 9 għada timxi mal kugini tagħha madwar il Mosta kollha idduruha kollha igifieri. Meta ngħidlek mixja (.) mixja mixja. Igifieri ma nlahhaqx mahha jien ovvjament (.) bil- go slow issa għax hi attiva iktar minni allura hi taggel iktar issa jien ngħagħel mhux għazin ma nimxix bil mogħod. Imma ikollha tieqaf kull darba tistennini tghidli għagħel (.) qed tifhem. Issa qabel kont nkun maha par in par e!!! Sas sajj igifieri (.) igifieri nhossni ahjar kieku. Ma ngħidlekx ukoll għandi gnien igifieri kull ffit zmien dejjem nahrat u naghmel imma għandi ix xogħol biz zejjed d dar. Imbajjad u niksi jien kont imbajjad. Din s sena ma bajjadx jien bex ngħagħel. Għax kelli l bajjad u għedtlu ibqa għaddej. Ma irridx mbajjad jien biex nagħel dik r rgauni ta'. Kelnha disastru id dar iifieri. Sad 9 ta bil lejla trid tahsel min fuq sa isfel kuljum kuljum kuljum.</p> <p>K: hin minnhom għedt ma nafx fhimtx sew qisu meta qed tagħmel x xogħol tad dar kont thossok iktar b sahhatek?</p> <p>P: iktar fulfilled.</p> <p>K: Barra r rutina tal gym li kellek, ix xogħol tal maintenance tad dar kont thossok iktar b sahhatek u iktar...</p> <p>P: hemm hu hekk hu. Igifieri kont ngħajja ovvja (.) imma tajjeb torqod u tqum imma tqum hadida. Llum qisek tqum ifhimni (.) you know ma thossok dik il gergu (.) ha ngħid hekk igifieri hawn hekk jergu jigbru (.) ma tibqax hekk (.) ha ngħid hekk Alla hares nibqa naghmel dak kuljum mhux tajjeb għal dak lis strapazz kollu. Imma zgur igifieri huwa mhux li nerga naqbad naqra l weights ha naghmel 50 kilos ta!! Imma dik n naqra weights u n naqra qed tifhem (.) dejjem thossok naqra ahjar (.) u irrid nerga nibda għax iktar biza dahlet go mohhi qed tifhem. Igifieri jekk ikolli insiefer wahdi ma nsifierx illum (.) ara meta kont n naha l ohra regolari l meetings kolla li kelli fl ewropa u konferenzi u preparamenti tal presidenza li kelnha wahdi qatt ma kien hemm xi hadd miegħi.</p>
<p>PA help to feel less not feel less very str.</p>	<p>4</p>



Appendix 10. COVID-19 information sheet

Face-to-face interview procedure in lieu of COVID-19 precautions

Dear Participant,

Thank you for accepting to carry out the interview face-to-face for the study titled “Physical activity and sedentary behaviour during retirement transition in Maltese Civil Servants”. Due to the current situation with regards to Covid-19, as a researcher, I am taking extra precautionary measures to ensure your safety during the interview process. The measures being taken are based on the Maltese public health guidelines and Coventry University COVID-19 standard operating procedures for undertaking face to face research.

- ✓ The researcher with whom you are undertaking the interview has been vaccinated with two doses and more than 14 days have passed since the last dose of the vaccine.
- ✓ All interviews will be taking place in an outside space with 2 meters distance between the interviewer and interviewee.
- ✓ Face masks shall be worn at all times.
- ✓ If between the time of our appointment and the interview I am notified of having been in contact with a positive case within the previous 10 days I will contact, you to postpone the interview date.
- ✓ Our appointment will be subject to cancellation should public health guidelines change and require this.
- ✓ In the case that I test positive two days post-interview, I will be obliged to mention this interview to the contact tracing team. However, based on the current public health guidelines, the precautions being taking during the interview should be enough and would not require you to stay in quarantine.
- ✓ In case I or you are experiencing any COVID symptoms the interview will be postponed or carried out online depending on your preference.
- ✓ If you are considered a high-risk person for COVID we will conduct the interview online.

If you have any further questions, you are kindly asked to contact me:

mobile: XXXXXX or email: spiterik2@coventry.ac.uk

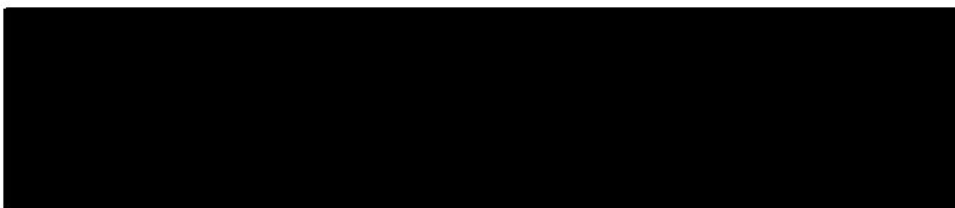
Karl Spiteri

PhD Student – Coventry University

8/9/2021

Appendix 11. Gate keeper approval

RE: Permission for PhD studies



Dear Mr Spiteri,

Please refer to correspondence below. I am writing on behalf of Ms Joyce Dimech, Permanent Secretary.

When you are ready to begin the data collection stage of your research, please get in touch with me or with Mr Raymond Desira, Assistant Director (in copy). We may be reached by email or by phone using the number that appears below. We will assist you in obtaining the data you need since your research is of interest to the Public Service.

Yours sincerely,

Charles Polidano

Head

Institute for Public Services

t: +356 22001254 e: charles.polidano@gov.mt | (www.opm.gov.mt)www.opm.gov.mt

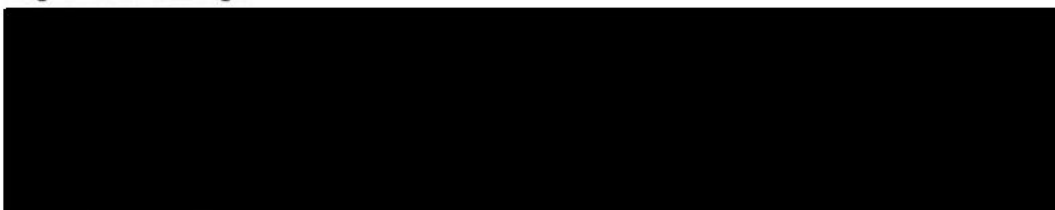
Kindly consider your environmental responsibility before printing this e-mail



OFFICE OF THE PRIME MINISTER

Sa Maison Road, Floriana FRN 1610

Begin forwarded message:



Dear Mr Spiteri

This is to confirm that the PPS and I have approved your request.

You shall be contacted in due course by Ms Joyce Dimech, Permanent Secretary (Strategy & Implementation), with regards to the use of this important research.

Regards,

Mark

Appendix 12. Consent form survey – MM study

Consent form

Changes in Physical Activity and Sedentary Behaviour in Maltese Civil Servants and Predictors of Change

Please answer the following questions by ticking the response that applies

- | | YES | NO |
|---|--------------------------|--------------------------|
| 1. I have read the Information Sheet for this study and any questions about the study have been answered to my satisfaction | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. I am aware that I can ask questions about the study at any time. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. I understand that I am free to withdraw from the study without giving a reason for my withdrawal or to decline to answer any particular questions in the study without any consequences. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I agree to provide information to the researchers for the duration of the research, under the conditions of confidentiality set out in the Information Sheet. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. I wish to participate in the study voluntarily. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. I consent to the researcher contacting me within 2 years' time to fill in the questionnaire for the second time. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. I consent to the information collected for the purposes of this research study, once anonymised (so that I cannot be identified), to be used for any other research purposes. | <input type="checkbox"/> | <input type="checkbox"/> |

Participant's Signature: _____ **Date:** _____

Participant's Name: _____

Preferred mode of administration: ___Email ___Hardcopy ___Telephone

Contact details for completing questionnaire second time: _____

Would you like to receive a copy of the results? ___Yes ___No

If yes include email address to forward results: _____

Researcher's Name: Karl Spiteri **Researcher's Signature:** _____

Researcher's contact details:
XXXXXXX

Please keep your copy of the consent form and the information sheet together.

Appendix 13. Participants information sheet interview – MM study

Participant Information Sheet

Title: Changes in Physical Activity and Sedentary Behaviour in Maltese Civil Servants and Predictors of Change.

Dear Participant,

I would like to thank you for participating in the questionnaire and for your availability to participate in the interview. You have been selected to participate in the interview as you have completed the questionnaire and will be retiring from civil service within the next year to 6 months. You are being asked to participate in an interview about your experience of retirement and how this might influence your physical activity levels.

What will I be required to do? You will be asked to answer some questions and 2 years later I will be contacting you again to answer similar questions. The interview will take about 30 minutes. The interviews will be audio recorded with your permission and then transcribed word by word. This will allow for analysing the interview.

Do I have to take part? It is up to you to decide if you want to take part. A copy of the information provided here is yours to keep along with the consent form if you do decide to take part. You can still decide to withdraw at any time without giving a reason or you can decide not to answer a particular question.

Where will this take place? You can choose to carry out the interview either at your place of work or place convenient for you.

Are there any possible risks or disadvantaged in taking part? There are no known risks by participating in this study.

What are the possible benefits of taking part? The interview can help you reflect about your retirement.

Will anyone be able to connect me with what is recorded and reported? All the data being collected will be stored in an anonymous way. Your identity and the transcript will be kept separately to protect your identity. During ethics review the University ensures that the data collected is dealt with in a secure way to protect the confidentiality of participants.

Who will be responsible for all of the information when this study is over? The researcher is responsible for your personal data.

Who will have access to it? Only the researcher will have access to your personal information. The raw data will be accessible to the supervisor team of the study.

What will happen to the information when this study is over? Your personal information will be kept until the end of the study, for about 2 years. After that any personally identifying information will be discarded. The unidentified data will be kept for the period of 10 years. This

data might be used by the researcher for further studies. The findings from this study will be used for the PhD thesis and for possible publication and presentation at scientific conferences.

How can I find out about the results of the study? If you are interested in the results of these, I can send you a summary of the results.

If you require further information or have any queries during the study period or want to seek further clarification, I would like to invite you to contact me on the details below. I appreciate your participation in this study and thank you in advance for your assistance.

Further questions? you can contact the researcher on the below details.

Karl Spiteri

XXXXXXX

Legal basis for research for studies The University of Sheffield Hallam undertakes research as part of its function for the community under its legal status. Data protection allows us to use personal data for research with appropriate safeguards in place under the legal basis of **public tasks that are in the public interest**. All University research is reviewed to ensure that participants are treated appropriately, and their rights respected. This study was approved by UREC with Converis number ER9249191. Further information at <https://www.shu.ac.uk/research/ethics-integrity-and-practice>

You should contact the Data Protection Officer if:

- you have a query about how your data is used by the University
- you would like to report a data security breach (e.g., if you think your personal data has been lost or disclosed inappropriately)
- you would like to complain about how the University has used your personal data

DPO@shu.ac.uk

You should contact the Head of Research Ethics (Professor Ann Macaskill) if

- you have concerns with how the research was undertaken or how you were treated

a.macaskill@shu.ac.uk

Postal address: Sheffield Hallam University, Howard Street, Sheffield S1 1WBT Telephone: 0114 225 5555

Appendix 14. Consent form interview – MM study

Consent form

Changes in Physical Activity and Sedentary Behaviour in Maltese Civil Servants and Predictors of Change

Please answer the following questions by ticking the response that applies

- | | YES | NO |
|---|--------------------------|--------------------------|
| 1. I have read the Information Sheet for this study and any questions about the study have been answered to my satisfaction. | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. I am aware that I can ask questions about the study at any time. | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. I understand that I am free to withdraw from the study without giving a reason for my withdrawal or to decline to answer any particular questions in the study without any consequences. | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I agree to provide information to the researchers for the duration of the research, under the conditions of confidentiality set out in the Information Sheet. | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. I wish to participate in the study voluntarily. | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. I consent to the researcher contacting me within 2 years' time to participate in another interview. | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. I consent to the interview being audio recorded and transcribed verbatim. | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. I consent to the information collected for the purposes of this research study, once anonymised (so that I cannot be identified), to be used for any other research purposes. | <input type="checkbox"/> | <input type="checkbox"/> |

Participant's Signature: _____ **Date:** _____

Participant's Name: _____

Contact details: _____

Researcher's Name: Karl Spiteri _____

Researcher's Signature: _____

Researcher's contact details:

Karl Spiteri
XXXXXX

Please keep your copy of the consent form and the information sheet together.

Appendix 15. Participants information sheet cognitive interview - reliability study

Participant Information Sheet

Cognitive interview of International Physical Activity Questionnaire – Long Form, Exercise Benefits Barrier Scale, Exercise Motivation Inventory – 2

Dear Participant

- Are you 18 plus?
- Feel comfortable answering a questionnaire in Maltese language?

I would like to invite you to take part in this study which will look into how good the Maltese translation of this questionnaire is. This questionnaire is used internationally but not yet available in the Maltese language. The questionnaire was translated from English by a professional translator, and I would like to check if the translation is understandable. This questionnaire measures the amount of physical activity you undertake over a period of one week, what barriers and motivator you find when you undertake physical activity. Your participation is very much appreciated as it can help to make this questionnaire available to other researchers in Malta working in the field of health.

What will I be required to do? You will be required to answer the questionnaire and while you are answering it I will ask you some questions on what the question makes you think. The interview will be audio recorded for further analysis of possible difficulties with the questionnaire.

Where will this take place? It will take place in a place convenient for you.

Are there any possible risks or disadvantaged in taking part? There are no known risks by participating in this study.

What are the possible benefits of taking part? Through your participation you will be assisting research in the area of physical activity. These studies will be made available to other researchers who carry out research in this area.

Will anyone be able to connect me with what is recorded and reported? All the data being collected will be stored in an anonymous way. During ethics review the University ensures that the data collected is dealt with in a secure way to protect the confidentiality of participants.

Who will be responsible for all of the information when this study is over? The researcher is responsible for your personal data.

Who will have access to it? Only the researcher will have access to your personal information. The raw data will be accessible to the supervisor team of the study.

What will happen to the information when this study is over? Your personal information will be kept until the end of the study. After that any personally identifying information will be discarded. The unidentified data will be kept for a 10 year period after the end of the PhD. The

findings from this study will be used for the PhD thesis and for possible publication and presentation at scientific conferences.

How can I find out about the results of the study? If you are interested in the results of these, I can send you a summary of the results via email.

If you require further information or have any queries during the study period or want to seek further clarification, I would like to invite you to contact me on the details below. I appreciate your participation in this study and thank you in advance for your assistance.

Do I have to take part? It is up to you to decide if you want to take part. A copy of the information provided here is yours to keep along with the consent form if you do decide to take part. You can still decide to withdraw at any time without giving a reason or you can decide not to answer a particular question.

With your participation you will be assisting me in completing my PhD studies at Sheffield Hallam University. I would like to thank you in advance for your participation and help.

Further questions? you can contact the researcher on the below details.

Researcher: Karl Spiteri

XXXXX

Legal basis for research for studies The University of Sheffield Hallam undertakes research as part of its function for the community under its legal status. Data protection allows us to use personal data for research with appropriate safeguards in place under the legal basis of **public tasks that are in the public interest**. All University research is reviewed to ensure that participants are treated appropriately, and their rights respected. This study was approved by UREC with Converis number ER9249191. Further information at <https://www.shu.ac.uk/research/ethics-integrity-and-practice>

You should contact the Data Protection Officer if:

- you have a query about how your data is used by the University
- you would like to report a data security breach (e.g., if you think your personal data has been lost or disclosed inappropriately)
- you would like to complain about how the University has used your personal data

DPO@shu.ac.uk

You should contact the Head of Research Ethics (Professor Ann Macaskill) if:

- you have concerns with how the research was undertaken or how you were treated

a.macaskill@shu.ac.uk

Postal address: Sheffield Hallam University, Howard Street, Sheffield S1 1WBT Telephone: 0114 225 5555

Appendix 16. Consent form cognitive interview - reliability study

Consent form

**Cognitive interview of International Physical Activity Questionnaire – Long Form,
Exercise Benefits Barrier Scale, Exercise Motivation Inventory – 2**

Before participating in the study, you are required to fill in the consent form. Kindly answer 'yes' or 'no' to each statement, this is required to be sure that you understood your participation.

	YES	NO
1. I have read the Information Sheet for this study and any questions about the study have been answered to my satisfaction.	<input type="checkbox"/>	<input type="checkbox"/>
2. I am aware that I can ask questions about the study at any time.	<input type="checkbox"/>	<input type="checkbox"/>
3. I understand that I am free to withdraw from the study without giving a reason for my withdrawal or to decline to answer any particular questions in the study without any consequences.	<input type="checkbox"/>	<input type="checkbox"/>
4. I agree to provide information to the researchers for the duration of the research, under the conditions of confidentiality set out in the Information Sheet.	<input type="checkbox"/>	<input type="checkbox"/>
5. I wish to participate in the study voluntarily.	<input type="checkbox"/>	<input type="checkbox"/>
6. I consent to the interview being audio recorded.	<input type="checkbox"/>	<input type="checkbox"/>

Participant's Signature: _____ **Date:** _____

Participant's Name: _____

Researcher's Name: Karl Spiteri

Researcher's Signature: _____

Researcher's contact details:

Karl Spiteri

XXXX

Please keep your copy of the consent form and the information sheet together.

Appendix 17. Participant information sheet – reliability study

Participant Information Sheet

Reliability testing of International Physical Activity Questionnaire – Long Form, Exercise Benefits Barrier Scale, Exercise Motivation Inventory – 2

Dear Participant

- Are you 18 plus?
- Feel comfortable answering a questionnaire in Maltese language?

I would like to invite you to take part in this study which will look into how good the Maltese translation of this questionnaire is. The study will be looking into how much this questionnaire provides the same results when tested over a period of time. This questionnaire is used internationally but not yet available in the Maltese language. It will measure the amount of physical activity you undertake over a period of one week, what barriers and motivator you find when you undertake physical activity. Your participation is very much appreciated as it can help to make this questionnaire available to other researchers in Malta working in the field of health.

What will I be required to do? What you need to do is answer the questionnaire and within 8 to 24 hours, in a time suitable for you, I will be contacting you again to re-answer the same questionnaire. The questionnaire will take about 30 minutes to complete each time.

Where will this take place? You can answer the questionnaire via email or through paper depending on what is most convenient for you.

Are there any possible risks or disadvantaged in taking part? There are no known risks by participating in this study.

What are the possible benefits of taking part? Through your participation you will be assisting research in the area of physical activity. These studies will be made available to other researchers who carry out research in this area.

Will anyone be able to connect me with what is recorded and reported? All the data being collected will be stored in an anonymous way. Your identity and the response to the questionnaire will be kept separate. During ethics review the University ensures that the data collected is dealt with in a secure way to protect the confidentiality of participants.

Who will be responsible for all of the information when this study is over? The researcher is responsible for your personal data.

Who will have access to it? Only the researcher will have access to your personal information. The raw data will be accessible to the supervisor team of the study.

What will happen to the information when this study is over? Your personal information will be kept until the end of the study, for about 1 month. After that any personally identifying information will be discarded. The unidentified data will be kept for a 10-year period after the

end of the PhD. The findings from this study will be used for the PhD thesis and for possible publication and presentation at scientific conferences.

How can I find out about the results of the study? If you are interested in the results of these, I can send you a summary of the results via email.

If you require further information or have any queries during the study period or want to seek further clarification, I would like to invite you to contact me on the details below. I appreciate your participation in this study and thank you in advance for your assistance.

Do I have to take part? It is up to you to decide if you want to take part. A copy of the information provided here is yours to keep along with the consent form if you do decide to take part. You can still decide to withdraw at any time without giving a reason or you can decide not to answer a particular question.

With your participation you will be assisting me in completing my PhD studies at Sheffield Hallam University. I would like to thank you in advance for your participation and help.

Further questions? you can contact the researcher on the below details.

Researcher: Karl Spiteri

XXXXXX

Legal basis for research for studies The University of Sheffield Hallam undertakes research as part of its function for the community under its legal status. Data protection allows us to use personal data for research with appropriate safeguards in place under the legal basis of **public tasks that are in the public interest**. All University research is reviewed to ensure that participants are treated appropriately, and their rights respected. This study was approved by UREC with Converis number ER9249191. Further information at <https://www.shu.ac.uk/research/ethics-integrity-and-practice>

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- you would like to complain about how the University has used your personal data

DPO@shu.ac.uk

You should contact the Head of Research Ethics (Professor Ann Macaskill) if

- you have concerns with how the research was undertaken or how you were treated

a.macaskill@shu.ac.uk

Postal address: Sheffield Hallam University, Howard Street, Sheffield S1 1WBT Telephone: 0114 225 5555

Appendix 18. Consent form – reliability study

Consent form

Reliability testing of International Physical Activity Questionnaire – Long Form, Exercise Benefits Barrier Scale, Exercise Motivation Inventory – 2

Before participating in the study, you are required to fill in the consent form. Kindly answer 'yes' or 'no' to each statement, this is required to be sure that you understood your participation.

	YES	NO
1. I have read the Information Sheet for this study and any questions about the study have been answered to my satisfaction.	<input type="checkbox"/>	<input type="checkbox"/>
2. I am aware that I can ask questions about the study at any time.	<input type="checkbox"/>	<input type="checkbox"/>
3. I understand that I am free to withdraw from the study without giving a reason for my withdrawal or to decline to answer any particular questions in the study without any consequences.	<input type="checkbox"/>	<input type="checkbox"/>
4. I agree to provide information to the researchers for the duration of the research, under the conditions of confidentiality set out in the Information Sheet.	<input type="checkbox"/>	<input type="checkbox"/>
5. I wish to participate in the study voluntarily.	<input type="checkbox"/>	<input type="checkbox"/>
6. I consent to the researcher contacting me within the next 24 hours to fill in the questionnaire for the second time.	<input type="checkbox"/>	<input type="checkbox"/>
7. I consent to the information collected for the purposes of this research study, once anonymised (so that I cannot be identified), to be used for any other research purposes.	<input type="checkbox"/>	<input type="checkbox"/>

Participant's Signature: _____ **Date:** _____

Participant's Name: _____

Preferred mode of administration: ___Email ___Hardcopy ___Telephone

Contact details for completing questionnaire second time: _____

Approximate time to be contacted: _____

Researcher's Name: Karl Spiteri **Researcher's Signature:** _____

Researcher's contact details:

XXXXXXX

Please keep your copy of the consent form and the information sheet together.

Appendix 19. Reliability testing questionnaire

Informazzjoni demografika

1. Data ta twelied:
2. Edukazzjoni: ☐ Primarja ☐ Sekondarja ☐ Terzjarja
3. Eta': _____
4. Stat ċivili: ☐ Single ☐ Miżżewweġ ☐ Armel/a ☐ Tgħix mas-sieħeb/a
5. Is-sena tal-irtirar mistenni: _____
6. L-iskala tal-impjegi: _____
7. Piż: _____ Tul: _____

L-1 PARTI: ATTIVITÀ FIŻIKA RELATATA MAX-XOGĦOL

L-ewwel parti hi dwar ix-xogħol tiegħek. Dan jinkludi xogħlijiet bi ħlas, xogħol fl-għalqa, xogħol volontarju, xogħol waqt xi kors, u kwalunkwe xogħol ieħor bla ħlas li ġieli għamilt barra minn darek. Tinkludix xogħol bla ħlas li forsi tagħmel fid-dar, bħal xogħol tad-dar, manutenzjoni ġenerali u li tiegħu ħsieb il-familja. Dan tkun mistoqsi dwaru fit-tielet parti.

1. Bħalissa inti għandek xogħol, jew tagħmel xi xogħol bla ħlas barra mid-dar tiegħek?

☐ Iva

☐ Le



Aqbez għat-2 PARTI: IT-TRASPORT

Il-mistoqsijiet li jmiss huma dwar l-attività fiżika kollha li wettaqt **fl-aħħar 7 ijiem** bħala parti mix-xogħol tiegħek bil-ħlas jew mingħajr ħlas. Dan ma jinkludix l-ivvjaġġar lejn ix-xogħol u lura.

2. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika **iebsa**, bħal terfa' xi haġa tqila, tħaffer, xogħol ta' kostruzzjoni jew titla' t-taraġ **bħala parti mix-xogħol tiegħek**? Aħseb biss f'dawk l-attivitàjiet fiżiċi li domt tagħmilhom għal mill-inqas 10 minuti kull darba.

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività fiżika iebsa waqt ix-xogħol



Aqbez għal mistoqsija 4

3. Bejn wieħed u ieħor f'ġurnata waħda kemm għaddejt ħin tagħmel din l-attività fiżika **iebsa** bħala parti minn xogħlok?

_____ **sigħat kuljum**

_____ **minuti kuljum**

4. Għal darb'oħra aħseb biss f'dawk l-attivitàjiet fiżiċi li domt tagħmilhom għal mill-inqas 10 minuti kull darba. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika **moderata**, bħal iġġorr xi haġa mhux tqila, **bħala parti minn xogħlok**? Jekk jogħġbok tinkludix il-mixi.

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività fiżika moderata waqt ix-xogħol ➡ **Aqbeż għal mistoqsija 6**

5. Bejn wieħed u ieħor f'ġurnata waħda kemm għaddejt ħin tagħmel din l-attività fiżika **moderata** bħala parti minn xogħlok?

_____ **sigħat kuljum**
_____ **minuti kuljum**

6. Matul **l-aħħar 7 ijiem**, kemm-il darba **mxejt** għal mill-inqas 10 minuti kontinwi **bħala parti minn xogħlok**? Jekk jogħġbok tgħoddx il-mixi li mxejt biex tmur ix-xogħol u lura.

_____ **ijiem fil-ġimgħa**

☐

L-ebda mixi waqt ix-xogħol ➡ **Aqbeż għat-2 PARTI: IT-TRASPORT**

7. Bejn wieħed u ieħor f'ġurnata waħda kemm għaddejt ħin **timxi** bħala parti mix-xogħol tiegħek?

_____ **sigħat kuljum**
_____ **minuti kuljum**

IT-2 PARTI: L-ATTIVITÀ FIŻIKA WAQT IT-TRASPORT

Il-mistoqsijiet li ġejjin huma dwar kif ivvjaġġajt minn post għal ieħor, fosthom lejn il-post tax-xogħol, xi ħanut, biex tmur tara film u l-bqija.

8. Matul **l-aħħar 7 ijiem**, kemm-il darba **vvjaġġajt b'vettura motorizzata**, bħal xi tren, karozza tal-linja, karozza jew tramm?

_____ **ijiem fil-ġimgħa**

☐

Ma vvjaġġajtx b'vettura motorizzata ➡ **Aqbeż għal mistoqsija 10**

9. Bejn wieħed u ieħor f'ġurnata waħda kemm għaddejt ħin **tivvjaġġa** fi tren, karozza tal-linja, karozza, tramm jew xi tip ieħor ta' vettura motorizzata?

_____ **sigħat kuljum**
_____ **minuti kuljum**

Issa aħseb biss fis-**sewqan tar-rota** jew il-**mixi** li forsi għamilt biex tivvjaġġa lejn ix-xogħol u lura, biex tagħmel il-qadjiet, jew biex tmur minn post għal ieħor.

10. Matul **l-aħħar 7 ijiem**, kemm-il darba **soqt ir-rota** għal mill-inqas 10 minuti kontinwi biex tmur **minn post għal ieħor**?

_____ **ijiem fil-gimgha**

☐

Ma soqtx ir-rota biex mort minn post għal ieħor ➡ **Aqbeż għal mistoqsija 12**

11. Bejn wieħed u ieħor f'gurnata waħda kemm qattajt ħin **issuq ir-rota** minn post għal ieħor?

_____ **sigħat kuljum**
_____ **minuti kuljum**

12. Matul **l-aħħar 7 ijiem**, kemm-il darba **mxejt** għal mill-inqas 10 minuti kontinwi biex tmur **minn post għal ieħor**?

_____ **ijiem fil-gimgha**

☐

Ma mxejtx biex mort minn post għal ieħor ➡ **Aqbeż għat-3 PARTI: XOGHOL TAD-DAR, MANUTENZJONI TAD-DAR U KURA TAL-FAMILJA**

13. Bejn wieħed u ieħor f'gurnata waħda kemm qattajt ħin **timxi** minn post għal ieħor?

_____ **sigħat kuljum**
_____ **minuti kuljum**

IT-3 PARTI: XOGHOL TAD-DAR, MANUTENZJONI TAD-DAR U KURA TAL-FAMILJA

Din il-parti hija dwar xi attivitajiet fiżiċi li forsi għamilt **fl-aħħar 7 ijiem** fid-dar tiegħek, bħal xi xogħol tad-dar, xogħol fil-ġnien jew fuq barra, xogħol ta' manutenzjoni ġenerali u kura tal-familja.

14. Aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt għal mill-inqas 10 minuti kontinwi. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika iebsa, bħal terfa' xi haġa tqila, tqatta' l-injam, timpala l-borra jew thaffer **fil-ġnien jew fil-bitha**?

_____ **ijiem fil-gimgha**

☐

L-ebda attività iebsa fil-ġnien jew fil-bitha ➡ **Aqbeż għal mistoqsija 16**

15. Bejn wieħed u ieħor f'gurnata waħda kemm qattajt ħin tagħmel xi attività fiżika **iebsa** fil-ġnien jew fil-bitha?

_____ **sigħat kuljum**
_____ **minuti kuljum**

16. Hawnhekk ukoll, aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt għal mill-inqas 10 minuti kull darba. Matul **I-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività **moderata** bħal iġġorr xi haġa ħafifa, tiknes, taħsel il-ħġieġ jew tnaddaf **il-ġnien jew il-bitha**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività moderata fil-ġnien jew fil-bitha → **Aqbez għal mistoqsija 18**

17. Bejn wieħed u ieħor f'ġurnata waħda kemm qattajt hin tagħmel xi attività fiżika **moderata** fil-ġnien jew fil-bitha?

_____ **sigħat kuljum**

_____ **minuti kuljum**

18. Hawnhekk ukoll, aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt għal mill-inqas 10 minuti kull darba. Matul **I-aħħar 7 ijiem** kemm-il darba għamilt xi attività **moderata** bħal iġġorr xi haġa ħafifa, taħsel il-ħġieġ, toġhrok l-art jew tiknes **fid-dar**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività moderata fid-dar



Aqbez għar-4 PARTI: ATTIVITÀ FIŻIKA BĦALA RIKREAZZJONI, SPORT JEW GĦALL-GOST

19. Bejn wieħed u ieħor f'ġurnata waħda kemm qattajt hin tagħmel xi attività fiżika **moderata** fid-dar?

_____ **sigħat kuljum**

_____ **minuti kuljum**

IR-4 PARTI: ATTIVITÀ FIŻIKA BĦALA RIKREAZZJONI, SPORT JEW GĦALL-GOST

Din il-parti hija dwar l-attivitajiet fiżiċi kollha li wettaqt matul **I-aħħar 7 ijiem** sempliċiment bħala rikreazzjoni, sport, eżerċizzju jew għall-gost. Jekk jogħġbok tinkludix attivitajiet li diġà semmejt qabel.

20. Jekk ma tinkludi ebda mixi li semmejt diġà, matul **I-aħħar 7 ijiem** kemm-il darba **mxejt** għal mill-inqas 10 minuti kontinwi **fil-ħin liberu tiegħek**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda mixi fil-ħin liberu



Aqbez għal mistoqsija 22

21. Bejn wieħed u ieħor f'ġurnata waħda kemm qattajt hin **timxi** fil-ħin liberu tiegħek?

_____ **sigħat kuljum**

_____ **minuti kuljum**

22. Aħseb biss dwar dawk l-attivitajiet fiżiċi li wettaqt għal mill-inqas 10 minuti kontinwi. Matul **l-aħħar 7 ijiem**, kemm-il darba wettaqt xi attività fiżika **iebsa** bħall-aerobika, il-ġiri, issuq ir-rota tgħaġġel jew tgħum tgħaġġel **fil-ħin liberu tiegħek**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività fiżika iebsa fil-ħin liberu



Aqbez għal mistoqsija 24

23. Bejn wieħed u ieħor f'ġurnata waħda kemm qattajt ħin tagħmel xi attività fiżika **iebsa** fil-ħin liberu tiegħek?

_____ **sigħat kuljum**

_____ **minuti kuljum**

24. Għal darb'oħra aħseb biss f'dawk l-attivitajiet fiżiċi li wettaqt għal mill-inqas 10 minuti kontinwi. Matul **l-aħħar 7 ijiem**, kemm-il darba għamilt xi attività fiżika **moderata** bħal issuq ir-rota b'ritmu regolari, tgħum b'ritmu regolari jew tilgħab it-tenis tnejn kontra tnejn **fil-ħin liberu tiegħek**?

_____ **ijiem fil-ġimgħa**

☐

L-ebda attività moderata fil-ħin liberu



**Aqbez għall-5 PARTI: HIN
BILQIEGĦDA**

25. Bejn wieħed u ieħor f'ġurnata waħda kemm qattajt ħin tagħmel xi attività fiżika **moderata** fil-ħin liberu tiegħek?

_____ **sigħat kuljum**

_____ **minuti kuljum**

IL-5 PARTI: HIN BILQIEGĦDA

L-aħħar mistoqsijiet huma dwar il-ħin li tqatta' bilqiegħda waqt ix-xogħol, id-dar, waqt xi kors u waqt il-ħin liberu. Dan jista' jinkludi l-ħin li tqatta' quddiem xi skrivanija, iżżur il-ħbieb, taqra, jew tara t-televixin bilqiegħda jew mimdud. Tinkludix il-ħin li tqatta' bilqiegħda f'xi vettura motorizzata jekk diġà semmejtu qabel.

26. Matul **l-aħħar 7 ijiem**, bejn wieħed u ieħor kemm qattajt ħin **bilqiegħda** f'xi ġurnata **tax-xogħol**?

_____ **sigħat kuljum**

_____ **minuti kuljum**

27. Matul **l-aħħar 7 ijiem**, bejn wieħed u ieħor kemm qattajt ħin **bilqiegħda** f'ġurnata **fi tmiem il-ġimgħa**?

_____ **sigħat kuljum**

_____ **minuti kuljum**

II-Benefiċċji tal-Eżerċizzju/Skala tal-Ostakli

Dawn li ġejjin huma ideat diversi dwar l-eżerċizzju. Jekk jogħġbok indika kemm taqbel jew ma taqbilx ma' dawn l-ideat billi tagħmel marka fil-kaxxa rispettiva minn fost "Naqbel Hafna", "Naqbel", "Ma Naqbilx" jew "Ma Naqbel Xejn".					
		Naqbel Hafna	Naqbel	Ma Naqbilx	Ma Naqbel Xejn
1	Niehu gost nagħmel l-eżerċizzju.				
2	L-eżerċizzju jnaqqasli l-istress u t-tensjoni.				
3	L-eżerċizzju jtejjibli s-saħħa mentali.				
4	L-eżerċizzju jehodli wisq mill-hin tiegħi.				
5	Bl-eżerċizzju nippreveni l-attakki tal-qalb.				
6	L-eżerċizzju jgħejjini.				
7	L-eżerċizzju jsaħħahli l-muskoli.				
8	L-eżerċizzju jagħtini sens ta' sodisfazzjon personali.				
9	Il-postijiet fejn nista' nagħmel l-eżerċizzju għalija jinsabu wisq 'il bogħod.				
10	Bl-eżerċizzju nhossni rilassat.				
11	Bl-eżerċizzju nista' nżomm kuntatt mal-hbieb u persuni li niehu gost magħhom.				
12	Ma nagħmilx l-eżerċizzju ghax inhossni imbarazzat hafna.				
13	L-eżerċizzju jgħinni biex ma jkollix pressjoni għolja.				
14	L-eżerċizzju jiswieni wisq flus.				
15	Bl-eżerċizzju nhossni iktar b'saħhti.				
16	Il-hinijiet tal-facilitajiet fejn isir l-eżerċizzju mhumiex konvenjenti għalija.				
17	L-eżerċizzju jsaħħahli u jissodali l-muskoli.				
18	L-eżerċizzju jtejjeb is-sistema kardjovaskulari tiegħi biex taħdem aħjar.				
19	L-eżerċizzju jgħejjini.				
20	Bl-eżerċizzju sirt inhossni iktar tajjeb minn gewwa.				

21	Ir-raġel/Il-mara (jew l-iktar persuna qrib tiegħi) ma tinkoraġġinix biex nagħmel l-eżerċizzju.				
22	L-eżerċizzju jżidli l-istamina tiegħi.				
23	L-eżerċizzju jtejjibli l-flessibilità tiegħi.				
24	L-eżerċizzju jiehu wisq mill-hin tar-relazzjonijiet fil-familja.				
25	Id-dispożizzjoni tiegħi titjeb permezz tal-eżerċizzju.				
26	L-eżerċizzju jgħinni norqod aħjar billejl.				
27	Jekk nagħmel l-eżerċizzju, ngħix iktar.				
28	Nahseb li n-nies ikunu jidhru koroh meta jkunu lebsin hwejjeg tal-eżerċizzju.				
29	L-eżerċizzju jgħinni biex ma nhossnix daqshekk għajjen.				
30	L-eżerċizzju huwa mod tajjeb biex niltaqa' ma' persuni godda.				
31	Bl-eżerċizzju nkun niflaħ nissaporti iktar fizikament.				
32	L-eżerċizzju jtejjibli l-mod kif inhares lejja nnifsi.				
33	Il-membri tal-familja tiegħi ma jheggunix biex nagħmel l-eżerċizzju.				
34	L-eżerċizzju jgħinni biex niffoka aħjar mentalment.				
35	L-eżerċizzju jgħinni biex inwettaq attivitajiet normali mingħajr ma nhossni għajjen.				
36	Bl-eżerċizzju, il-kwalità tax-xogħol tiegħi titjeb.				
37	L-eżerċizzju jehodli wisq hin mir-responsabbiltajiet tiegħi tal-familja.				
38	L-eżerċizzju huwa divertiment tajjeb għalija.				
39	Permezz tal-eżerċizzju, l-oħrajn jaċċettawni aktar.				
40	L-eżerċizzju nsibu tqil għalija.				
41	Bl-eżerċizzju ġismi jiffunzjona aħjar b'mod ġenerali.				
42	Għalija ma tantx hawn postijiet fejn nista' nagħmel l-eżerċizzju.				

43	Bl-eżerċizzju nkun nidher aħjar fiżikament.				
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Inventarju tal-motivazzjoni għall-eżerċizzju – 2

Fil-paġni li ġejjin hawn numru ta' raġunijiet li n-nies jagħtu meta jkunu mistoqsijin għaliex jagħmlu l-eżerċizzju. *Kemm jekk int bħalissa qed tagħmel l-eżerċizzju b'mod regolari u kemm jekk le*, jekk jogħġbok aqra kull raġuni sew u indika, billi tagħmel ċirku man-numru t-tajjeb, kull raġuni *hix vera* għalik personalment, *jew jekk kinitx tkun vera* għalik personalment li kieku kont tagħmel l-eżerċizzju. Jekk xi raġuni assolutament ma tarahiex tghodd għalik, aghmel ċirku madwar in-numru 0. Jekk xi raġuni taraha tassew tghodd għalik, aghmel ċirku madwar in-numru 5. Jekk xi raġuni taraha tghodd għalik sa ċertu punt, aghmel ċirku madwar il-1, it-2, it-3 jew l-4, skont kemm tqisha li tirrifletti r-raġuni għaliex tagħmel l-eżerċizzju jew kont tagħmlu kieku kont tista'.

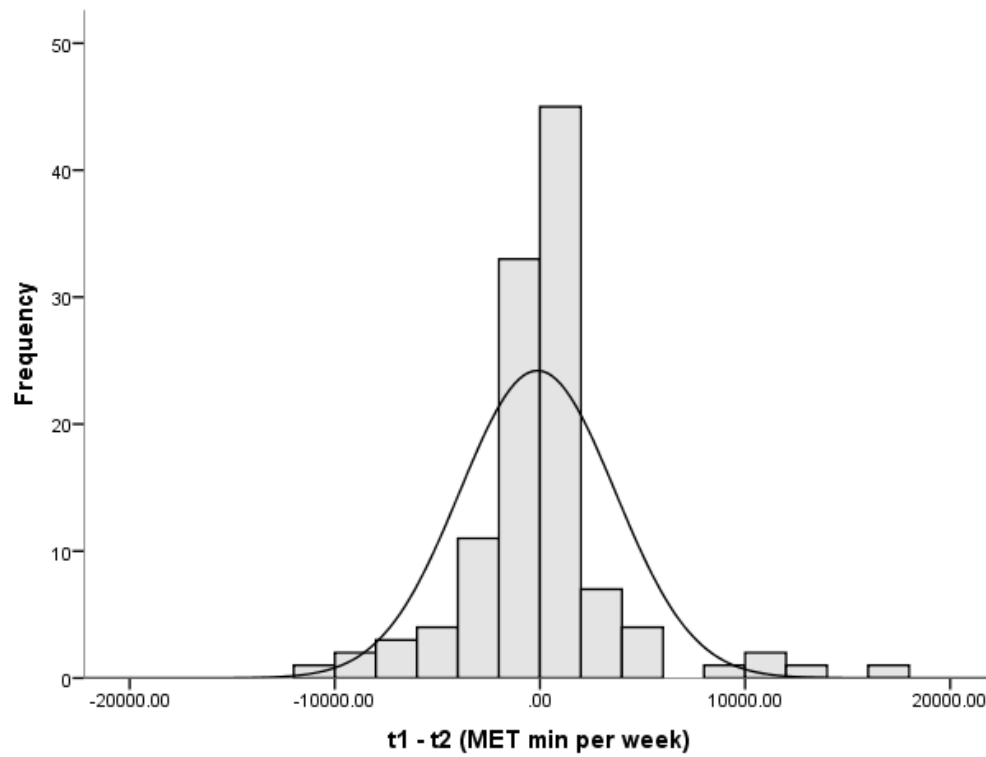
Ftakar li nixtiequ nkunu nafu għaliex *int personalment* tagħzel li tagħmel l-eżerċizzju jew għandek mnejn tagħzel li tagħmel l-eżerċizzju, u mhux jekk taħsibx li r-raġunijiet mogħtija huma tajbin għal *kwalunkwe individwu* biex jagħmel l-eżerċizzju. Ikun ta' għajjnuna għalina jekk ikollna f'tit informazzjoni bażika dwar min mela dan il-kwestjonarju. Napprezzaw jekk tagħtina din l-informazzjoni:

		Assolutament ma tghoddx għalija					Tghodd hafna għalija
	Jien nagħmel l-eżerċizzju (jew kont nagħmlu, kieku kont nista') ...	0	1	2	3	4	5
1	Biex nibqa' rqi						
2	Biex nevita l-mard						
3	Għax jgħinni nhossni tajjeb						
4	Biex nidher iżgħar						
5	Biex nuri lill-ohrajn x'kapaċi nagħmel						
6	Għax jagħtini l-ispazju biex nahseb						
7	Biex inkun b'saħħti fiżikament						
8	Biex nibni saħħti						
9	Għax niehu gost inhossni li qed neżerċita lili nnifsi						
10	Biex inqatta' l-hin mal-hbieb						
11	Għax it-tabib tani l-parir li nagħmel l-eżerċizzju						
12	Għax niehu gost nipprova nirbaħ f'attivitajiet fiżiċi						
13	Biex nibqa'/insir hafif.						
14	Biex ikolli miri x'nilhaq						
15	Biex nonqos fil-piż						

16	Biex nevita problemi ta' sahha						
17	Għax l-eżerċizzju nħossu jagħtini l-enerġija						
18	Biex għismi jkun tajjeb						
19	Biex inqabbel l-abbiltajiet tiegħi ma' tal-oħrajn						
20	Għax jgħinni nnaqqas it-tensjoni						
21	Biex niehu hsieb saħhti						
22	Biex inżid fija s-sens ta' reżistenza						
23	Għax l-eżerċizzju fih innifsu nsibu ta' sodisfazzjon						
24	Biex ingawdi l-aspetti soċjali tal-eżerċizzju						
25	Biex nippreveni marda li tigrifil-familja tiegħi						
26	Għax niehu gost nikkompeti						
27	Biex inżomm ruhi flessibbli						
28	Għax jagħtini sfidi personali x'niffaċċja						
29	Biex jgħinni nikkontrolla l-piż						
30	Biex nevita l-mard tal-qalb						
31	Biex nerga' niehu saħhti lura						
32	Biex nidher aħjar						
33	Biex dak li rnexxieli nwettaq jiġi rikonoxxut						
34	Biex jgħinni nimmanigġja l-istress						
35	Biex inhossni iktar b'saħhti						
36	Biex inkun niflah iktar						
37	Għax l-esperjenza nnifisha li nagħmel l-eżerċizzju tagħtini gost						
38	Biex niehu gost inkun attiv ma' persuni oħra						
39	Biex jgħinni nirkupra minn xi mard jew korrimment						
40	Għax niehu gost bil-kompetizzjoni fiżika						
41	Biex nibqa'/insir flessibbli						
42	Biex niżviluppa l-ħiliet personali						
43	Għax l-eżerċizzju jgħinni naħraq il-kaloriji						

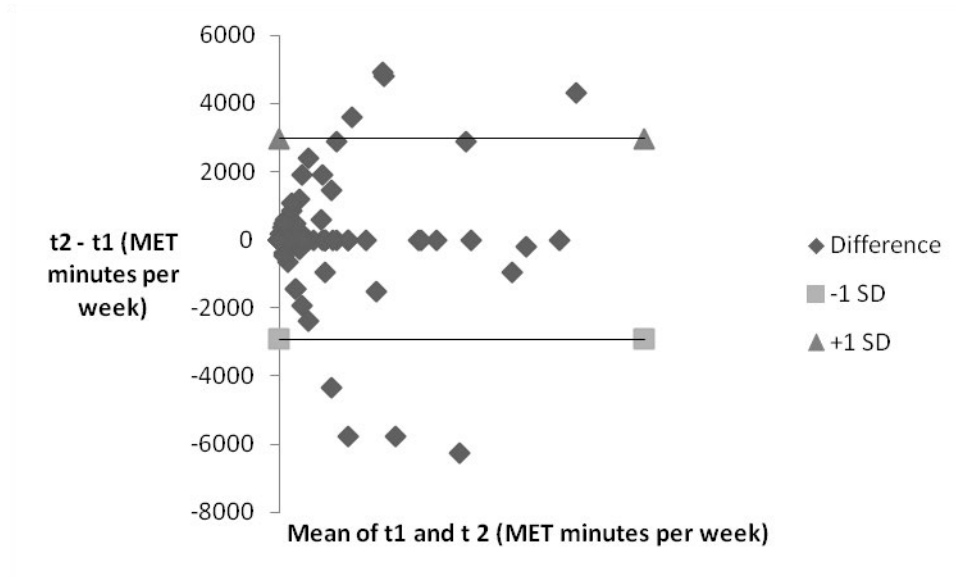
44	Biex nidher iktar attraenti						
45	Biex jirnexxili naghmel affarijiet li l-ohrajn mhumie x kapaçi jagħmlu						
46	Biex inneħhi t-tensjoni						
47	Biex niżviluppa l-muskoli tiegħi						
48	Għax inhossni fl-aqwa tiegħi meta naghmel l-eżercizzju						
49	Biex naghmel ħbieb godda						
50	Għax l-attivitajiet fiżiçi jogħġbuni, speċjalment meta jkunu kompetittivi						
51	Biex inqis lili nnifsi skont l-istandards personali tiegħi						

Appendix 20. Supplementary file 1 Histogram of test1 – test2 with distribution line

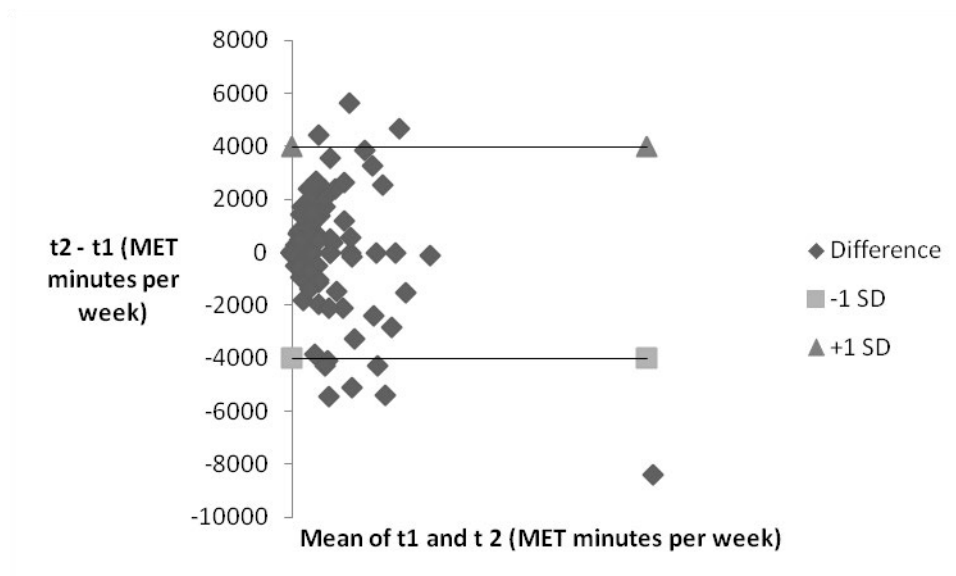


Histogram of test1 – test2 with distribution line

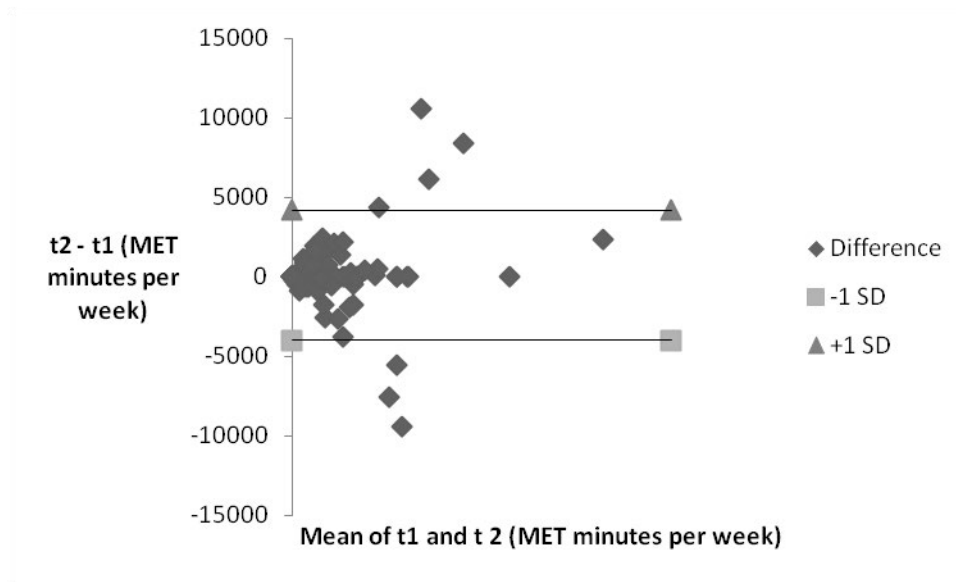
Appendix 21. Supplementary file Bland Altman plots IPAQ-long MT



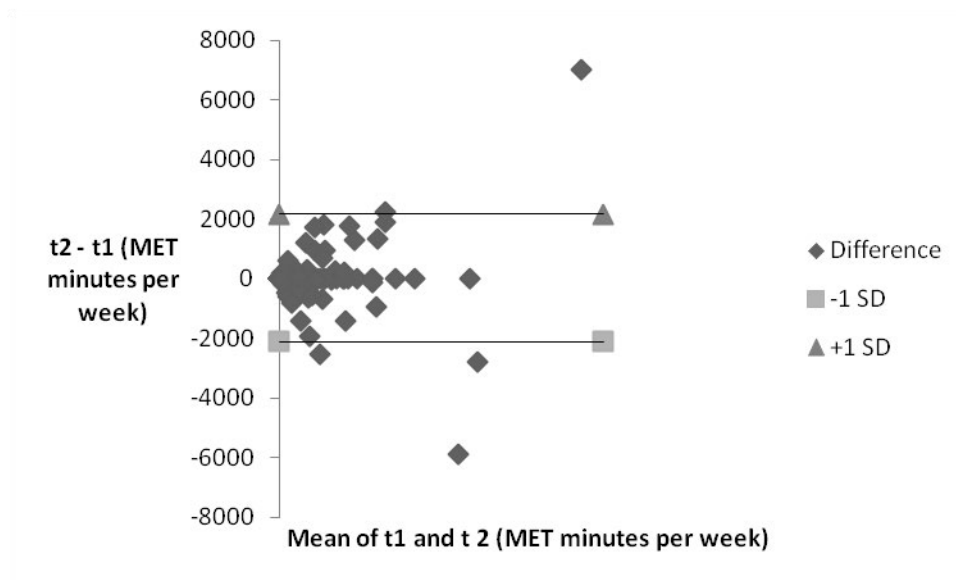
Bland-Altman plot for total vigorous physical activity



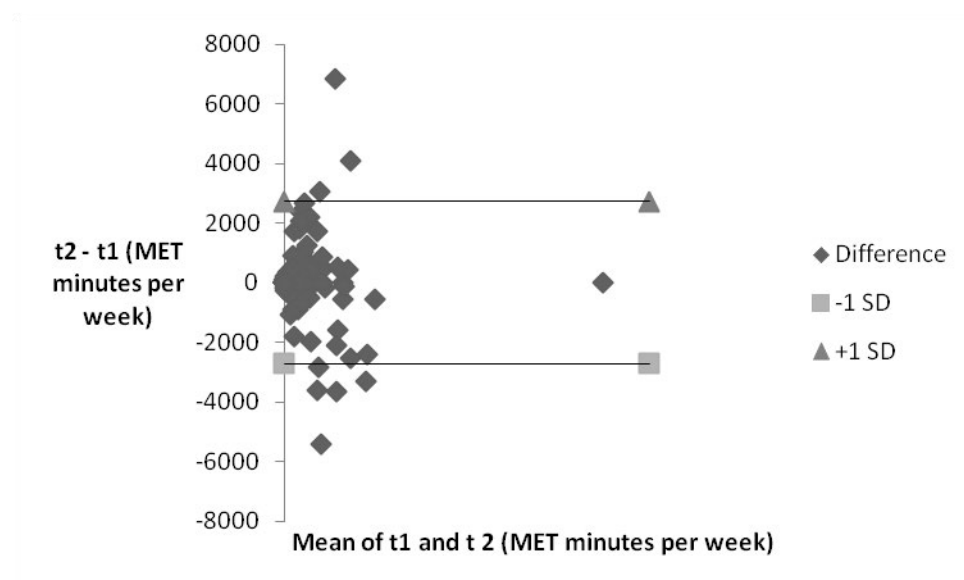
Bland-Altman plot for total moderate physical activity



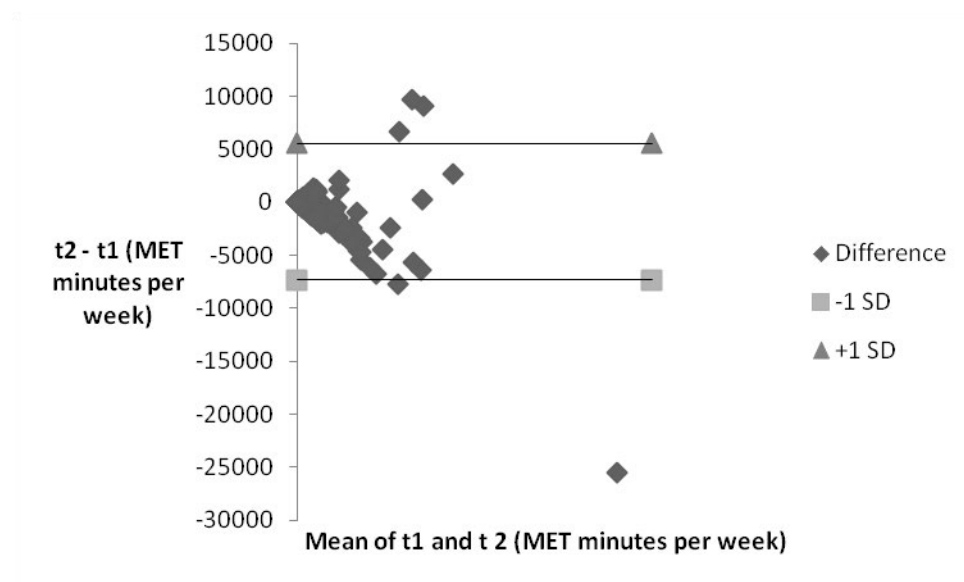
Bland-Altman plot for total walk physical activity



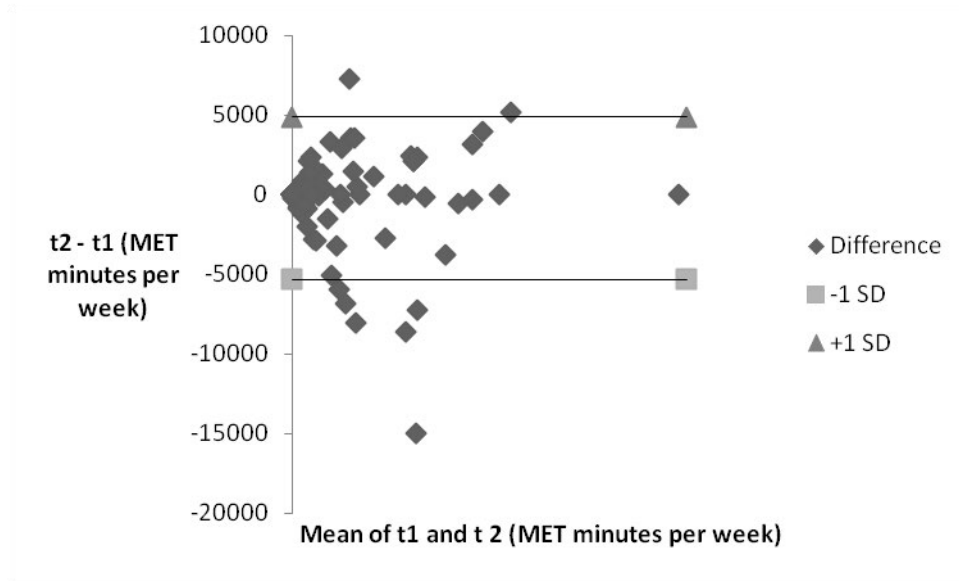
Bland-Altman plot total leisure physical activity



Bland-Altman plot for total domestic physical activity

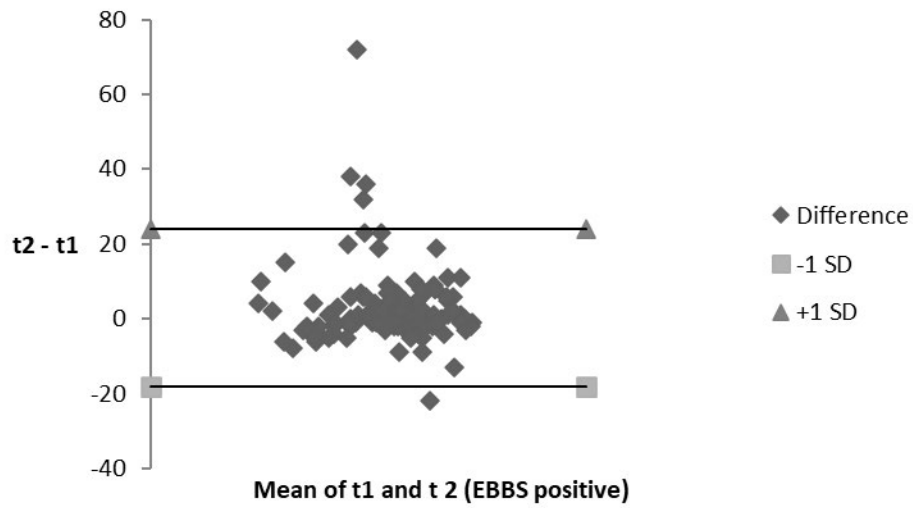


Bland-Altman plot for total transport physical activity

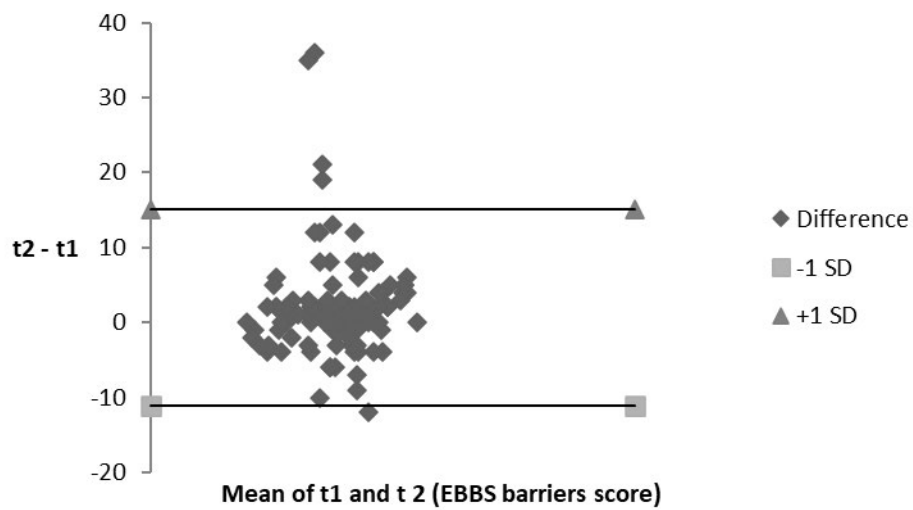


Bland-Altman plot for work physical activity

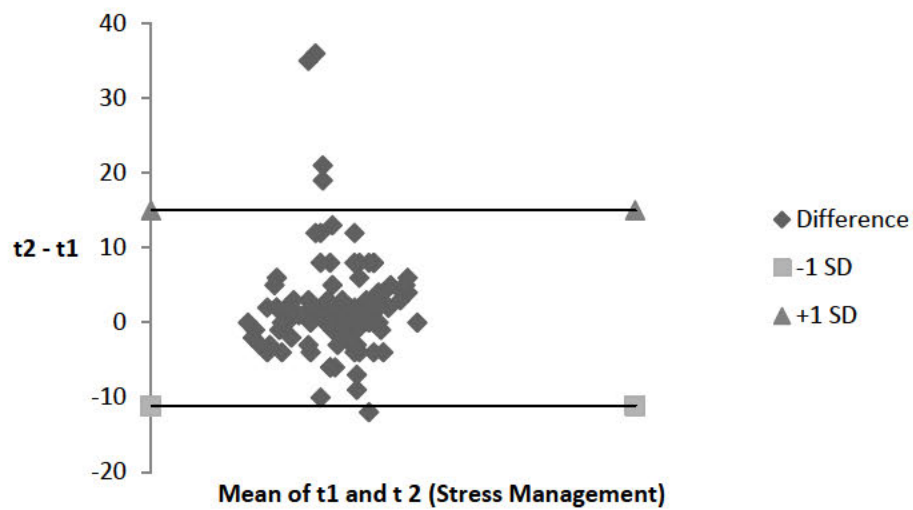
Appendix 22. Supplementary file Bland Altman plots EBBS and EMI-2



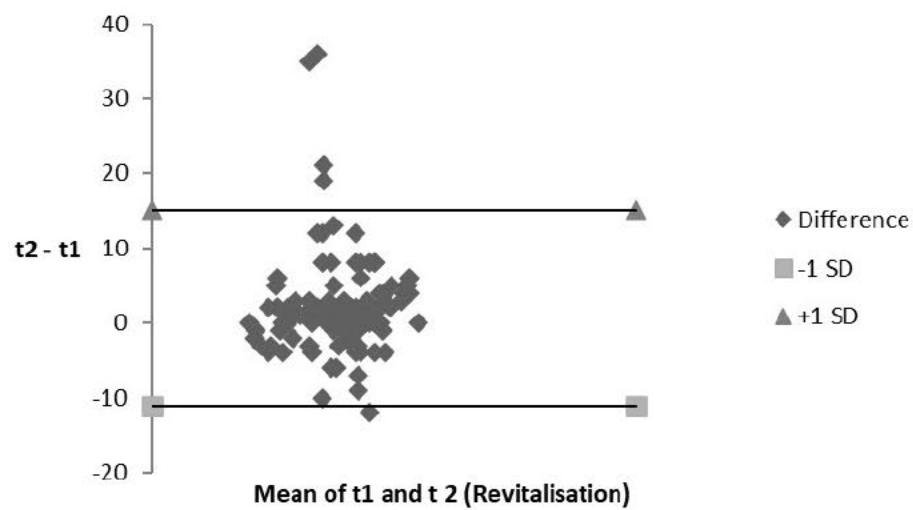
Bland-Altman plot for EBBS Positive score



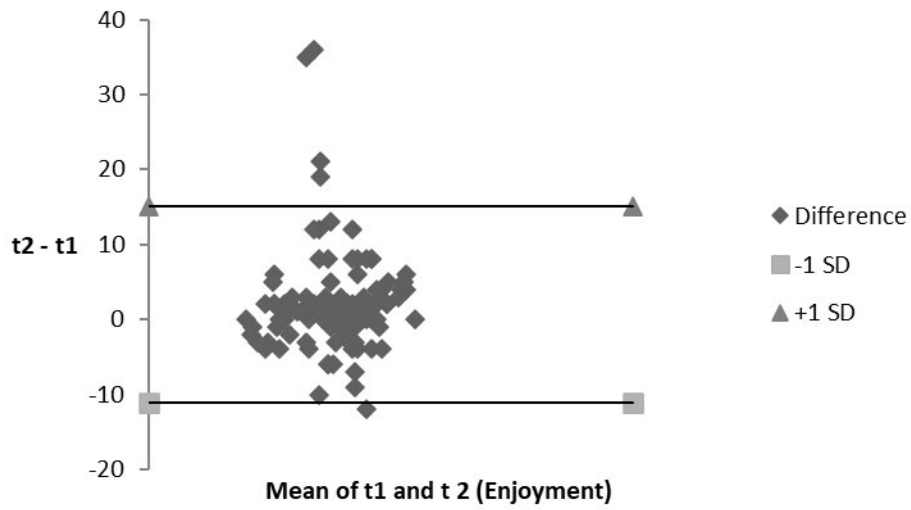
Bland-Altman plot for EBBS Barriers score



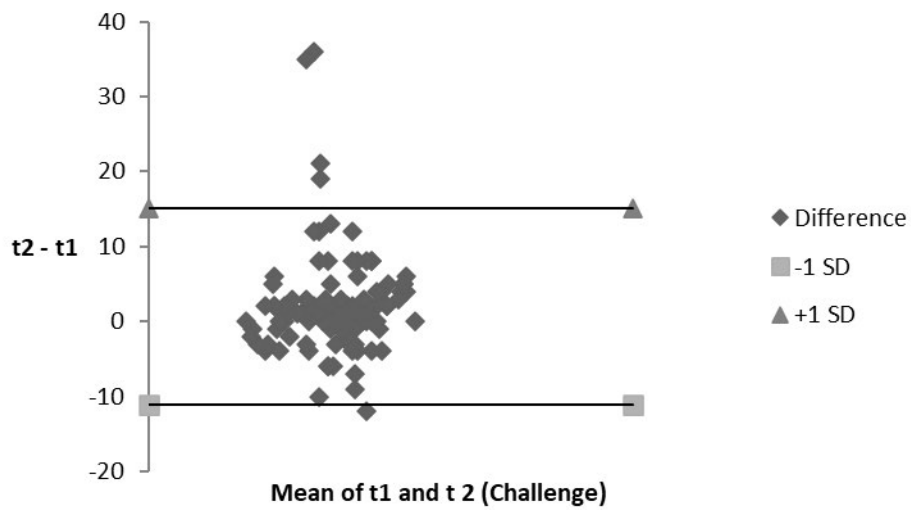
Bland-Altman plot for Exercise Motivation inventory-2 Stress Management



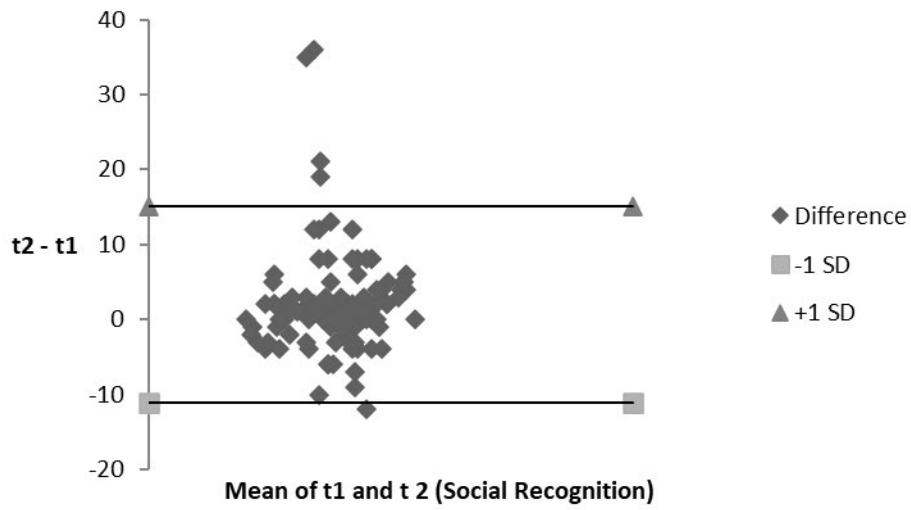
Bland-Altman plot for Exercise Motivation inventory-2 Revitalisation



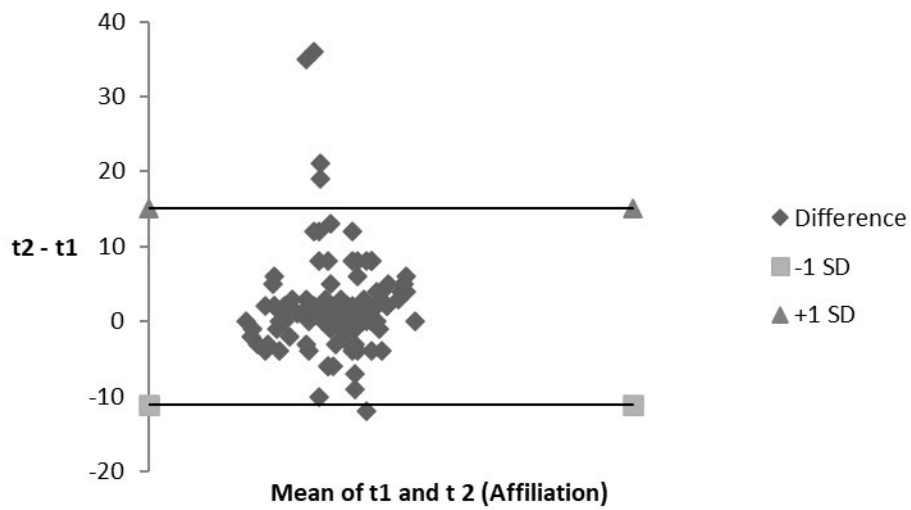
Bland-Altman plot for Exercise Motivation inventory-2 Enjoyment



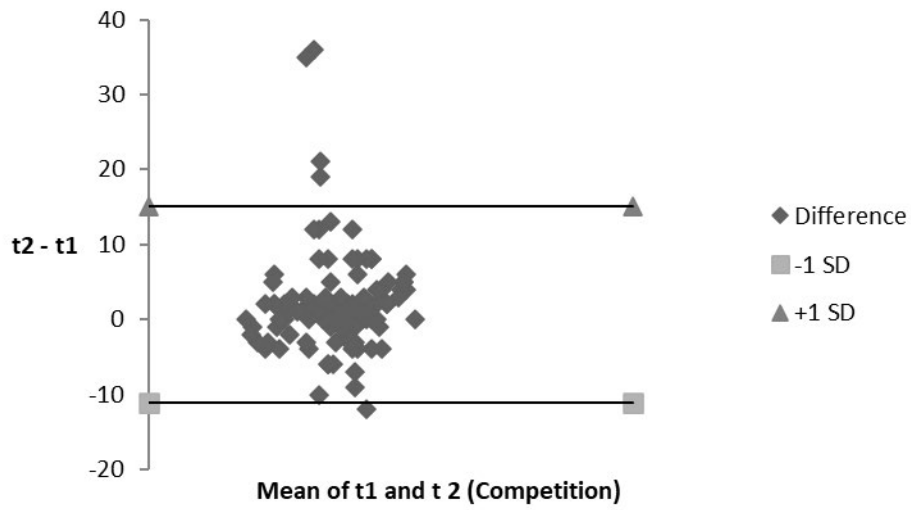
Bland-Altman plot for Exercise Motivation inventory-2 Challenge



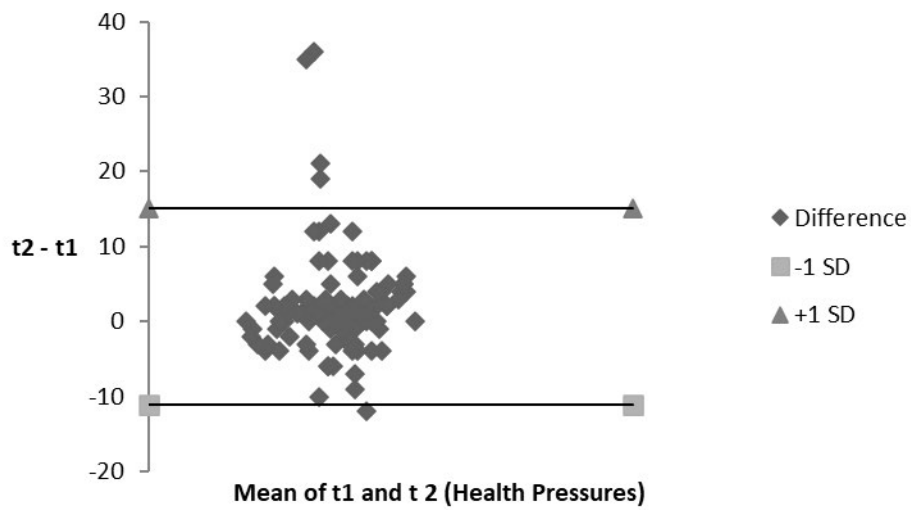
Bland-Altman plot for Exercise Motivation inventory-2 Social Recognition



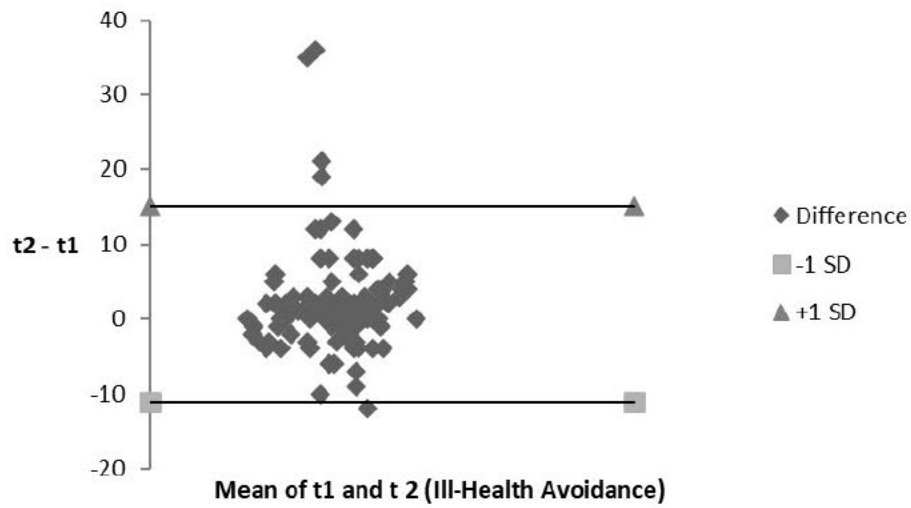
Bland-Altman plot for Exercise Motivation inventory-2 Affiliation



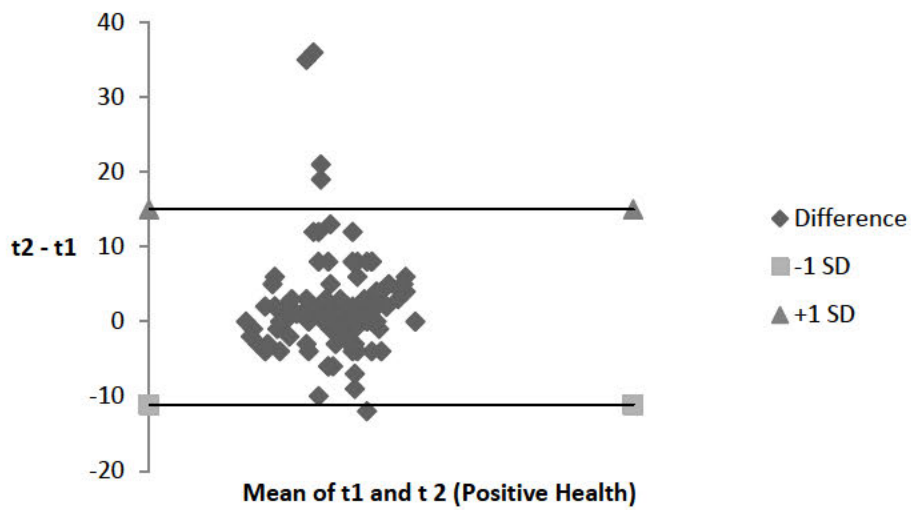
Bland-Altman plot for Exercise Motivation inventory-2 Competition



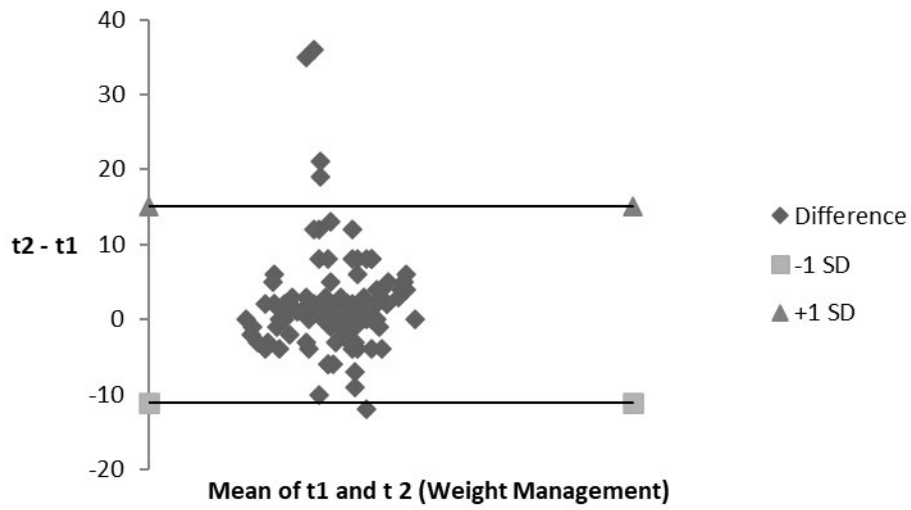
Bland-Altman plot for Exercise Motivation inventory-2 Health Pressures



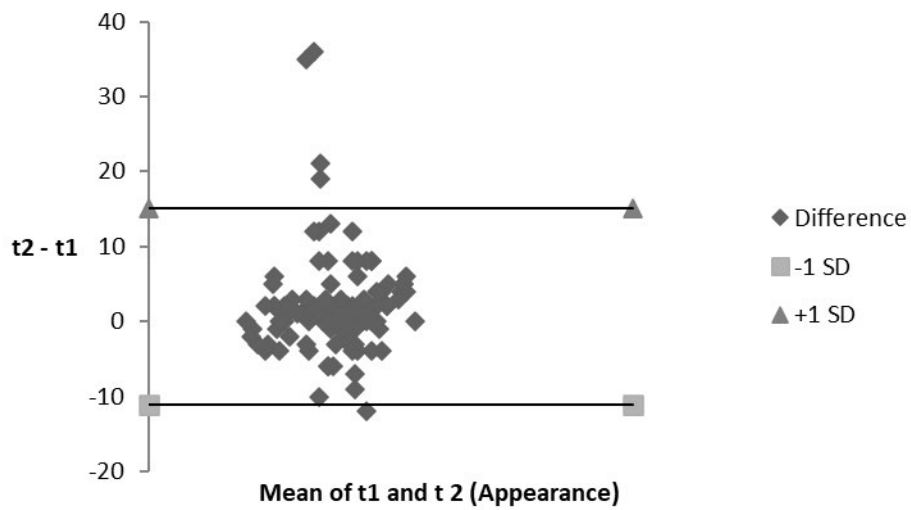
Bland-Altman plot for Exercise Motivation inventory-2 Ill-Health Avoidance



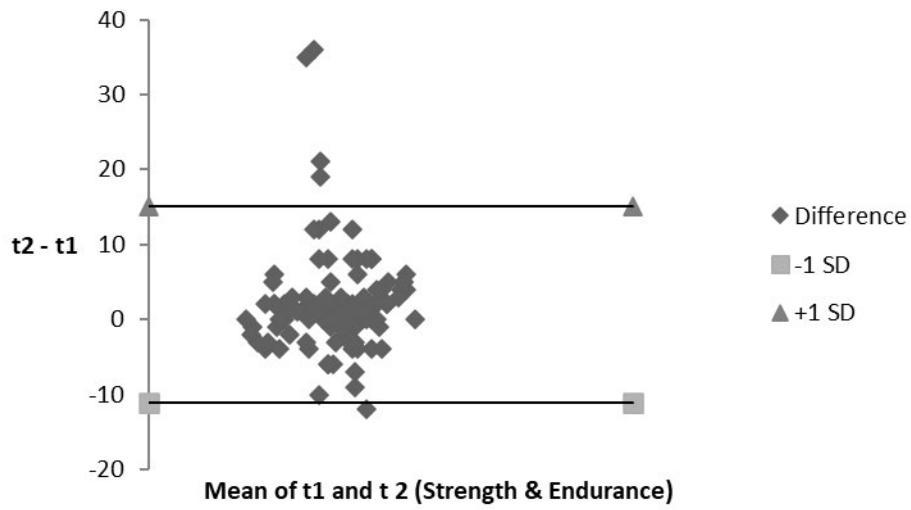
Bland-Altman plot for Exercise Motivation inventory-2 Positive Health



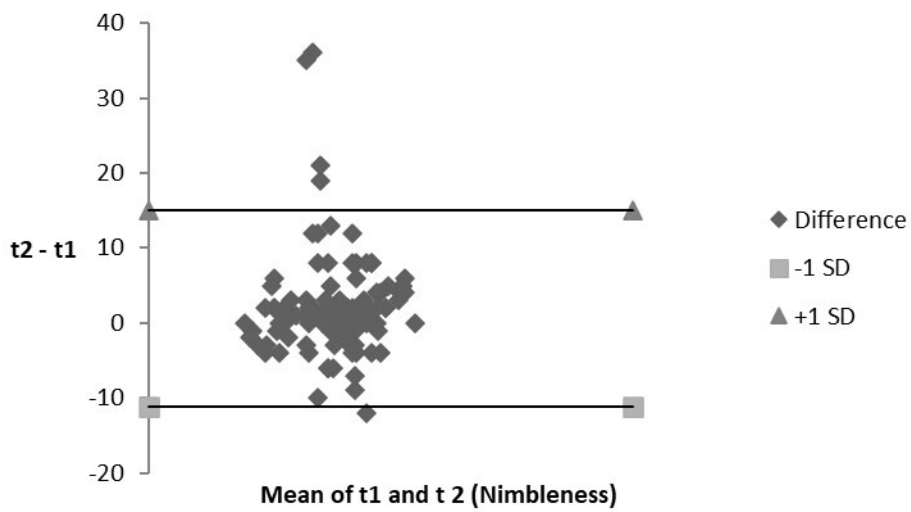
Bland-Altman plot for Exercise Motivation inventory-2 Weight Management



Bland-Altman plot for Exercise Motivation inventory-2 Appearance



Bland-Altman plot for Exercise Motivation inventory-2 Strength & Endurance



Bland-Altman plot for Exercise Motivation inventory-2 Nimbleness

Appendix 23. PROSPERO protocol

Prospero protocol

PROSPERO
International prospective register of systematic reviews


National Institute for
Health Research

UNIVERSITY of York
Centre for Reviews and Dissemination

Systematic review

Fields that have an **asterisk (*)** next to them means that they **must be answered**. **Word limits** are provided for each section. You will be unable to submit the form if the word limits are exceeded for any section. Registrant means the person filling out the form.

This record cannot be edited because it has been marked as out of scope.

1. * Review title.

Give the title of the review in English.

Barriers and motivators of physical activity participation in middle age and older adults

2. Original language title.

For reviews in languages other than English, give the title in the original language. This will be displayed with the English language title.

3. * Anticipated or actual start date.

Give the date the systematic review started or is expected to start.

28/07/2017

4. * Anticipated completion date.

Give the date by which the review is expected to be completed.

03/08/2018

5. * Stage of review at time of this submission.

This field uses answers to initial screening questions. It cannot be edited until after registration.

Tick the boxes to show which review tasks have been started and which have been completed.

Update this field each time any amendments are made to a published record.

The review has not yet started: No

Review stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Provide any other relevant information about the stage of the review here.

finalising protocol

finalising protocol

6. * Named contact.

The named contact is the guarantor for the accuracy of the information in the register record. This may be any member of the review team.

Karl Spiteri

Email salutation (e.g. "Dr Smith" or "Joanne") for correspondence:

Karl

7. * Named contact email.

Give the electronic email address of the named contact.

Karl.Spiteri@student.shu.ac.uk

8. Named contact address

Give the full institutional/organisational postal address for the named contact.

9. Named contact phone number.

Give the telephone number for the named contact, including international dialling code.

10. * Organisational affiliation of the review.

Full title of the organisational affiliations for this review and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

None

Organisation web address:

11. * Review team members and their organisational affiliations.

Give the personal details and the organisational affiliations of each member of the review team. Affiliation refers to groups or organisations to which review team members belong. **NOTE: email and country now MUST be entered for each person, unless you are amending a published record.**

Mr Karl Spiteri. Sheffield Hallam University
Dr David Broom. Sheffield Hallam University
Dr Kate Grafton. Sheffield Hallam University
Dr John Xerri de Caro. University of Malta
Miss Amira Hassan Bekhet. Faculty of Physical Therapy, Cairo University, Cairo, Egypt.

12. * Funding sources/sponsors.

Details of the individuals, organizations, groups, companies or other legal entities who have funded or sponsored the review.

None

Grant number(s)

State the funder, grant or award number and the date of award

13. * Conflicts of interest.

List actual or perceived conflicts of interest (financial or academic).

None

14. Collaborators.

Give the name and affiliation of any individuals or organisations who are working on the review but who are not listed as review team members. **NOTE: email and country must be completed for each person, unless you are amending a published record.**

15. * Review question.

State the review question(s) clearly and precisely. It may be appropriate to break very broad questions down into a series of related more specific questions. Questions may be framed or refined using P(I)E/COS or similar where relevant.

What are the barriers, encountered by middle aged and older adults, to being physically active?

What motivates middle aged and older adults to be physical active?

16. * Searches.

State the sources that will be searched (e.g. Medline). Give the search dates, and any restrictions (e.g. language or publication date). Do NOT enter the full search strategy (it may be provided as a link or attachment below.)

The selected databases will be searched for relevant published articles dated between 1990 to date. The year 1990 was selected as a starting date to keep the literature relevant to barriers and motivators older adults might currently encounter. The following terms will be used for the search: 'older adults', 'adults', 'barrier', 'motivator', 'motiva*', 'physical activity', 'exercise', 'sport', 'motor activity'. The following terms were identified from previous systematic reviews on similar topics. Data bases: PubMed/MEDLINE, EMBASE, PsycINFO, CINAHL Complete, SPORTDiscus, Cochrane Library, reference checking within identified articles.

17. URL to search strategy.

Upload a file with your search strategy, or an example of a search strategy for a specific database, (including the keywords) in pdf or word format. In doing so you are consenting to the file being made publicly accessible. Or provide a URL or link to the strategy. Do NOT provide links to your search **results**.

Alternatively, upload your search strategy to CRD in pdf format. Please note that by doing so you are consenting to the file being made publicly accessible.

Yes I give permission for this file to be made publicly available

18. * Condition or domain being studied.

Give a short description of the disease, condition or healthcare domain being studied in your systematic review.

This systematic review will look into barriers and motivators of physical activity in community-dwelling

population between the age of 50 to 70.

19. * Participants/population.

Specify the participants or populations being studied in the review. The preferred format includes details of both inclusion and exclusion criteria.

Inclusion: community-dwelling people between the age of 50 and 70.

Exclusion: Children, Adults under the age of 50 and older adults above the age of 70.

Participants undergoing intervention.

20. * Intervention(s), exposure(s).

Give full and clear descriptions or definitions of the interventions or the exposures to be reviewed. The preferred format includes details of both inclusion and exclusion criteria.

Physical activity, barriers and motivators.

21. * Comparator(s)/control.

Where relevant, give details of the alternatives against which the intervention/exposure will be compared (e.g. another intervention or a non-exposed control group). The preferred format includes details of both inclusion and exclusion criteria.

No control group is required.

22. * Types of study to be included.

Give details of the study designs (e.g. RCT) that are eligible for inclusion in the review. The preferred format includes both inclusion and exclusion criteria. If there are no restrictions on the types of study, this should be stated.

Qualitative and observational studies (Cohort studies, Case-controlled studies, cross-sectional). The primary

aim of the study needs to include identifying barriers or motivators towards physical activity participation.

23. Context.

Give summary details of the setting or other relevant characteristics, which help define the inclusion or exclusion criteria.

24. * Main outcome(s).

Give the pre-specified main (most important) outcomes of the review, including details of how the outcome is defined and measured and when these measurement are made, if these are part of the review inclusion criteria.

Identify barriers towards physical activity participation in 50 to 70 year olds.

Identify motivators towards physical activity participation in 50 to 70 year olds.

Measures of effect

Please specify the effect measure(s) for you main outcome(s) e.g. relative risks, odds ratios, risk difference, and/or 'number needed to treat.

25. * Additional outcome(s).

List the pre-specified additional outcomes of the review, with a similar level of detail to that required for main outcomes. Where there are no additional outcomes please state 'None' or 'Not applicable' as appropriate to the review

None.

Measures of effect

Please specify the effect measure(s) for you additional outcome(s) e.g. relative risks, odds ratios, risk difference, and/or 'number needed to treat.

thematic analysis

26. * Data extraction (selection and coding).

Describe how studies will be selected for inclusion. State what data will be extracted or obtained. State how this will be done and recorded.

27. * Risk of bias (quality) assessment.

State which characteristics of the studies will be assessed and/or any formal risk of bias/quality assessment tools that will be used.

The risk of bias for the identified studies will be done through MMAT. The risk of bias will be carried out by two different authors. If there are any disparities between the two initial reviews, reviewer number 3 will review.

28. * Strategy for data synthesis.

Describe the methods you plan to use to synthesise data. This **must not be generic text** but should be **specific to your review** and describe how the proposed approach will be applied to your data. If meta-analysis is planned, describe the models to be used, methods to explore statistical heterogeneity, and software package to be used.

Aggregative data synthesis as suggested by Dixon-Woods et al (2006) will be used for data synthesis. The Categorisation will be based on established criteria for analysing health behaviour. The Theory Domain framework will be used for categorisation.

29. * Analysis of subgroups or subsets.

State any planned investigation of 'subgroups'. Be clear and specific about which type of study or participant will be included in each group or covariate investigated. State the planned analytic approach.

Subgroup analysis for middle aged 50 to 64 and old adults 65 to 70.

30. * Type and method of review.

Select the type of review, review method and health area from the lists below.

Type of review

Cost effectiveness

No

Diagnostic

No

Epidemiologic

PROSPERO
International prospective register of systematic reviews

No

Individual patient data (IPD) meta-analysis

No

Intervention

No

Living systematic review

No

Meta-analysis

No

Methodology

No

Narrative synthesis

No

Network meta-analysis

No

Pre-clinical

No

Prevention

No

Prognostic

No

Prospective meta-analysis (PMA)

No

Review of reviews

No

Service delivery

No

Synthesis of qualitative studies

No

Systematic review

Yes

Other

No

Health area of the review

Alcohol/substance misuse/abuse

PROSPERO
International prospective register of systematic reviews

No

Blood and immune system

No

Cancer

No

Cardiovascular

No

Care of the elderly

No

Child health

No

Complementary therapies

No

COVID-19

No

Crime and justice

No

Dental

No

Digestive system

No

Ear, nose and throat

No

Education

No

Endocrine and metabolic disorders

No

Eye disorders

No

General interest

No

Genetics

No

Health inequalities/health equity

No

Infections and infestations

No

International development

No

Mental health and behavioural conditions

No

Musculoskeletal

No

Neurological

No

Nursing

No

Obstetrics and gynaecology

No

Oral health

No

Palliative care

No

Perioperative care

No

Physiotherapy

No

Pregnancy and childbirth

No

Public health (including social determinants of health)

Yes

Rehabilitation

No

Respiratory disorders

No

Service delivery

No

Skin disorders

No

Social care

No

Surgery

No

Tropical Medicine

No

Urological

No

Wounds, injuries and accidents

No

Violence and abuse

No

31. Language.

Select each language individually to add it to the list below, use the bin icon to remove any added in error.

English

There is an English language summary.

32. * Country.

Select the country in which the review is being carried out. For multi-national collaborations select all the countries involved.

Malta

33. Other registration details.

Name any other organisation where the systematic review title or protocol is registered (e.g. Campbell, or The Joanna Briggs Institute) together with any unique identification number assigned by them. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here. If none, leave blank.

34. Reference and/or URL for published protocol.

If the protocol for this review is published provide details (authors, title and journal details, preferably in Vancouver format)

Add web link to the published protocol.

Or, upload your published protocol here in pdf format. Note that the upload will be publicly accessible.

Yes I give permission for this file to be made publicly available

Please note that the information required in the PROSPERO registration form must be completed in full even if access to a protocol is given.

35. Dissemination plans.

Do you intend to publish the review on completion?

Yes

Give brief details of plans for communicating review findings.?

36. Keywords.

Give words or phrases that best describe the review. Separate keywords with a semicolon or new line. Keywords help PROSPERO users find your review (keywords do not appear in the public record but are included in searches). Be as specific and precise as possible. Avoid acronyms and abbreviations unless these are in wide use.

Physical Activity

Older adults

Middle aged

Barriers

Motivators

37. Details of any existing review of the same topic by the same authors.

If you are registering an update of an existing review give details of the earlier versions and include a full bibliographic reference, if available.

38. * Current review status.

Update review status when the review is completed and when it is published. New registrations must be ongoing so this field is not editable for initial submission.

Please provide anticipated publication date

Review_Ongoing

39. Any additional information.

Provide any other information relevant to the registration of this review.

40. Details of final report/publication(s) or preprints if available.

Leave empty until publication details are available OR you have a link to a preprint (NOTE: this field is not editable for initial submission). List authors, title and journal details preferably in Vancouver format.

Barriers and Motivators of Physical Activity Participation in Middle-Aged and Older Adults—A Systematic Review

Give the link to the published review or preprint.

<https://journals.humankinetics.com/view/journals/japa/27/6/article-p929.xml>

Appendix 24. Supplementary material 1 MMAT score

Supplementary material 1 *MMAT* scores

Reference	MMAT question number							
	Qual	Qual	Qual	Qual	Quan	Quan	Quan	Quan
	1.1	1.2	1.3	1.4	1.1	4.2	4.3	4.4
Alizadeh & Salehi, (2015)	x		x					
Arnautovska, O'Callaghan, & Hamilton, (2017)	x	x	x	x				
Arras, Ogletree, & Welshimer, (2006)					x	x	x	
Ayotte, Margrett, & Hicks-Patrick, (2010)					x	x	x	
Ball, Salmon, Giles-Corti, & Crawford, (2006)	x	x	x					
Belon, Nieuwendyk, Vallianatos, & Nykiforuk, (2016)	x	x	x					
Bopp <i>et al.</i> , (2007)	x	x	x					
Bruner, (2009)	x	x	x					
Buman, Daphna Yasova, & Giacobbi, (2010)	x	x	x					
Caperchione <i>et al.</i> , (2012)	x	x	x					
Casey, Eime, Ball, & Payne, (2011)	x	x	x					
Cassou <i>et al.</i> , (2011)	x	x	x					
Ceria-Ulep, Serafica, & Tse, (2011)	x	x	x					
Chatfield, (2015)	x	x		x				
Chaudhury, Mahmood, Michael, Campo, & Hay, (2012)	x	x						
Chrisman, Nothwehr, Yang, & Oleson, (2015)	x	x						
Cousins, (2003)	x	x	x					
Dacey, Baltzell, & Zaichkowsky, (2008)						x	x	
Das, Sartore-Baldwin, & Mahar, (2016)	x		x					
Evans, (2011)	x	x	x					
Gallagher <i>et al.</i> , (2010)	x	x	x					
George, Kolt, Rosenkranz, & Guagliano, (2014)	x	x	x					
Gobbi <i>et al.</i> , (2012)					x	x	x	
Gonzales & Keller, (2004)	x	x	x					

Reference	Qual 1.1	Qual 1.2	Qual 1.3	Qual 1.4	Quan 1.1	Quan 4.2	Quan 4.3	Quan 4.4
Gray <i>et al.</i> , (2016)	x	x	x					
Guell, Panter, Griffin, & Ogilvie, (2018)	x	x	x					
Guell, Shefer, Griffin, & Ogilvie, (2016)	x	x	x					
Harley, Rice, Walker, Strath, & Quintiliani, (2014)	x	x	x					
Henwood, Tuckett, Edelstein, & Barlet, (2011)	x	x	x					
Jancey, Clarke, Howat, Maycock, & Lee, (2009)	x		x					
Kalavar, Kolt, Giles, & Driver, (2004)					x	x	x	
Kamphuis, van Lenthe, Giskes, Brug, & Mackenbach, (2007)	x	x	x					
Keegan, Middleton, Henderson, & Girling, (2016)	x	x	x	x				
Kegler <i>et al.</i> , (2013)	x	x	x					
Kolt, Driver, & Giles, (2004)					x	x	x	
Kolt, Paterson, & Cheung, (2006)	x	x	x					
Kosteli, Williams, & Cumming, (2016)	x	x	x	x				
Kowal & Fortier, (2007)					x	x	x	
Leavy & Aberg, (2010)	x	x						
Mathews, Lakshmi, Ravindran, Pratt, & Thankappan, (2016)	x	x	x					
McArthur <i>et al.</i> , (2014)	x	x	x					
Melillo <i>et al.</i> , (2001)	x	x	x					
Miller & Brown, (2017)	x	x						
Mitra, Siva, & Kehler, (2015)	x	x	x					
Mohamed <i>et al.</i> , (2014)	x	x	x					
Mosquera <i>et al.</i> , (2012)	x	x	x					
Paluck, Allerdings, & Kealy, (2006)		x	x					
Rathanaswami, Bengoechea, & Bush, (2016)	x	x	x					
Romeike <i>et al.</i> , (2016)	x	x	x					
Royce <i>et al.</i> , (2003)	x	x	x					
Sebastião <i>et al.</i> , (2015)	x	x	x					
Sebastião, Ibe-Lamberts, Bobitt, Schwingel, & Chodzko-Zajko, (2014)	x	x	x					

Reference	Qual 1.1	Qual 1.2	Qual 1.3	Qual 1.4	Quan 1.1	Quan 4.2	Quan 4.3	Quan 4.4
Steltenpohl, Shuster, Peist, Pham, & Mikels, (2018)	x	x	x					
Van Dyck, Mertens, Cardon, De Cocker, & De Bourdeaudhuij, (2017)	x	x						
Wertman <i>et al.</i> , (2016)	x	x	x		x	x		

Note: 'x' denotes articles reached criteria.

MMAT is Mixed Methods Appraisal Tool

Appendix 25. Supplementary material 2 Characteristics of studies containing quantitative data

Supplementary Material 2

Characteristics of studies containing quantitative data

Reference	Country	Sample	Age Range (years)	% Population within studied population	Behaviour theory	Barrier tool	Motivator tool
Arras <i>et al.</i> , (2006)	USA	641	45-90	53.1	Health promotion model	Barriers to health promoting activities for disable people	Not assessed
Ayotte <i>et al.</i> , (2010)	USA	472	50-75	100	Social cognitive theory	Perceived barriers to exercise scale	Not assessed
Dacey <i>et al.</i> , (2008)	USA	703	50-79	53	Self-determination theory and transtheoretical model	Not assessed	Exercise motivation inventory-2
Gobbi <i>et al.</i> , (2012)	Brazil	359	60+	49.3	Socio-ecological	Barrier to PA practice questionnaire	Not assessed
Kolt <i>et al.</i> , (2004)	Australia	840	55-93	~60	No behavioural theory	Not assessed	Participation motivation questionnaire
Kowal & Fortier, (2007)	Canada	509	39-68	60	Ecological approach	Questionnaire based on previous literature	Not assessed

Appendix 26. Supplementary material 3 Qualitative data extracted and characteristics of studies containing qualitative data

Supplementary Material 3

Qualitative data extracted and characteristics of studies containing qualitative data

Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years	Motivators 50-64 years	Barriers 65-70 years	Motivators 65-70 years
Alizadeh & Salehi, (2015)	Iran	No behaviour theory	60-97	60	Lack of motivation, physical health limitation, and customs.	No motivators reported in this age group.	Environmental safety, weather too hot.	No motivators reported in this age group.
Arnautovska <i>et al.</i> , (2017)	Australia	Integrate Behaviour Change Model	67-87	20	No barriers reported in this age group.	No motivators reported in this age group.	Negative states (pain, fear and safety), past experience, perceptions about old age, time constraints, safety of footpaths, weather.	For well-being, obtain a health benefit, for fun, for pride, doctor, media, aesthetics of place.
Ball <i>et al.</i> , (2006)	Australia	Ecological	18-65	56	Lack of time management, conditions at work, lack of motivation.	No motivators reported in this age group.	No barriers reported in this age group.	No motivators reported in this age group.
Belon <i>et al.</i> , (2016)	Canada	ANGELO framework	25-64	35	Dirtiness, acts of vandalism, ugliness, safety, car dependence.	Social relationships, community organisation, walking the dog.	No barriers reported in this age group.	No motivators reported in this age group.
Bopp <i>et al.</i> , (2007)	USA	No behaviour theory		44	Lack of time due to work, family and church. Lack of willpower or desire. Lack of knowledge on how to exercise, fatigue due to work schedule, health condition. Exercise	Need to take care of body, health benefits of exercise, improve mental health, sense of vitality, being determined and have willpower.	No barriers reported in this age group.	No motivators reported in this age group.

groups not constant,
recreation places too
crowded,
neighbourhood
safety concerns, no
age appropriate
programs.

Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years	Motivators 50-64 years	Barriers 65-70 years	Motivators 65-70 years
Bruner & Chad, (2013)	Canada	No behaviour theory	15-55+	19	Cold weather, personal safety (primarily from animals), laziness.	No motivators reported in this age group.	No barriers reported in this age group.	No motivators reported in this age group.
Buman <i>et al.</i> , (2010)	USA	No behaviour theory	50-75	26	History of traumatic experience, fear of injury, cost, time management.	Health concerns, prevention of disease, literature, witness other people getting sick, enjoyment.	No barriers reported in this age group.	No motivators reported in this age group.
Caperchione <i>et al.</i> , (2012)	Australia	No behaviour theory	43.8 (±10.84)	30	Time, work, child care, family needs, laziness, lack of motivation.	Better health, weight management, disease prevention, set example to children, fear becoming ill.	No barriers reported in this age group.	No motivators reported in this age group.
Casey <i>et al.</i> , (2011)	Australia	Socio-ecological model	25-64	25	Injuries and disabilities, pain, previous experience when younger, bad experience with health system, culture in social area, program with lack of	No motivators reported in this age group.	No barriers reported in this age group.	No motivators reported in this age group.

exclusivity for
specific age groups,
affordability of
facilities, quality of
facilities.

Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers years	50-64	Motivators years	50-64	Barriers 65-70 years	Motivators 65-70 years
Cassou <i>et al.</i> , (2011)	Brazil	No behaviour theory	69.9 (±6.9)	25	No barriers reported in this age group.		No motivators reported in this age group.		High socio-economic class: lack of social support and everyday obstacles, or barriers faced during their daily life, weather, social isolation and health conditions Low socio-economic class women: cost, everyday obstacles, and household chores, lack of time, lack of safety.	No motivators reported in this age group.
Ceria-Ulep <i>et al.</i> , (2011)	Hawaii	No behaviour theory	65-87	47	No barriers reported in this age group.		No motivators reported in this age group.		Competing role responsibilities (family obligations, job constraints, community responsibilities), church religious, family obligations. Feeling tired and weak, lack of motivation and laziness, ageing.	No motivators reported in this age group.
Chatfield, (2015)	USA	No behaviour theory	53-70	16	Injuries, temporal illness, lack of time, weather extremes.		Mental health, manage daily stress, improve quality of		No barriers reported in this age group.	Change in motivation over time, competition motivation,

							life, Women: manage weight.		comparison with others.			
									Uneven sidewalks or tripping hazard, busy street with high traffic volume, traffic congestion, feeling unsafe, crime, accessibility.		No motivators reported in this age group.	
Chaudhury <i>et al.</i> , (2012)	Canada	No behaviour theory	65-92	34	No barriers reported in this age group.		No motivators reported in this age group.					
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years		Motivators 50-64 years		Barriers 65-70 years		Motivators 65-70 years	
					Narrow sidewalks, lack of resources and facilities, busy streets, difficulty cycling, having to pay to use facilities, children, and crime.						No motivators reported in this age group.	
Chrisman <i>et al.</i> , (2015)	USA	Social- cognitive Theory	27-75	19			Children.		No barriers reported in this age group.		No motivators reported in this age group.	
											Social encouragement from family, friends, physicians, past mastery, habitual activity.	
Cousins, (2003)	USA	Social- cognitive Theory	55-92	41	No barriers reported in this age group.		No motivators reported in this age group.		Negative beliefs.			
					Perception of physical activity, work demands, believing they were physical active enough at work, family obligation, pain from PA ailments.						No motivators reported in this age group.	
Das <i>et al.</i> , (2016)	USA	Health Belief Model	51.3 (±11.6)	12			No motivators reported in this age group.		No barriers reported in this age group.		No motivators reported in this age group.	

Evans, (2011)	USA	Kleinman's EMS	40-60	20	Physical condition, too tired, laziness and lack of motivation, no partner, other obligations (work, family, social), lack of time, rain or excessive heat.	No motivators reported in this age group.	No barriers reported in this age group.	No motivators reported in this age group.
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years	Motivators 50-64 years	Barriers 65-70 years	Motivators 65-70 years
Gallagher <i>et al.</i> , (2010)	USA	No behaviour theory	61-85	21	No barriers reported in this age group.	No motivators reported in this age group.	Rundown neighborhood, presence of people, safety of area, traffic and sidewalks, bad weather, fear of falling.	Presence of people.
George <i>et al.</i> , (2014)	Australia	No behaviour theory	34-64	15	Time and work commitments, family schedule, lack of available facilities, ageing and decline in physical condition, lack of motivation and laziness, not having something to strive.	Maintaining and improve health, increase longevity, participate with physical activity with their children, be good role model to children, stress reliever, change of scenery, guilt of not being physical activity, belong to a social group, appearance and fitness, succeed in their sport of activity.	No barriers reported in this age group.	No motivators reported in this age group.

Gonzales & Keller, (2004)	USA	Ecological	48-65	10	Family comes first, friends, laziness, fatigue, pain.	Family friends.	No barriers reported in this age group.	No motivators reported in this age group.
								Health benefits, maintain physical functioning, psychological well-being, enjoyment, satisfaction, opportunity to socialise, friendly competition. High socio-economic class: rehabilitation from health conditions, physical activity presented on the media.
Gray <i>et al.</i> , (2016)	Northern Ireland	Self-determination Theory and Self-efficacy Theory	50+	28	Lack of recreational facilities, admission funds, lack of transport.	Low socio-economic class: health conditions, safety at night, knowledge on PA guidelines, weather.	High socio-economic class: time constraints, family commitments.	
								Lifelong activities, social support, family, friends, neighbours, social norms.
Guell <i>et al.</i> , (2016)	UK	No behaviour theory	65-80	32	No barriers reported in this age group	No motivators reported in this age group	Physical limitation, ill health, lack of companions or friends.	
								Life history of participating if physical activity, health benefits, being part of a team, "busy ethic".
Guell <i>et al.</i> , (2018)	UK	No behaviour theory	65-80	40	No barriers reported in this age group.	No motivators reported in this age group.	Health problems, no motivation, retirement as a busy period in life.	

Harley <i>et al.</i> , (2014)	USA	Success Model Approach and Positive Deviance	26-65	14	Financial, physical strain, history of sedentary relapse.	Getting or staying healthy, disease, weight loss, mental health, social connections and gratification.	No barriers reported in this age group.	No motivators reported in this age group.
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years	Motivators 50-64 years	Barriers 65-70 years	Motivators 65- 70 years
Henwood <i>et al.</i> , (2011)	Australia	No behaviour theory	65-81	18	No barriers reported in this age group.	No motivators reported in this age group.	No barriers reported in this age group.	Health benefits (physical and mental), group environment, social challenge to improve.
Jancey <i>et al.</i> , (2009)	Australia	No behaviour theory	64-74	16	No barriers reported in this age group.	No motivators reported in this age group.	General aches and pains, loss of flexibility, lack of balance, confidence, and shortness of breath. Poor body image and incumbent weather. Social obstruction to exercise as they are labelled as old.	No motivators reported in this age group.
Kalavar <i>et al.</i> , (2004)	USA	Self-efficacy Theory	66-79	10	No barriers reported in this age group.	No motivators reported in this age group.	Health problems, fear of injury, bad weather, inadequate environment (sidewalk, potholes), not something you do at old age, no past experience of exercise, not wanting to start something new,	Peers, doctor, self-motivation.

									laziness, no motivation, not part of culture in US / daily routine, lack of time due to family.		
						Bad weather and winter. Low socio-economic class: poor neighbourhood aesthetics, feeling unsafe, cost for taking part in exercise.					
Kamphuis <i>et al.</i> , (2007)	Netherland	Theory of Planned Behaviour	29-81	38			High socio-economic class: walking the dog.		No barriers reported in this age group.	No motivators reported in this age group.	
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years	Motivators 50-64 years	Barriers 65-70 years	Motivators 65-70 years			
Keegan <i>et al.</i> , (2016)	UK	No behaviour theory	31-57	14	No barriers reported in this age group.	Role models, awareness by others, activity together, moral support, 'me time', being part of group, physical environment.		No barriers reported in this age group.	No motivators reported in this age group.		
Kegler <i>et al.</i> , (2013)	USA	Positive Deviance and Socio-ecological	40-70	29	No barriers reported in this age group.	Managing health problems, advice from health care providers, manage or lose weight, health benefits of exercise, good feeling, and thinking of family, care for family members, and care		No barriers reported in this age group.	No motivators reported in this age group.		

									for oneself. Pets, military background.		
									Lack of education about benefits and how to carry physical activity, lack of motivation, perceptions about safe walkways, weather, facilities, transport, extended family over protection of older generation, health and medical conditions, health professional not instructed to exercise, embarrassed to exercise in front of other people, reluctance to participate with other cultural groups.	No motivators reported in this age group.	
Kolt <i>et al.</i> , (2006)	New Zealand	Self-efficacy Theory	60-79	24	No barriers reported in this age group.		No motivators reported in this age group.				
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years		Motivators 50-64 years		Barriers 65-70 years	Motivators 65-70 years	
Kosteli <i>et al.</i> , (2016)	UK	Social-cognitive Theory	54-79	37	Lack of time either perceived or real due to family or personal reasons, pain, lack of motivation to start exercising, less structure post-retirement, social comparison with younger generation,		Prescription by physician, necessity to stay health, enjoyment, mood regulation, relaxation, social life, previous physical active at work, gives purpose in life.		No barriers reported in this age group.	No motivators reported in this age group.	

					inclement weather, lack of exercise partner, financial.						
Leavy & Aberg, (2010)	Dublin and Stockholm	No behaviour theory	65-89	30	No barriers reported in this age group.		No motivators reported in this age group.		Environment being a barrier (heavy traffic, lack of green areas), joint pain and breathlessness.	Transition from working to retired life, self motivation feel good factor, being part of a club.	
Mathews <i>et al.</i> , (2016)	India	Socio- ecological model	25-60	28	Lack of time, motivation and interest, physical discomfort caused by walking.		Pleasant walking routes and sight of other walkers.		No barriers reported in this age group.	No motivators reported in this age group.	
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years		Motivators 50-64 years		Barriers 65-70 years	Motivators 65- 70 years	
McArthur <i>et al.</i> , (2014)	Canada	No behaviour theory	40-62	53	Poor mood, poor experience, self- sabotage, lack of structure, other demands, have necessary equipment ready, fatigue, self- sacrifice.		Positive feeling, enjoyment, doing something different, meaningful, perceived health benefits.		No barriers reported in this age group.	No motivators reported in this age group.	
Melillo <i>et al.</i> , (2001)	USA	No behaviour theory	59-76	17	No barriers reported in this age group.		No motivators reported in this age group.		Fear and a feeling of inappropriateness in their culture, negative effect on their health, shame at doing exercise,	No motivators reported in this age group.	
Miller & Brown, (2017)	USA	No behaviour theory	65-72	10	Health conditions, expensive,		Health benefits, feel good factor, enjoyment, to		No barriers reported in this age group.	No motivators reported in this age group.	

					uncontrollable life events.			remove solitude, part of routine, support from friends and family.			
									Personal safety, health condition, climate condition, sidewalks, wide roads, traffic, health benefits, previous life experience, health related problems.		
Mitra <i>et al.</i> , (2015)	Canada	No behaviour theory	65-74	14	No barriers reported in this age group		No motivators reported in this age group.			No motivators reported in this age group.	
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years		Motivators 50-64 years		Barriers 65-70 years	Motivators 65-70 years	
Mohamed <i>et al.</i> , (2014)	USA	No behaviour theory	28-65	17	Exercise not a top priority employment is. Embarrassment to exercise, cultural barriers as in Somalia they as not use to exercising, cost of facilities and transport.		Role models within their community, sense of competition.		No barriers reported in this age group.	No motivators reported in this age group.	
Mosquera <i>et al.</i> , (2012)	Colombia	No behaviour theory	20-64	44	Lack of bike paths, physical infrastructure poor, past negative experience, hostile environment to cycle, cultural barrier to bicycle use, women perceived less safe than men, cultural		No motivators reported in this age group.		No barriers reported in this age group.	No motivators reported in this age group.	

					barrier are they as not though at a young age.						
Paluck <i>et al.</i> , (2006)	Canada	No behaviour theory	18-65+	44	Lack of facilities and resources, cold weather, distance to facilities, no formed groups.		No motivators reported in this age group.		No barriers reported in this age group.		No motivators reported in this age group.
Rathanaswami <i>et al.</i> , (2016)	Canada	No behaviour theory	37-55	8	Family responsibility, upbringing, clothing, cost, language, societal issues.		No motivators reported in this age group.		Feeling guilty that they are taking time for themselves that does not benefit the whole family, location, immediate living surrounding and husband.		No motivators reported in this age group.
Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years		Motivators 50-64 years		Barriers 65-70 years		Motivators 65-70 years
Romeike <i>et al.</i> , (2016)	Netherland	Theory of Planned Behaviour and Self-Regulating Theories	20-65	36	Lack of time, busy schedule. Male: irregular hours. Female: work commitments, family commitments. Lack of motivation, mood, tiredness.		No motivators reported in this age group.		No barriers reported in this age group.		No motivators reported in this age group.
Royce <i>et al.</i> , (2003)	USA	Socio-ecological	22-75	53	Perception that physical activity is inconvenient and not compatible with busy lifestyle. Tired at end of day, past experience with		No motivators reported in this age group.		No barriers reported in this age group.		No motivators reported in this age group.

walking when younger, narrow view of what physical activity is, community values, gender difference in activity selection, lack of social support, no community value on competition and sport not participation, reliance on car transport, urban area makes travelling long and distant, lack of available resources, poor walk ability, facilities opening hours, safety.

Author	Country	Behavioural Theory	Age Range (years)	Sample Size	Barriers 50-64 years	Motivators 50-64 years	Barriers 65-70 years	Motivators 65-70 years
Sebastião <i>et al.</i> , (2015)	USA	Socio-ecological Perspective	60-80	20	No barriers reported in this age group.	No motivators reported in this age group.	Health issues, fixed income limited access to exercise, role as caregivers, neighbourhood unsafe.	Friends and family, social centre and church.
Sebastião <i>et al.</i> , (2014)	USA	Socio-ecological	65-75	7	No barriers reported in this age group.	No motivators reported in this age group.	Chronic health problems, bad weather, lack of safety, lack of infra-structure.	Friends, encouragement.

Steltenpohl <i>et al.</i> , (2018)	USA	Socio-emotional Selectivity Theory	18-26 and 59+	78	No barriers reported in this age group.	Encouragement from others, family and friends support, meet people.	No barriers reported in this age group.	No motivators reported in this age group.
					Physical barriers were paving stones, tram rails (mainly dangerous for cyclists), wrongly parked cars, poorly maintained sidewalks, and dangerous crossings. Accessibility to sports centres, bad weather, no partner to be active with, lack of time, financial issues, no motivation, having too much time – difficult to organise free time, health barrier, insufficient opportunities.			
Van Dyck <i>et al.</i> , (2017)	Belgium	No behaviour theory	62.9 (±1.9)	37		No motivators reported in this age group.	No barriers reported in this age group.	No motivators reported in this age group.
Wertman <i>et al.</i> , (2016)	Canada	Health Belief Model and Life Course Theory	40-82	20	Not enough time, expensive.	Health benefits, new experiences, reduce isolation, individual practice.	No barriers reported in this age group.	No motivators reported in this age group.

Appendix 27. Supplementary file 1 interview guide

Supplementary file 1

Interview guide

1. Can you describe your daily routine from when you wake to when you go to sleep?
(Including your sedentary activities).
 - 1.1.1. You feel you do enough PA? Why so?
 - 1.1.2. When I mention a physically active person what comes to mind?
 - 1.1.3. What would give you the motivation to be a physically active person? Or what gives you the motivation to be a physically active person?
 - 1.1.4. Are there things that interfere with your physical activity?
 - 1.1.5. Do you predict that retirement will have an impact on your PA level? In what way?
 - 1.1.6. Has there been any life events which influenced your PA?
 - 1.1.7. Are there things that will interfere with your plan for PA after retirement?

Optional questions:

- 11.1.1. Will retirement influence your ability to be physically active?
- 11.1.2. How do you see your current routine change with retirement?
- 11.1.3. Do you think retirement will help you organise your PA?
- 11.1.4. Can you see your motivation toward PA change after retirement? If so, in what way will it change?
- 11.1.5. What about Resources like money or access to facilities or equipment for physical activity, how this influences your physical activity?
- 11.1.6. Your surroundings, how does it influence your PA?
- 11.1.7. How will your significant other (family or friends) influence you during this period?

Appendix 28. Supplementary file 2 participants' profile

Participant's profile

Participant's pseudo name	Employment level	PA category
Agnes	Clerical	Low
Antoinette	Management 1	Low
George	Clerical	Low
Lenard	Non-clerical	Low
Sean	Management 1	Low
Vivienne	Management 1	Low
Albert	Management 1	Medium
Carmen	Management 1	Medium
Chris	Management 1	Medium
David	Non-clerical	Medium
Jason	Clerical	Medium
Jessie	Clerical	Medium
Josephine	Management 1	Medium
Josette	Clerical	Medium
Maria	Non-clerical	Medium
Raymond	Non-clerical	Medium
Claire	Management 1	High
Konrad	Management 1	High
Lilly	Clerical	High
Mike	Management 3	High

Participant's story

Lenard

Lenard is a driver and spends most of his day seated. He works on a shift basis. On his days off he is assisting his son in construction and home renovations. He worked in construction as a manual worker for 25 before becoming a driver. He was supposed to retire last year but he is working an extra year. He enjoys doing physical jobs. However, he admits this had its toll on his health, especially since he is getting older. Being active at work helps him to feel good and less stiff. In his time off he likes to walk for errands and when possible, uses public transport and walk to avoid traffic. Walking helps him to feel less stiff and him to think and relax. His PA is linked to work and there aren't any barriers to being active. He goes walking for family reasons when going out with his kids or when on short breaks.

Once he retires, given his active personality, he would like to remain active and maybe work a couple of hours a day. Retirement is seen as part of the ageing process. Due to age related changes, he cannot work as much, therefore he has to decrease his activity levels. Since he was always active, he is sure to find something to do once he retires. His ability will decrease with retirement secondary to ageing. At the same time retirement is seen as having time for self. The amount of time available to be physically active will depend on his wife's health as he has to assist her if she is unable to take care of their grandson.

David

David has been working within the civil service for the past 40 year, he will be retiring within the coming months. He works as a porter and has a lot of walking during the day to deliver letters and files through the different department. He considers himself as an active personality as PA is part of his routine. He goes walking daily with his wife and does some body weight exercises routinely as well. He is very much aware of the need to be active to remain healthy. Walking also helps him to relax from a busy day. If he gets lazy, he is scared it will be difficult for him to remain active and healthy. He acknowledged that the fact that he has no children gives him more free time and flexibility. Work gives him the push to remain active, even when it comes to the routine PA. For him retirement is a double-edged sword. It will give him more free time for self. At the same time the busy aspect of work will be lost which might hinder his motivation to be active. One of the things which David and his wife have been noticing is that as he is getting older his level of activity is decreasing. He is becoming less energetic and his initiative is decreasing. This paired with the influence of retirement is making him wonder whether retiring is the right thing to do.

Lilly

Lilly is Maltese but previously lived abroad in the UK, she has been working within the Maltese civil service for the past 7 years. She will be retiring within the coming months. She is a very active person and 'I've always' is something which she repeats to highlight that she has always been active. PA is part of who she is and part of her life. She is eager to retire to increase her activity levels. When she was in pain in the past, due to a health problem, she tried and continued to be as active as much as possible. The fact that she had to stop made her appreciate even more how important PA is for her life. For her PA is part of her routine. She sees PA as part of a healthy lifestyle and not a stand-alone thing. For her the lifestyle is passed through generations. In fact, her children are also active. She was able to adapt her PA level through her life. Exercise is alone time, even though she tries to be active with her husband. However, she prefers alone to be able to exercise at her own pace. When it comes to recreational PA, such as walks in the country she prefers to be with her husband. Knowing that one day she might be dependent on other people and unable to be active makes her 'panic'. 'What do I do!' her perseverance in continuing to be active is shown throughout, she managed to adapt to her circumstances to maintain a lifestyle which makes her feel healthy.

George

George works as a clerk within the civil service. He will be retiring by the end of the year. He spends most of his day working at a desk mostly being sedentary. At home he is also sedentary in his activities. He has a defeatist attitude towards exercise. He identifies himself as lazy, and unmotivated to start exercising. George is aware of the health benefits of being active even given his knee condition. However, he finds it difficult to start. He is demotivated that his activity patterns can change with retirement, since he has been inactive for a long time. So it is useless starting now. He does not feel the need to be active since he is coping in daily activities. The lack self- belief and belief that exercise will help him makes it difficult for him to see himself active.

Retirement is seen as a possible opportunity due to time availability, but at the same time he has no plans or hobbies. Given his perspective he see it as unlikely to change his attitude or PA level after retirement.

John

John considers himself active at work. He works as a cleaner and has a lot of running about during his day. He does a lot of lifting and moving things around. When he gets home, he enjoys relaxing watching television and reading newspaper to relax. His leisure time activities are sedentary in nature. Even though he claims to like sports his activities involve occasional billiard, darts and watching football on the television. When he was young, he used to play football with friend but this only lasted a while, he prefers sedentary activity to relax. When he tries to be active, he gets lets down by feelings of breathlessness, so he does not push himself. He related this breathless to his smoking patterns which he identified as bad. Even though he claims he does not do enough PA he claims to routinely going for walks near his village and comminute regularly by foot to nearby villages. He describes himself as not fit. This could be related to his idea that PA is exercise or sports. As routine PA is not seen as part of 'PA'.

He was supposed to retire this year but decided to extend for another year. He sees works as important part of his activity. He identified concerns that once he stops work, he is unlikely to compensate for this PA with his new daily routine. He did not do any plan for his retirement as yet. His aim is to use his free time in retirement to become healthier and fit. Due to work he did not have enough time to dedicate to self. He wants to stop smoking and will commut by foot more frequently.

Albert

Albert works in management he has been working within the civil service for the past 40 years. He should be retiring in nearly a year's time. Albert is very active at work and he goes the extra mile by involving himself in extracurricular activities and social events at home. He does not like sedentary work and present work which involves movement. He has an active personality and has various hobbies which he is very passionate about. He spends most of the day being active doing things he likes when not working. Albert had been active in sport since he was young, he tried football, cycling and walking. He used to cycle to and from work until he has a near accident. Since there was an increase in traffic he stopped. The passion for cycling has been passed from generation to generation. He claims that his dad and son where both active. His type of activity varied depending on the socio and cultural context. Whatever type of activity he does he is proud of what he does. He is due to retire within the coming year however, he has certain reservations. Albert enjoys going to work and meeting people and he will miss this aspect of work. On the other hand, he is sure he will be active. since he has various hobbies, he will find things to do and will surely remain active. He does not expect to change his level of activity because he is retiring. With ageing he expects his activity to change but not to stop completely the day when he has to stop being active will happen but until then he will continue to be active and adapt.

Appendix 29. Supplementary file 3 quotations in original language

Supplementary file 3 interview quotes to support theme development in original language

1) Learned experiences	<p>“Issa trid tara il fatt ukoll li jiena trabbejt f dik l era fejn kullimkien konna immorru bil mixi. Il mummy kienet tmexxini hafna igifieri. L iskola bil mixi, konna immorru min tas sliema (.) sa paceville bil mixi. Dejjem nimxu. Imbghad tkun qisa fik, hekk fik tigi, li thobb timxi” Jessie</p> <p>“missieri kien ihobb mmur jonsob ezempju meta kien jahdem mal gvern mohhu ara llum hekk hu bnazzi. gieli ommi Alla jahfrila tghidlu inti mur. U ghax nofs lira. Meta spicca mill irtirar l ewwel ena mar klujum, t tieni sena cempilt darba minnhom mid dar jien u irrispondih u ghedtlu ma mortx tonsob? Qalli ghax a nghidlek Jason qalli imbghad tibda tixba dik ta kuljum. igifieri jekk inti taghmel hobby tieghek kuljum imbghad meta tkun nieqes l oggett mixtieq minnu iktar tkun tixtieq taghmlu. Meta inti ghandek liberta li taghmlu xhin trid u hekk nahseb tibred minnu li taghmlu l oggett. U inti taghmlu x hin trid.” Jason</p> <p>“nixtieq nkun car mieghek u emphasis. Illi meta bniedem ikun aktar attiv orrajt anki jekk ikun marid ezempju l fatt illi qed taghmel l attivita fizika inti tfisser li inti indipendenti. Inti indipendenti. Ija psychologigament ghax inti mhux the fizical only biss pscyhological inti thossok hafna hafna ahajr u fullfilled f hajtek. Jekk inti se tiddependi min kulhadd..jien omni kienet bhali dik li nibza. Bhali attiva haga u ohra. U hadd ma kien jaghmilla bzar fuq imniehira ghax kienet intelligentissima. U din f’daqqa wahda min September sa June giet bicca laham. Motor neuron disease, attakala n nerviturni l ewwel ma wehlila ilsiena. Allora frustrazzjoni kbira imbghad ideja u saqqa qed tifhimni. X jibqa f hajtek. Igifieri din spiccatila l attivita kollha. Allua jin ngib lila quddiemi dejjem. Li kieku ikolli nimrab bhala jien ghedtilhom ara x se taghmlu wahda injection u mmur ll hemm ghal kwiet. Ghax mhux se nissaporti. U kienet determinata li tube feeding ma tridx. X hin t tnejn gew ghax bilfors ghamlulha t tuba ghax ma tistax tiekol iktar liquid spiccat, sewwa. U x’hin qbadu t tube intilfet min sensija telqet. Ghamelt 3 tijiet u mietet. L aqwa haga. U harqa qatt ma kellha. Konna nnizluha u nohduha t toielt, mela nkella bil patella lis spatar..” Mike</p>
2) Psychosocial factors shaping the retirement transition	<p>“ 61 bi hsibni nara x naghmel igifieri jew reduced jew nieqaf ghal kollox. Bhal issa qed naghmel l homework. Pero ghadni kif cempilt lil t’hemm isfel (HR). Biex nara e jekk nahdem, igifieri jekk nahdem siegha kemm naqbad paga bl allowance kollox qed nara jaqbillix hekk nkella Tigi gurnata fil gimgha tiehu l penzjoni u tithallas ta dik l gurnata, nara x’sa jaqbel. Imma bhal issa mohhi hekk qed jahdem” Chris</p> <p>“(...) igifieri jien taf x’nghid meta bnidem jieqaf mix xoghol dik wahda mill problema. ghax mohhok tibda tghid</p>

jien wasalt li (u:m) imma allura wahda mill problemi l bniedem jien kif nhossa jien qed nghid nieqaf mix xoghol nghid ha nkun kuntent. ha nkompli x se naghmel! (.) pero dik tkun go mohhok u gieli nghid se nieqaf u gieli nghid le. Dik wahda li (...)"

David

"Riċerkatur: The fact that you won't be coming to work, your mental ability will be influenced?

Lilly: It's the mental that I'm worried about more so! Because with me coming to work having less time, to look into, I go online book for information anything I don't know Google it so to be to occupy my mind mm I'm planning this Alaskan cruise on my own rather than going to a tour."

Lilly

"anki soċjalment ikolli nirtira min hawn totalment nkun cert li filghodu ikolli mmur nimxi mal mara qed tifhimni fis 7 ta filghodu tghidli ejja nimxi ghax kieku ma nkunx hawn kieku nimxi maha fis 7. Allura hija importnati u. Igifieri kieku tghidli mmur fis sitta mmur. Qed nahsiba nergax nibda mmur l gym kmieni kmieni filghodu fl 4, fil 5. Ghax nohssni taghmilli iktar gid. U meta kont mmur l gym u kont mmur x xoghol mhux cajta qed nghidlek kont nidhol id dar fl 10 kemm niekol nerga nara l emails norqod u gili kont mmur fil 5 6 ta filghodu ta.."

Mike

3) The discernment

aspect of retirement

"...most probably 99.9% li nerga nibda nahdem xi haga differeti ghalija its challenge li nhobb nhobb nzomm lili attiva.."

Carmen

"Izjed diffiċli ghax issa il mara tat tifel ha jkollha tarbija iehor u il mara izzomulha. Igifieri ha jkolli noqghod mal mara mis sena id diehla."

Lenard

"Riċerkatur: Tahseb li l baby se jaffetwak?

Parteċipant: Iwa, iwa

Riċerkatur: Se jaffetwalek r rutina?

Parteċipant: iwa iwa, ghax bi hsibni e! igifieri (hehe) l ewwel haga li ghedtilhom jien e ara ma tmorrux titilqu l baby fxi nursery. Dik biss ghedtilhom jiena.

Riċerkatur: Ok

Parteċipant: Ghedtlihom ghax jiena naf illi baby tmur (hehe) i mean l genitui li huma l iktar irabbuhom t tfal u mhux hekk imma li titfahom f'nursery, hekk ma nistax halija jiena. Forsi dik menalita tieghi ghax llum Alla hares kulhadd

jaghmel kif qed nahseb jien u u kif inhua l affarijiet diffiċli sewwa. Imma jien l affarijiet ruhi li jekk hu trid ghajnuna min ghandi se issibha. sewwa. Ghal menu sakemm tigber naqra l baby sewwa?! Imbghad jaghmlu huma. Imma fejn jekk issaqsuni (.) jiena bi hsibni nghin igifieri (hehe) mm”

Claire

“...imma jasal z zmien tghid jien irrid nibdel il il din r rutina tal hajja issa kbir sehem i tajtu. issa irrid nibda l hajja l ohra. illum jew ghada trid tibdija kar! ikollok 61, u ikollok 64 l penzjoni sabiha tkun b'sahhtek. Jekk tkun marid, jekk tkun marid, wara x'penzjoni hi! igifieri din nara min jibqa jahdem sa l ahhar jien ghalija ikun qed jiccewwec nifhima jien. l opinioni tieghi! igifieri jien irrid nitlaq mill penzjoni kif jien b'sahhti ha ngawdi izjed. heq mhux hekk! issa nbilli nitlaq jien b'64 u nibda kopti tugani, dari jugani, eqq titantak l awrina, ahna lirgiel. Le le! E e e go sodda tkun tajjeb mhux biex tgawdi l penzjoni. Jew xi naqa dementia. mhux veru....”

Chris

4) Engagement in PA

“..igifieri kummissjoni djakunija, chairperson, nghalle d dutrina, igifieri dejjem kont attiva min wara l hin ta l iskola. Biss issa dan l ahhar 9 snin, ghandi lit tfial tat tifla li qed nraabbija jien allura nzomm ruhi attiva biha ukoll..”

Carmen

“Parteċipant: emm, per eżempju qabel (.) s-sibt konna mmorru nizfnu ghax inhobb. Igifieri kieku jkolli c chance igifieri nerga' naghmilha mma r ragel heqq ma tantx ihobb, jipprova iktar affarijiet relax u hekk.

Riċerkatur: Ok

Parteċipant: Trid tikkuntenta lil kulhadd.”

Maria

“Riċerkatur: Din l haga hija tieghek u tar ragel?

Josephine: Iwa ghax Frank ihobb jimxi bhali ukoll r ragel iwa. Dak jimxi iktar minni proppjament..”

Josephine

“Riċerkatur: L- ewwel hin minnhom semejt li tmur timxi ghalfejn taghmilha bil mixi u mhux bil karozza?

Parteċipant: Ghax noqghod nohrog l karozza biex tmur tixtri! Jekk ma ikollix xija kbira allura ghandi dak s sodisfazzjon jekk hragt imxejt naqra forsi rajt bniedem sellimtli naqra. ifhimni jew titlaqa ma xi hadd tkun ilek ma tarah imma l bqija (.) tittawal naqa fil hwienet. biex tonfoq ghat tfal, mhux ghalija ta ghat tfal!!”

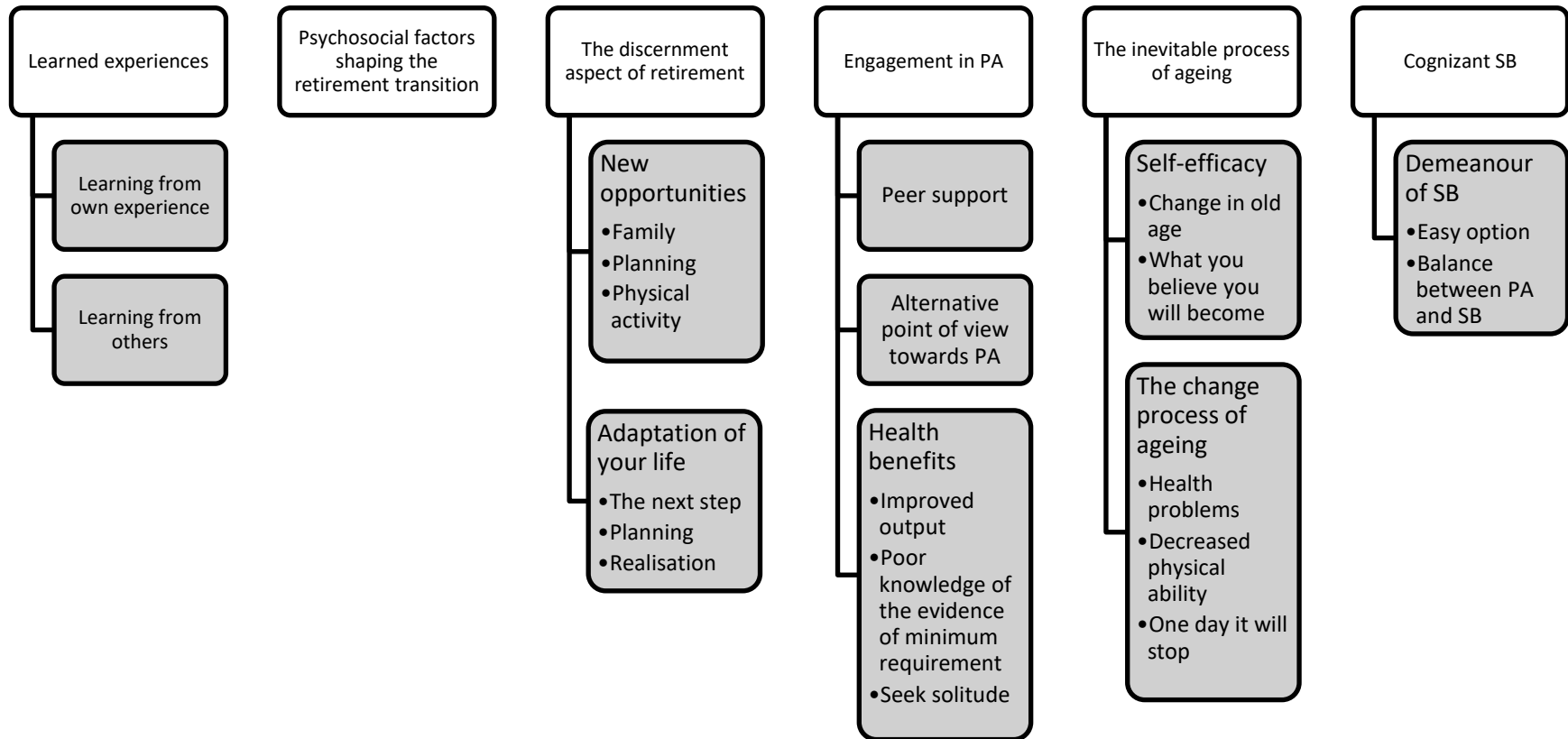
Vivienne

“...U inhossni aktar b'sahhti meta inkun attiv..”

	Mike
5) The inevitable process of ageing	<p>“Le. Fil fatt jien ha nghidlek naqsek diga certu affarijiet jien kont naghmel affarijiet hemm (u:m) bejn illum l gurnata naqqast u l mara tghidli. Inti ma ghadex li kont mhux billi nipprova. Imma tghidli inti meta kont ta 61 mod illum 64 tghidli ma ghadex. Voldieri u vera igifieri nhossa d differenza. Nhossni ghajjen u tghidli gismi. tghidli naqqas u illum l gurnata naqqast. u ghada pit ghada nissoposni nnaqas. Pero ma nieqafx. (u:m) Xi haga nibqa naghmel zgur..”</p> <p>David</p> <p>“Partecipant: Yeah. I think my problem been is that if this stops I am scared that I will get depressed I don't know how to cope with it I think (.) but (.) if something happen to my brain or if something happens to me physically then I just don't know. I would just go (u:m) so there is a negative side to this as well (.) I think.</p> <p>Ricerkatur: What do you think..</p> <p>Partecipant: Cos it depressed me when I was in pain with activities and it really it was to the that that. I (...) (eh) I did want to (...) I didn't want to life! I thought no! if this is (.) I don't want to (.) no! mm (..) it came to mind and that is the truth (.) yeah (.) so hey bit it will happen one day that I will be stuck may be in a wheelchair I don't know, don't know”</p> <p>Lilly</p> <p>“u tibda tara l eta gejja u ma tridx li tixjeh u li ma tiflahx taghmel xejn. jekk jista ikun i prolonge that process (laugh) kemm jista ikun xorta se tixjeh imma tibda attiva mhux issir. qisek cabocca fuq siggu.”</p> <p>Carmen</p> <p>“Igifieri heq, hija xi haga li nahseb tikber mieghek. Tibqa tikber tibqa go fik. Difficli hafna biex imbgħad la, ghax ahna nahsbu issa la nitlaq issa nibda nibda zee. Nahseb li hija xi haga li tikber go mohhok, tikber mieghek.”</p> <p>Sean</p> <p>“Ricerkatur: Ghandek xi haga tghinek biex naghmel aktar attivita fizika?</p> <p>Partecipant: Il hsieb tahseb li inti hekk ha taghmlu gej ahjar. Jekk tahseb li inti li ha taghmel hu ahjar ghalik(.) ha taghmlu. Jekk inti mhux se taghti kas mhux se jkollok way jew tghid isma kuragg li inti ha tiprova timxi jew taghmel tip ta training. Int tghid jien li ha naghmel ghax se jghin lili. Ahna mhux jien nahseb biss bhala bnedmin meta tasal fil punt li int tghid ara x ghamilt ma iccaqlaqtx allura dak il hsieb irid jigi qabel biex inti f lahhar ma tigix fejn inti lanqas jollok sahha li taghmel dik il mixja. Trid tibda qabel. Issa dak il hsieb ghadni ghaddej. Allura nghid allura ghaddej u iz zmien ikun qieghed iqarraq bik ta..”</p>

	George
6) Cognizant SB	<p>“Qatt ma mmur d dar u npoggi quddiem t television min l 4 ta wara nofs in nhar per ezempju. No way. Lanqas nissaporti (laughing) no way. Jien anki jekk nara film jekk ma nqumx 3 darbiet ma nissaportix .eee.”</p>
	Mike
	<p>“Riċerkatur: Igifieri tuza l exercise biex jejjek mentalment u fizikament</p>
	<p>Parteċipant: Ehe, ehe. U anki nkun hawn hekk ta. Issa jew ghax tidra hekk dik l haga li noqod bilqeda mhux haga li</p>
	<p>togobni u nistikja. Igifieri l hin kollu nivvinta x se naghmel biex nqum min hemm hemm (.) niprova..”</p>
	Josephine
	<p>“Nahseb jiena. Igifieri trid, trid kif taghmel, you set goals ghax inkella tispicca noqod tara it television tiekol u</p>
	<p>flok taghmel l ezercizju aktar titazzen. U facli biex biex ma taghmel xejn u facli biex toqghod bilqeda, facli biex</p>
	<p>toqghod tara t television, u facli hafna biex tiekol. Igifieri.....”</p>
	Sean
	<p>“Riċerkatur: Semmejt il hobbies tieghek. Li thobb taqra u hekk. Thosshom li qishom li ikun hem</p>
	<p>kompetion bejn taqrx xi ktieb jew taghmel l exercise jew tmur timxi</p>
	<p>Parteċipant: Le wahda nghanila filghodu u l ohra qabel norqod. Ma tinterferix wahda ma l ohra. It tnejn bzonjuzi</p>
	<p>ghalija.”</p>
	Jessie
	<p>“xoghol hija moghod bilqeda kwazi ghandi hafna milli gurnata bilqeda l ftit li nqum ejja nqum biex naghmel</p>
	<p>naqra dawra. Kwazi kwazi iktar naghmilha ghalija milli ghax xoghol”</p>
	Agnes

Appendix 30. Supplementary file 4 developed themes



Appendix 31. Supplementary file 5 interview quotes

Supplementary file 5: Participants' interview quotes to demonstrate theme development

- 1) Learned experiences
- “You have to consider the fact that I lived in an era where we used to walk for our all our activities. Mummy used to make us walk a lot. We used to go to school by foot, we used to go to Sliema (.) until Paceville all on foot! Always walking. Then it becomes part of you, you start to love walking”
Jessie
- “Dad (*refers to his father who was also a civil servant*) used to like trapping for example when he used to work with the government he was always thinking about the weather (*to go trapping*). My mum used to tell him just go.....When he retired the first year he used to go every day, once in his second year (*since his dad retired*)I called home and he took the call I told him you didn't go trapping? He told me let me tell you Jason you get bored doing the same thing over and over. That's it, if you do your hobby every day then when you lack the desired object you would want to do more. When you have the freedom to do whatever you want you would not want to do the object anymore.”
Jason
- “I want to be clear with you and emphasis. That when a person is more even if he is ill for example the fact that you are doing physical activity means you are independent. You are independent. Yes psychologically because you it is not the physical only psychologically you feel very much better and fulfilled in your life. If you are going to depend on everyone (.) My fear is that I am like my mum. She was active doing this and that like me. And no one would spit on her nose because she was very intelligent. And suddenly, in June, she because of a piece of meat. Motor neuron disease, her n nervous system got affected first lost control of her tongue. She got greatly frustrated then her hands and legs got affected. All her activity was gone. Her story is always on my mind. If I had to be in her situation I would ask for an injection and I would go quietly. Because I will not stand it. And she was determined not to get tube feeding. On Monday they came (*doctors*) because it was necessarily to do the tube because you she could not eat more liquid. And by the time they put the tube she lost consciousness. She died after 3 days. The best thing. And she never had a pressure sore. We would take her down and take her to the toilet...”
Mike
- 2) Psychosocial factors shaping the retirement transition
- “ (*I am*) 61 and intend to think what I do i.e. either reduced (hours) or quit altogether. At the moment I am doing my homework. But I just called (HR). To see if I work, that is to say if I work hours how much I will get paid with allowances and all I'm check whether working is better. I work one day a week and get the pension and get paid for that day, I see which one is the best option. But right now my mind is wondering”
Chris
- “I don't know what to say when a person stops working that is one problem. Because your mind starts to say I'm done (u:m) so it's one of the problems I feel that man says let quit my job and I'll be happy. Let me continue what I shall do! (.) but that

what goes through your mind at times I will say stop and sometimes I will say no. That part of it (...)"

David

"Researcher: The fact that you won't be coming to work, your mental ability will be influenced?

Participant: It's the mental that I'm worried about more so! because with me coming to work having less time, to look into, I go online book for information anything I don't know Google it so to be to occupy my mind mm I'm planning this Alaskan cruise on my own rather than going to a tour."

Lilly

"Even socially I have to retire from here totally be sure that in the morning I have to go walking with my wife at 7 in the morning she tells me lets go so if I weren't here I would go for walk with her at 7. It's important for me. I mean if you tell me I go at six I go. I'm thinking I'll start going to the gym early in the morning at 4, at 5. Because I feel it does more good. And when I used to go to the gym and I was going to work not a joke I'm telling you I was going home at 10 as soon as I ate I would see the emails again and I would go again at 5 6 in the morning."

Mike

3) The discernment aspect of retirement

"...most probably 99.9% I will restart working again something completely different it is a challenge for me I like to keep myself active."

Carmen

"More difficult because now my sons wife is going to have another baby and my wife will be assisting her. I mean I have to stay (*at home*) with a wife as of next year."

Lenard

"Researcher: Do you think the baby will affect you?

Participant: yes, yes

Researcher: will r affect your routine?

Participant: yes yes, because I really want to! I mean (hehe) the first thing I told them doesn't leave the baby in some nursery. That's all I told them.

Researcher: ok

Participant: I told them because I know babies (hehe) I mean the parents are the most in the children upbringing and not leaving them in a nursery, I cannot accept it myself. Maybe that is my mentality because in today situation it's not possible for everyone to do as I think and and how things stand today things are very difficult. But if they want help whoever they will find it. Well. For a short period until the baby grow a bit?! But then they do whatever they want. But if they ask me (.) I intend to help (hehe) mm"

Claire

“...but there comes a time when you say I want to change in routine I am old and did my part. Now I want to start the other life. Sooner or later you have to start! You could be 61, or 64 the beautiful of a pension is to be healthy. If I’m sick, if I’m sick, it not pension at all! In my opinion those who continue to work until the end for me are getting screwed from my understanding. It’s my opinion! I want to start retirement when I am healthy so I can enjoy it more. heq! If I leave at 64 and start with pain in my knee, my back hurts, problems with urine, we are men. No no! e e e you will be good to stay bed and you would not enjoy the pension. Or some dementia....”

Chris

4) Engagement in PA

“..religious commission, chair person, teach catechesis, as in I was always active after school time (*works as teacher*). Now for the last 9 years, I have my son’s daughter who i take care of and I keep myself active with her too.”

Carmen

“Participant: emm, for example before (.) on a Saturday we used to go dancing because I love it. I mean, if I had a chance, I'd do it again, but my husband really doesn't like it, he prefers to relax, and so on.

Research: Ok

Participant: You have to please everyone.”

Maria

“Researcher: Is this something you do with your husband?

Participant: Yes because Frank loves to walk like me. He walks more than I do actually.”

Josephine

“Researcher: Before you told me you go for on foot why do it and not by car?

Participant: So not to get out of the car (*from the garage*) and do the shopping! if I don't have a lot of stuff to buy then I have that s satisfaction going out for a walk and maybe I meet someone to talk to talk. Or else meet with someone you haven't seen in a long time but for the rest (.) do some window shopping. Buy something for the children, not for me for children!”

Vivienne

“...I feel stronger when I am active.”

Mike

5) The inevitable process of ageing

“ No. In fact I'm going to tell you I already miss doing certain things I used to do things there (u:m) compared nowadays I slowed down and my wife tells me you are no longer the same even though you try. But she tells me you were 61 you were one way today you are 63 you older. So and it is true that I feel the difference. I feel tired and my body tells me. It tells me

slow down and nowadays I slow down. And tomorrow it's a pity but tomorrow I will decrease further. But I do not give up. (u: m) it is something I will keep on doing for sure."

David

"Participant: Yeah. I think my problem been is that if this stops I am scared that I will get depressed i don't know how to cope with it I think (.) but (.) if something happen to my brain or if something happens to me physically then I just don't know. I would just go (u:m) so there is a negative side to this as well (.) i think.

Researcher: What do you think..

Participant: Cos it depressed me when I was in pain with activities and it really it was to the that that. I (...) (eh) I did want to (...) I didn't want to life! I thought no! if this is (.) I don't want to (.) no! mm (..) it came to mind and that is the truth (.) yeah (.) so hey bit it will happen one day that I will be stuck may be in a wheelchair I don't know, don't know"

Lilly

"And you start to see the yourself ageing and you don't want to grow old and you can't do anything. If it can be prolong the process (laugh) as much as possible you will still age but being active you don't become. like a coached potato."

Carmen

"I mean hey, it's something I think which grow with you (*referring to exercise*). It keeps growing in you. It is very hard to then either, because we think now I'm leaving (*retiring*) I can starts (*do exercise*) eee. I think it's something that grows with you, in your mind."

Sean

"Researcher: Do I have something which helps you to do physical activity?

Participant: The thought that if you do you will do better. If you think that what you do is better for you (.) You will do it. If you do not pay attention you will not have a way or say you get the courage that you will try to walk or do some kind of training. You will do if you believe it will help me. We don't just think as human beings when you get to a point where you say see what I've done I didn't move so that thought has to come before so that in the end you don't end up not even having the strength to do that walk. You have to start earlier. Now that thought is still ongoing (*for him*). So time goes on and I'm fooling myself."

George

6) Cognizant SB

"I never go home and sit in front of the television from 4pm for example. No way. Nor do I endure (laughing) anyway. Even if I watch a movie if I don't stand up 3 times I can't stand it."

Mike

"Researcher: What you are saying is, that you use exercise to help you mentally and physically

Participant: Yes, yes. And even here (*at work*) that is what I do. Its either because I got used to it, sitting is not something I like and able to withstand. That is it, all the time I invent what to do so I get up from sitting (.) I try.”

Josephine

“I think. That is to say, you want, no matter how you do it, you set goals because otherwise you end up watching television eating and instead of doing the exercise you want to do become lazier. And it is easy to do nothing and easy to sit down, easy to watch television, and very easy to eat. I mean...”

Sean

“Researcher: You mentioned your hobbies. That you loved to reads and so on. Do you that there is a competition between reading a book or doing exercise or going for a walk.

Participant: No, one I do in the morning and the other before bed time. It does not interfere with each other. They are both need for my end.”

Jessie

“Work is seated I have most of my day sitting down the little I get up get up let’s get up and walk a bit. I almost do it more for myself than for work”

Agnes

Appendix 32. Participants stories and data analysis

Albert's story

Albert considers himself as an active person and is always looking for something to do. He is very involved at his workplace and has a sense of belonging. At the same time, he is looking forward to retire some day soon due to difficulties at work. He has 2 routines a workday routine and a non-workday routine as he works on shift basis. His work is most sedentary and finds it tiring due to his long hours. The lack of movement in his work is one of these things which makes it more tiring according to him. On his off day he tried to be active by involving himself in different social activities, so he keeps himself busy. He links his business with exercise and feel he is very active. This perception of him being busy seems to be coming from his engagement with exercise since a young age. He was involved with exercise and used to train regularly when he was younger this seen to give him the conviction that he can and is still active. He still engages with different exercise activities such as swimming and walk with less intensity then when he was young. Part of the decrease in activity is attributed to him being older now. On retiring the initial days were holiday like. He spent the initial weeks watching television and eating with minimal activity. Until he realised that this will be his retired life and decided to get into a new routine. Even though Albert was happy with his retirement it was not easy for him to fill his time. He was always active but filling all the free time in retirement was difficult for him. He was planning on going to the band club and making new friends but due to COVID he must cancel his plan. Meanwhile, a new opportunity came up with his family getting a new pet which became his best friend. This helped him to become active again and started going to the fields more often than before and spend time there with the dog. Sporadically he goes out for long walks with the dogs, these would be unplanned. Since retiring Albert noticed that he is finding himself thinking more and become more worried about things since he is less busy. Being busy during the morning is very important for him. He finds that having initiative is important to find things to do and try and be active as much as possible. His role also changed within the family and is taking up more house chores since his wife is still working. Albert feels he is settled in his new routine and is happy the way things are, he is doing enough physical activity as he is not gaining any weight and does not wish to go to his previous plan of going to the band club.

Pre-retirement

Extracts	Interpretation
p: meta nkun hawn, xoghol. jien bhali issa qed nahdem 2 gewwa u 2 barra. allura jien qed nahdem tip nofs s sena hux hekk! mela allura nofs s sena (.) mela allura fnofs s sena	The difference between work and nonwork days in activity levels.
ghandi cans naghmel iktar exercise.	Opportunity to carry out exercise is present.

issa meta nkun hawn ħafna mix xogħol bilqegħda. fuq lis-skrivani telefons għaddejjin, ma tistax tiċċaqlaq biex tieħu Bela kafè jew xi kultant iġilbulek għax erba' telefons l hin kollu idoqqu. meta ngħidlek widnejk kissrulek. immur d dar nofsi mejjet. imma insomma. tipprowa tiċċaqlaq naqra meta tkun hawn imma xorta diffiċli jiġifieri. most of the time bilqegħda ma tiċċaqlaq xejn ma tagħmel xejn u dik dik hi jiġifieri ħlief tpaċpiċ u (.) stress fuq moħħok u stress billi problemi li ikun hawn għax hawn min iċ-ċemplulek bi problemi l bqija ma ċċempillux hadd.	Work is mostly sedentary and forced into him. Tiring job and feel exhausted due to long hours and being busy with no energy to do anything. Emphasis on the lack of movement he experiences at work.
issa meta nkun d dar imbagħad dik storja oħra.	Highlighting the contrasting difference between activity at work and when not working.
jien ma nafx noqgħod kwiet u ma nafx ma nagħmel xejn. mela	Active all the time busy doing something.
jekk filgħodu tkun x xita ngħid ha nara x se nivvintaw, ġieli ġejt anki hawn x xogħol. peress li nieħu ħsib tal ġimgha l kbira u dawn l festi u hekk nara x'ivvinta biex nigi hawn. u daqqa sejjer biex jorganizza karta ha noħroġ karta s swali per eżempju tal Christmas carol. issa bħal issa żmien tal ġimgha l kbira.	Socially active and keeps himself busy
Allura indur kullimkien, u nkun qed nagħmel l exercise. biex iddum kullimkien hawn għandek sat tnejn u nofs biex iddur. hawn l mixja hawn l ġenn hawn. imbagħad ma tkunx xita nkun d dar imbagħad l għalqa. r: ok	Perception of what exercise is. Being active and busy. Links activity to exercise
p: immur l għalqa sal bieraħ stress. il bieraħ mort l għalqa xi sena u nofs kif (u:m) kont hawn. qadd niżbor imbagħad żbart żewġ sigriet oħra taż żebbuġ, e ħrat ħarta l għalqa kelli biċċa isfel għamlet ftit piżelli u naqra ċiċri. iva. żbart d dwieli kollha li kelli u bejn saqqiet naqra u naqra l hawn u naqra l hemm għax reggħet qisha waqfet x xita u wasalt d dar xi ħamsa u nofs dalam.	Wants to highlight his activity which might not be as active as actually is.
dalam mort d dar għajjien mejjet. inħsilt, kif kilt ksaħt mill ewwel. qisu demm mar kollu fl istonku tiegħi (laughing) u bdejnt nħoss bard, u l mara għajtilha se immur norqod u qaltli x inhi. għajtilha se immur norqod, inti għamel li trid (laughing) għajtilha għax friżajjat. tgħid kemm dahqet biha, u dalgħodu qomt u fl erba'. fl erba' nqum jien. jien ara l bieraħ fis seba' żgur kont rieqed fis seba'. fix xitwa norqdu kmieni jien però nqum kmieni mal erba' u nofs, l erba' nqum ma hemmx sajjf u xitwa.	Tired after his activity as he was busy.
u xogħol u mhux xorta nqum. xorta nqum u nitlaq l barra. kif nqum irrid nitlaq l barra. Bela kafè jekk nkun ġej hawn nieħu shower u nitlaq l barra. hawn hekk ġieli sitta nieqes kwart diġà nkun hawn. filgħodu anki fil ħamsa u nofs ġieli	Specific routine which keeps him going. And keeps him accountable at work. Showing his commitment.

<p>l bieb ikun għadu magħluq. iva ta! ngħid halli nistenna barra għax jaf ikunu qed iddur s swali, u mhux se nċempel lil night manager ikun x imkien XXX u jarawni appa (laughing) u ikollhom raġun. biex noqgħod niżżilhom allura iva milli bqija iddejjaq ma nagħmel xejn.</p>	
<p>u qabel iktar eneġerġetiku. qabel kont mit-Tirrenja bir rota meta kont għadni żgħir.</p>	<p>Less energetic then when he was younger. Due to age.</p>
<p>kont ċiklista jiena. jiġifieri għamel żewġ season tlieta fil peak tiegħi. imma jien qed ngħidlek 40 sena ilu ta jiġifieri ta. għax jien se nagħlaq 62 qed tifhem. fil peak tiegħi kont nagħmel 50 mile illum u l għada 100 mile. mhux ċajt mili ta! hekk kont naħdem jien. anki jittrejnja kuljum, kuljum. xita u mhux noħroġ tad x kellna tajjeb. karożzi xejn karożzi, xejn xejn xejn. illum nibża', l aħħar. għamlet habta kont bdejt niġi bir rota ergajt hawn. kont qtajt ili 10 snin. kif inżilt hal Qormi hawn Van tal hobż ma rannix bir round about u baqa' ħiereġ u ħsibtu se joqtolni bir rota ta wara. kont bilmoghod jien ta! li kelli d dawl u Alla ried, u kif nduna kesa. waqaf nieżel mill karożza ma felaħx issuq bil qatta li ha. ħaseb li bis shock li ha. jien Għajjat lu għedtlu ma gara xejn mur bilmoghod. għedtlu jien orrajt u jien bqajt ġejt hawn x xogħol. imbagħad rajtu tani warning u għidt daqshekk ġejt l hawn.</p>	<p>Before he was more energetic and use to exercise. Comparing himself to when he was younger, much younger in his 20s. this made him active to this day.</p>

Extracts	Interpretation
<p>Pero' jien nibża, nibża veru nibża illi jekk timrad dik n naqra u tibda taqta, nibda naqta, tibda taqta l mixi, taqta ċertu attivita',</p>	<p>Fear of lack of activity and health problems becoming more real with ageing.</p>
<p>imma ejja ma nimxix daqqsek. ejja ngħidlu, se tibda b'saħħtek. f'dak l kas, e. il karattru tiegħi le.</p>	<p>Activity is needed for him to remain health.</p>
<p>għax jien kif nqum nibda naħseb kif se nagħmel hekk. nagħmel hekk. imma irrid nagħmel hekk. m'hemm se nibda. ngħid issa nara, hekk hemm nista nuri għandi xi erbġha jew ħames noti, ktibthom dalghodu dawn.</p>	<p>He considers himself and active persona and mentally always active.</p>

Extracts	Interpretation
<p>p: u nagħmel jiġifieri biex nagħmel erbġha ħames siegħa fl- ilma biss l ħin kollu halli ma titlaqx. ara ġieli f'gurnata fid disgħa naslu hemm</p>	<p>Highlights his exercise, tolerance and endurance.</p>
<p>l ewwel naqra kafè kif naslu dik ta vizzju. nibda narma bil-moghod tlett erbġha fl ilma jiġifieri Adrian tinsix ili e! tgħidli</p>	<p>Active on his own and this is mentioned many a times.</p>

<p>inti dejjem baħar waħdi immur baħar (laughing) u veru miskina. imbagħad nitlaq, nerga naqra kafè ohra, forsi tpejjep sigarett, forsi u nerga ninzel tlett siegħat ohra jiġifieri jien għandi sitt siegħat fl ilma biss e. fil fatt anki fis sajf. jien fis sajf nilbes għax tiksah għax peress li iddum hafna xorta tiksah. għax inti trid tqis xi kultant thoss dik n naqra dik, issib rokna. u meta toghdos ha ssibu iktar kiesah. bin nifs jiġifieri mhux biè cilindri. imma jiġifieri imbagħad la iddum hafna.</p>	
<p>jiġifieri l exercise anki fis sajf nagħmlu jien għax l baħar nhobbu. kemm jien u kemm l mara, thobb l baħar. jiġifieri mmorru hafna l baħar. jekk ma nkunux nistaw. filli fis sajf ma tanx ikolli għaliex immur l għalqa għax jien ma għandix raba saqwi. qed tifhem allura, ma ikolli għaliex immur. imma baħar iva e! baħar iva! mmorru mort hafna baħar. imbagħad xitwa jekk ma tkun tajba immur l għalqa. dejjem l għalqa jiġifieri hemm xi haga se tagħmel e!</p>	<p>He considers himself to exercise regularly and there is a difference between summer and winter.</p>
<p>hemm hekk nahseb jien lanqas hu exercise iktar skarriġ! r: għaliex? p: għax ikun milwi darek, daqshekk milwi. issa ma nsemmux l bieraħ għadni ejja nimmaġinaw dan l għalqa għadek hawn għax xi daqshekk fiha sewwa. dik l bl ohra qeda hemm hekk tajjeb. jiġifieri jien l ħin kollu b'inqas taz żabra għadni hawn maħruq għax naf li beda jahraqni x imkien, telqet xi selha x'imkien. ma nafx fejn qed imma naf li tlajt xi selha insomma anyway, mela darba ohra mort min hawn u hemm qisu bogħod hames piedi mhux iktar l ħin kollu mawweg. tatqa z zabbra nimxi inqum (u:m). ghamilt ghamilt nahseb erba siegħat. igifieri dak l inqas hu exercise. mawweg gang hafna mix xogħol tar raba iktar skarig ta! mhux exercise, exercise x'hin tmur timxi. il hamrija, imma certu xogħol tar raba skarig.</p>	<p>Differentiates between exercise and activity during his hobbies.</p>
Extracts	Interpretation
<p>p: e issa jien qed immur għal wieħed żgħir jien. imbagħad e 60, 70 xorta mhux tibqax l istess. żgur li le. però (.)</p>	<p>Ageing will be changing your ability to be active.</p>
<p>hafna milli mill issa se nkun wieħed minnhom jien jien per jien diġà kieku qaluli per eżempju tidhol f'ċertu għaqdiet. per eżempju tal każin tal banda jien diġà qaluli, qaluli għandna bżonn wieħed bħalek ahna. qalli tkun tista' torganizza ċertu affarijiet.</p>	<p>He is already planning for retirement thinking about his options.</p>
<p>dak parti mill attività jiġi nifhem jien e.</p>	<p>There is a natural change in the type of physical activity from younger. When you are younger</p>

	you can do more ‘exercise’ now you become active.
jigifieri dan ghandejn fejn trid, fejn trid illum. dawn jieħdu pjaċir bik għax inti taqşam l esperjenza tiegħek qed Tifhimni tahsem ma volontarjat jigifieri dak, tara l morda l każin.	Feeling he can contribute to other social clubs. Due to his experience.
dawn hekk qaluli lili tal Karmnu ta santa Marija qaluli Ġuż ara kultant tiġix tatina daqqa ta id.	Social pressure on how to adapt to retirement.
għedtlek iva niġi jien. mhux se nghidilhom le! u forsi veru ikolli ċans immur. ngħid illum mort każin u darba oħra mort n naha l oħrajn mhux xorta. xejn xejn ma tiddejjaq tagħmel l-Istess xogħol.	The need for a routine.
illum mort l każin u l għada tgħid forsi halli immur sa nisboh oġġett ma għandux x'jaqsam xejn. imma mhux qed tagħmel. hawn min irrid ta. hawn ħafna min irrid jien naħseb illi anzi naħseb li l maġġoranza tan nies jekk ma thobbx di natura għažżien, għax jekk tkun għažżien għažżien.	Comparing to other and considers himself and active person.
imma jekk inti tkun mdorri tmur l-Każin u toqgħod tixrob t te hekk se tmur, għax min tweled tond mhux se immur kwadru u qed tifhem. imma jien naħseb li ħadmet.	Retirement depends on what you are used to doing.

Post-retirement

Extracts	Interpretation
Filgħodu qisni bqajt iqum l –istess jien però flok iqum fl 04:30 – 04:45 qisni qed iqum għas 06:00.	Routine is similar but less strict to try and maintain the same work routine.
Qisni ittardjat siegħa, Jien ma jkollix x nagħmel, x iqum nagħmel biex noqgħod niċċassa. Fil bidu kont iktar kont nixgħel naqra naqra news BBC.	This change is due to lack of set appointments. No purpose to wake up early.
Computer xejn qabel kont kien ikolli għalxiex, għax daqqa ġejja festa irrid nara kif ha nagħmlu xi haġa u tikkuntattja lil daww u daqqa fuq il facebook u issa se nagħmlu hekk u, ma xulxin, issa xejn u.	The lack of purpose results in decrease use of technology. No motivation, purpose to do things.

Extracts	Interpretation
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Issa bħalissa qed nagħmel proġetti, tgħidli x inhuma dawn il proġetti,	Out of initiative finding a purpose, which is interesting.
Għandi xi żebgħa żgur x imkien, il bieraħ zbaht bl aħdar u naqra abjad,	Excitement about what he is doing.
qed nagħmel l pinnuri issa, jekk trid tordna xi wiehed,	Proud of what he is doing.
.... Iva. S'issa għamilt tnejn, wiehed normali biex ngħaddi żmien u iehor kien fih naqra xogħol imma dan fih aktar xogħol. Qed nagħmel wiehed imma ic ċuċati għax	This is only to be active as I have nothing to do.
m hemmx instructions jew hekk, jien qed nara fuq il You Tube u narawhom jaħdmu	Going over and above to do this new hobby.
allura imbagħad inkiser mohhi biex nara kif se jaħdem, għax ma jgħidlek biċċa biċċa, jew per eżempju, issa qed nagħmel raġel u mara fuq see saw	The need to feel tired.
R: ok P: Fuq see-saw għandek li skrun jiġbed wire fildiferruwa għandek fildiferuwa m ġewwa u fildeferruwq iddur, allura waħda x ħin iddur dak ikun qed jiġbed is see saw, allura tila u nieżel, imma dak kollha biċċiet żgħar haddimhom bl injam trid	Highlights that this hobby requires mastery.

Extracts	Interpretation
P: Qabel kellna, ma nafx kemm ilu, issa ilu naħseb għaxar snin kienet gidbet kelba Jovanna ħabba t tifel għax konna sejr in għandi ikun Għawdex, qed niftakar kont wegġajt għajnejja b xi zokk u dak twebbes u imbagħad kien hemm waħda ħabiba tagħha kien ilha tgħidilna Għandi klieb, hu wiehed hu wiehed u din qaltilha mela tina wiehed għal jumejn u minn jumejn baqa' hemm, imma qatt ma kont nagħti każ u hekk jiġifieri. Imma dana qiesu ġie hekk qed tifhem l aktar kien jiehu pjaċir jilgħab bil kelb Ian it tifel jilgħab miegħu u jaqbdu lanqas naf xiex jiena, mhux li, jien sadanittant kont inkun xogħol dak iz żmien. Ma kellhiex dak ic ċans eeee wara ġurnata , jiena minn dejjem kont torqod kmieni, l-istess bqajt ta	Work took most of his life and did not allow him time for hobbies. Now that he is retired he is more flexible and able to carry out hobbies he was not expecting.

Extracts	Interpretation
Fil preżent ma nafx, fil preżent ma nafx imma fil bidu hekk konna, kullimkien magħluq u insomma dan, ISSA ma nafx nerga ngħidlek,	Highlight the importance of going

però qisni tajt qisni qbadt dan tal għalqa u dejjem hemm u dejjem nivvintaw u daqqa għamilt ix xibka, issa qed nagħmel taparsi pinnuri u wara l pinnuri forsi nivvintaw xi haġa oħra, qed tifhem x irrid ngħidlek jien jiena jiġifieri Għandi x nagħmel eh Għandi x nagħmel. Sal bierah stess	to the fields for him.
Mary qaltli kif irqad kwarta qisek qieghed fuq ix xwiek Charles,	Expresses his active personality.
qaltli jekk trid tmur l għalqa mur, ghidtilha Grazzi caw	Urge to go to the fields.

Extracts	Interpretation
L-ewwel ġurnata ferħan li tlaqt, m għandiex x nagħmel, ma nafx min fejn ha nibda, x se noqgħod nagħmel issa, mhux nara it televixin, iva issa Għandi ċans nara it televixin. L –ewwel jumejn tlieta televixin films, it tifel gabli Netflix nara pause wara ġimgha bdejt nixba u zid fl ikel u mm ieqaf naqra u zid fl ikel. Wara xi ħmistax kemm ha ndum nara Televixin zid fl ikel fit tmienja u nofs ta fil għodu ħabib tiegħi, platt għaġin mmm kemm huwa tajjeb l għaġin f'xi tmienja u nofs ta filgħodu	Remembering his first day he felt lost on how to fill his free time. He could do all he wished for and did not have time for. Sitting time increased drastically.
.... Ma nistax nibqa' sejjer hekk jien se nsir daqs бага jekk nibqa' sejjer hekk, qtajt qtajt dik u bdejt nieħu oats biss oats, naqra oats jekk hekk, għax ma tagħmel xejn m għandekx fejn tmur, issa jista' jkun forsi jkollok xi naqra ta problema fix xitwa inkella ix xitwa li ġejja ħabib issa naraw x ġej għax tkun ix xita ma nistax immur l għalqa ħabba tajn, jien immur għadni karma noqgħod hemm imma l kelb kif ha niftehmu joqgħod hemm, dak jiġġennu u jiġġennu lili, insomma	Then there was a realisation phase where he realised, he could not continue in such an unhealthy lifestyle.
U imbagħad għid l uniku mezz imbagħad bdejt ngħid lil Mary, ghidtila Fra ibda tina xogħol xbin u nibda naħseb xogħol li rrid nehda u hekk bdejt u... nagħmel x nagħmel kollox sewwa, jien nemmen li nipprova noqgħod attent taf x jiġifieri ta, imma Anka per eżempju platti biex ikolli x nagħmel filgħodu, taħsel xejn filgħaxija u filgħodu tagħmel xejn int hallijomli għax ha niġġennu ma nagħmel xejn,	Tried and wanted to be busy.
kemm ha idum ma nagħmel xejn kemm ha idum nara televixin, allura biex taħsel l-art u l parapett ma tafx, kif dejjem għandek tlett sigħat jien idum ha ngħid hekk imma l mara ma jdumx daqshekk,	Feeling useless and with no purpose.
imma jiena idum, għaġla ma jkolliex ngħaddi żmien u ngħid in nofs ta nhar ta filgħodu lest , imma din ma taħsilix kuljum l-art u mhux l-ewwel darba tidhol Mary ikun xi żewġ passi tal kelb ha nerġa nġati daqqa ta biċċa, qed Tifhimni jiġifieri heqq tara x' ha tivvinta tara x ha tivvinta daqqa immur ngħid mela ha immur fil kamra, kamra ta imbarazz ngħidilha jien Karl ngħid noqgħod	Especially morning needed to be busy. A need to be doing something.

nirraṅga naqra u dejjem issib x tirraṅga ta per eżempju il bottijiet tal fliexken tal ta ta ta tat l viti tal viti jew tal msiemer ngħid ha noqgħod nilgħabu l –msiemer tal zewg pulziera nitfahhom hawn, noqgħod nilgħabu hekk qed Tifhimni x irrid ngħidlek jiena, il pinzell niġborhom per eżempju kollha f'post wiehed, l għodda per eżempju

Extracts	Interpretation
Heqq l-ewwel ewwel jumejn tlieta fis sixth xxxxxx tiehu gost għax tgħid issa problemi tax xogħol u tqassim tan nies li konna nagħmlu hliet problema ma tismax, għax hemm isfel min icempillek għax għandu problema l bqija ma jċempluli ħadt. Hames telefons idoqu min mindu bdejt ngħid ngħid jiena dan l aħħar kont l aħħar sena id dar kif nidhol id dar jgħidilha Fra mobile titifi u telefon għaqilu, ma rridx nisma' telefons xejn xejn xejn xejn xejn. Kien dejjaqni telefon, kif nisma telefon al allura xhin waqaft hekk bla telefon xejn inkun f'burdata ma nisma' assolutament xejn, lanqas karożza lanqas min inpaċpaċ, għasfur pitirros ipespes naqra u daqshekk.	Highlight the initial happy period of getting rid of the work problems. There were things at work which he did not enjoy doing and was happy to get rid of.
F daqqa wahda nismaghha taqa, in ġenerali,	Sudden change your day is empty.
però l importanti trid tara x trid minnek għax mil bqija ngħidlek jiena taqa' f depression	The need to find things to do.
xxxxx għamilt ħabta u taf x ġrali biss ukoll imma naħseb anke kont ili ġej hekk, sirt inkwieta ħafna, inkwieta u naħseb ħafna.	Change in character is brought about by the lack of purpose and less things to do. More time to think.

Extracts	Interpretation
..... jien naf għal mod tal kelma naqbad kantun tad disgħa u nitfa hawn, hemm ara x għadni. Imbagħad illum tas sitta nerfaw, erfajtu imma x differenza, terfa tmienja għaxra mod u terfa vjaġġ ġebel mod ieħor.	The change in physical strength compared to when he was younger.
X differenza Karl ehhe eh.. u anki kif taħsibha. Ha mmorru l baħar? Immorru l baħar, qbadna u tlaġna u x inhu qbadna u tlaqna, illum irrid naħseb għa għas siggħu, irrid naħseb għal mejda irrid naħseb għal umbrella, irrid naħseb għal... lanqas naf kemm trid taħseb għal affarijiet kemm inkwetat, ħabba x xemx, ħabba x xemx, ix xemx mhux tajba xemx.	Contrast between now and when he was young in terms of mentality.
Intant fil għalqa jien għandi biċċa tinda imma ma noqgħodx inkwetat għalhekk għal dan l affarijiet jien	The changes in the norm. before he was easier going. This is

jinkwieta. Imma qabel ma kont naħseb għalxejn, qbadna ha mmorru, u imxi ha mmorru sal baħar, billi mmorru sal baħar	impacting on the amount of physical activity and type of activity he carried out.
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Extracts	Interpretation
Jiena meta kont qed nippjana biex nirtira kull ma kelli go moħħi kien biss hu, nevitaw da l inkwiet li hawn hawn, nibda hajja ġdida, nibda hajja ġdida, u immur fejn ma nara lil ħadt.	There was no specific time or day he wanted to retire. He only planned to get rid of his work difficulties.
Kważi tiġi anti social għax hekk tiġi, u ilhaqtu għax hekk ġejt, hekk ġejt. Però kultant mhux minhabba fija ħabba l mara ngħid forsi mhux qed nagħmel sewwa. Anke għax ninkwieta, xxxx għax tant mhux ġejt anti soċjali imma daqsxejn per eżempju jekk tiġi inti għandi ha nieħu gost, jekk t'istedina inti biex niġi għandek mhux daqshekk. Ha niġi b riġpett ta darba u daqshekk. Ma nieħu gost noħroġ. Fhimt? Dik però jien anke naħseb dik kienet diġà go moħħi dik ta jiġifieri ta illi jekk jista' jkun ma immur għand hadd imkien,	The change influences his character and his approach to things.
I għalqa fejn ma nisma u nara lil hadd ghax in nies dejquni, dik il kelma. Issa ghax forsi kont hawn imma forsi li kont post iehor forsi xufier tal linja għal mod tal kelma ha jsemmi xufier tal linja, ma jitlaqx ma ħafna nies ukoll forsi xxxxx ukoll kulhadd għandu l problemi tiegħu,	Trying to explain his change in character because of his work.
allura jien ridt immur nqatta mil hajja li kont qed ngħix, nqatta min kollox u immur x imkien fejn ma nara lil hadd.	The change he is experiencing was something he looked forward to.

Extracts	Interpretation
Le zidt zidt zidt zidt zidt zidt. Qabel kont qabel kont attiv ghax anka hawn kont nigri l hawn u l hemm, imma issa qed ngħidlek bil kelb gas down kulimkien,	Comparing to previous levels of activity. He now feels more active because of his pet.
biex naqbad u mmorru chadwick lakes mid dar bil mixi ta u lura ma rrid xejn ehh bih, nehodlu flixkun ilma, tlaqna bruce. L-ghalqa il hin kollu għaddej daqs kemm hlejt ilma u kaloriji l għalqa dan is sajjf insaqqi qatt, u tellajt hajt, l għalqa, eqq eqq eqq	He is now free to go on hikes whenever he wants and wishes too without planning.

eqq, ghabbejt fil karozza, fil karozza ghabbejthom tuzzana, tuzzana. Meta ndahhalom nerfahhom nerga, heqq iddum fih ix xoghol fuq xahar jigiefier eh eheh jien kemm ili barra.	
Forsi f xahar ghamilt hekk, f xahar ghamilt hekk, f xahar ghamilt hekk qed tifhimni?	The need to constantly find things to do and change activities. Finding fun activities.
r: ehe	Activity is exercise for him.
Eqq eqq le le le bhala exercise bhala exercise hafna aktar milli kont nahdem hawn, hafna hafna mili kont naghmel hawn.	
Oh oh kif ma jhalliniex kwiet jien hekk irridu, hekk irridu. Xi kwarta wara li jiddejjaq min jaf kemm inkun qieghed l ghalqa u jibda jinbah jew jara xi haga hemm barra, nghidlu immorru ghaliha? Nghidlu imxi inlibssu c cinga u tlaqna, u malajr kwazi nispicca iz zebbiegh ta nimxu nimxu nimxu nimxu, immorru lura, tlaqna lura daqshekk jigifieri exercise jidher imma ma hxienx bilkemm nghidlek inqazt xi naqra forsi ma hxienx,	Wants to be active and enjoys the activity he does.
le le il hin kollu ghaddej ma nieqafx jien, Eh	Doing enough exercise is no weight gain.
	Considers himself very active.
Extracts	
Interpretation	
R: Tahseb il haga li terga tinda l pjan li kellek hames snin ilu terga tinda tnur ghall festa u affarijiet hekk tixtieq	He managed to adapt to his new routine and is happy.
P: Ma Nahsibx le, le le le kif jien qieghed sewwa, le le. Ma nahsibx illi ha mmur la ma mortx s issa ha mmur biex eh ehehehee naghmel hbieb u hekk,	
jiena fuq kollox qatt ma mort, allura minghajru nghaddi mhux oggett kont per ezempju kont niehu gost, qtajt ghal xi raguni u allura qiesni looking forward li ha nirranga biex nerga mmur. Le far from it, jiena qatt ma kont hemm.	Justification for not wanting to change again based on his previous experience.
Issa qieghed sewwa kif jien, qieghed komdu kif jien, nibqa kif jien m ghandiex ghalfejm immur hemm.	Routine is set and happy.

Claire's story

Claire is an active person; she plans to retire soon but has no fixed date yet. She engages routinely with physical activity and was planning her retirement activities. She is planning purposeful physical activity in fields their family owns by taking care of animals and fields. Occasionally, she engages in long periods of exercise by going on hikes with her family and/or

friends. Her engagement with hikes started since she was young. She recalls with great enthusiasm and a sense of achievement hikes she participated in when she was young. This practice continued until now. She expects retirement to be a busy period in her life with a lot of activities she enjoys. Exercise and being physically active feature within her retirement plan.

Upon retirement the situation changed completely from what she was expecting. Due to the family reasons, she took up the role of main carer for her mother. At the same time the COVID situation developed. This meant she developed her own bubble inside her home with media being her source of information about whether life is safe outside her bubble. Since she was trapped inside, fear of her physical ability getting worse due to her lack of activity developed. She started engaged in a new routine of exercise. This was based on her previous knowledge on how important exercise is to be healthy. Once the family and COVID situation settled she returned to her previous retirement plan. She is now engaging in being physically active in their fields and exercising. However, she is now realising the influence of ageing on her body by noticing how her walking speed has been decreasing slowly. Retirement was a positive experience for her, an awaited change which required adjustment. Her physical activity levels fluctuated since retiring due to the world and family situation.

Extracts	Interpretation
hekk hu, eq gieli niftemu per ezempju	Exercise is not part of daily routine.
nghidu ara llum ma ha naghmlu xejn mixja.	Usually done with partner or friends.
kif ghamilna l gimgha l ohra,	
u imxejna min had dingli u morna sa wied z zurrieq hafna satejn u nofs mixi.	There is a sense of achievement in being active and able to sustain a certain level of exercise.
sabiha hafna dik l mixja u vera.	The importance of surrounding to be active.
tghaddi, ghandek tlajja u l inzul (hehe) nsomma (.)	Highlighting the challenges to highlight her achievements.

Extracts	Interpretation
p: inhossni ahjar, inhossni ahjar gieli ghax jien bniedma ninkwieta hafna e!	Identified the need for her to engage in walking as an exercise.
u tir release tension jien, to release stress jien min go mohhi l mixi tant nhobbu.	Exercise is done for a target, with an aim in mind.
tant niehu pjacir nimxi.	Enjoyable experience which is part of the reward for exercising.
veru ma inhix xi wahda slim,	Being able to exercise and carrying it out is not related to weight.
min dan imma s issa jien nemmen illi li inti ghadek kapaci timxi imxi! (.) fhimt tahlix hin fil hajja nobod nahli l hin ma irridx nahli l hin jekk jista ikun.	Part of her believe system, that she should engage in exercise, instead of being sedentary doing nothing. Exercise is done with a sense of purpose.

le ghadni niflah imbghad meta imbghad naraw.	Being able to exercise is an enjoyment and until I am able to I will enjoy it.
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Extracts	Interpretation
l ewwel net dak mhux xoghli. qed tifhemni	Carrying out domestic physical activity as part of her hobbies.
u nhosni kapaci qed naghmel xi haga li jiena din mhux tas soltu tieghi fhimt. u jogobni hekk li taghmel xi haga (..) jien naf anki, ghidli xse ssemi, mi jaf kemm l darba zbart s sigar jghidu tizbor s sigar per ezempju	A sense of purpose within the activity.
kif qed tghid int, titkellem ma xi hadd illi ikun imdorri mmur l ghalqa u nhidlek l modff tizbor s sigar, iwa jekk	Recognition of being able to do something which she is not expected to know about encourages her to engage in further domestic physical activity.
tinterassa ruhek tkun taf kif fhimt. u xejn ma jaqtali qalbi, ikolli naghmel xi haga naghmilha u nitghallem fuq u naghmilha.	Using activities which involve physical activity to develop her know and sense of purpose.

Extracts	Interpretation
r: xse tagheml la tieqaf? p: (u:m) u kemm se nkun ghajjiena.	The expectation that retirement will be a busy period in her life.
din l attivita li qed nghidlek (hehe) li se naghmel mhux meta nkun off biss, kuljum looking forward ta li nieqaf.	She is enthusiastic about being busy with things she enjoys doing.
imbghad qed nrabbi diga giex ti fniek, (hehe) vera ta! (hehe) biex qed tidhaq! imma bis serjeta u mmur mm meta mmur mar ragel nghidlu halli nalifhom jiena, innatfilhom nalifhom nsomma nghmilhom dak li ghandhom bzonn.	Already planning her retirement activities.
hekk u niehu pjacir !	Highlights the enjoyment of being physically active in activities she enjoys.
naqthalhom l haxix intihom jieklu. u bi hsibni bi hsibni, nsomma ghedtlu diga ghamilli fejn nrabbi sitt tigigiet ()	Emphasising this all part of her retirement plan

Extracts	Interpretation
p: taf li min dejjem.	Exercise is part of her lifestyle
u l hadd kien dejjem johodna mixja twila.	Exercise was a weekly activity when young.

kont niehu pjacir dejjem qatt ma naf li ghedtilhom erfewni. dejjem kont nimxi kont niehu pjacir nimxi. imma meta kont zghira. imbghad bdejt nigber konna mmoru hikes daqqa ma tal knisja, ma tafx inti.	Sense of achievement and enjoyment in recalling her exercise activities.
dak z zmien kienu poplari hafna l hikes. anki min had dinjgli sa tas sliema mort.	Walking hikes were part of the culture, which she was brought up with.
r: ok p: le vera ta (u:m)! r: twil p: hafna twila, u igifieri wasalna filghaxija min filghodu imbghad lura btal linja. igifieri u wahidna lura (u:m) fid dlam igifieri vera jidlam kmieni imma. mhux forsi waqafna xi nafa nieklu li kelna mana stess igifieri qas morna niekolu x imkien jew hekk. dak z zmien ma tanx kien poplari. li tidhol tiekol x imkien. u u kif wasalna tas sliema tal linja u. domna gurnata sejr in. imma ma kontx naqta qalbi niehu pjacir immens. imment kont niehu pjacir.	There is a sense of achievement in what she manages to do since she was young. Highlighting the continuous effort required in the long walks.
r: qisek zammejt p: iwa, hija xi haga li li ittini hekk. baqet ittini dik l kuragg li nibqa ghaddeja. li mmur nimxi. sabiha. imbghad dejjem mill kampjanja.	The sense of achievement since she was young provided her with the motivation to keep on repeating the activity.

Extracts	Interpretation
P: l- ewwel gurnata, malajr sibt x naghmel.	Retirement was busier than expected due to event out of her control.
Nghidlek il verita ghaliex ghibt lil ommi tghix mieghi minhabba l – covid u ommi kella 89 bid- dementia	Family choices and global life events influenced her retirement plan.
u dejjem kelli x naghmel maghha. Jigifieiri okkupajt hini bil- lejl u b' inhar ghaliya u ghal familja. Irrid inlahhaq mal- familja xorta wahda u insomma	Retirement was busier than she ever expected in juggling the different unexpected situations.
ikkopjajt bl- ghajnuna t' Alla, bit tajjeb u l- hazin.	Spiritual support and trust in the difficult situation of adjustment.

P: Iwa iwz. Dazgur. Dak xejn imbaghad. Xejn, ghal bidu xejn. Xejn xejn ghall bidu li harget il covid.	There was an adjustment period. She had plans which she had to change.
Nahseb ghamilna, nahseb ghamilt qrib is sitt xhur ma hrigtx xejn. Ghax il covid qisu u ommi gew flimkien qisu hawn. Fl istess zmien, allura imma imbaghad meta qisu ssetilja naqra skont l- ahbarijiet issetiljaw l- affarijiet	Due to the COVID situation she got detached from the world. She went into a bubble and the television was the key to the world.
bdejt nissograw nohorgu naqra.	There was a lot of fear to re-introduce activities which she enjoys. Attempt to normality.
Kont nohroga fuq il wheelchair u nitla l cliffs hekk ninbuttha u dan. Ma kontx nieqaf imkien biex ma nieqafx jew jigi ikellimni xi hadd. Lanqas nissogra noqghod bil qeghda ma kont fuq xi bank jeww hekk ghax kont nibza. U insomma u kont nohrog naqra hekk.	The social aspect of exercise was removed due to COVID. However, she still identified the importance of trying to be active.
Ikkowppjana hekk kif stajna insomma. (..) Jien ma kontx nohrog minhawn ehh.	Highlighting how difficult and unexpected the situation was for her.
Dejjem gewwa anki l quddies fuq it television. Il hin kollu imma nsomma (rassenjata)	She highlights that she had to give up even important aspects of her life.

Extracts	Interpretation
P: Ijja Ijja, u bil haqq ghax insejt nghidlek. Jien kont nibza li niggamja hawn gej.	She was aware of the consequence of reducing her mobility and the impact this would have on her health.
Allura kont noqghod naghmel l-exercises niftakar.	Developed a new routine to carry out exercise which she perceived would help her to remain healthy.
Kuljum kont naghmel ftit exercises jew nitla t-tarag. Tieghla u nizla. Fhimt.	The importance of a sustained routine.
Biex ma niggamjax hawn gej.	The exercise was done with a specific aim in mind.
Kont nibza lu mhux se nibqa nimxi. U kont nibza.	Consequence for the increase sedentary behaviour.
Dik peress li nhobb nimxi hafna hemm xi haga li kienet tbezzani illi em peress li kont ghamilt tul ta zmien hawn gew ma nibqax. R: Jigifieri dik is-sena li ghamilt hawn kont toqghod taghmel l-exercises.	Based on her previous experience of her health and how she was feeling in not being able to carry out her usually exercise pattern she was scared of losing her ability.

P: Ixa kont. Kont naghmel exercises, ghax kont nibza. Kont zidt naqra fil weight ta imma ukol jigifieri ghax sissa (laugh) igifieri kont zidt naqra fil weight imma ghenitni naqra. Ghenitni illi kot naghmel nqara exercises.

Extracts	Interpretation
Ha nghidlek. Ifhem. Imma issa jew ghax xi kultant	The experience was difficult to explain based on her knowledge and previous experience.
jien ma nafx jekk hux normali li jigrilek hekk.	She was going into uncharted territory of ageing.
Ghax issa ghandi 64.	Age is a realisation of her getting old.
Hemm qisek mal mixi indunajt li mhux nghaggel nimxi daqs qabel, fhimt? Dik xi haga normali?	Realisation that age can result in her being slower. She questions is this is happening to her who is physically active.
Ir ragel jien pero ir ragel tieghi irqiq. 60 xi haga jizghen. Jigifieri jien kont fuq 90, issa qeghda 86 ghax bdejt naqra dieta	She tries to make comparison with her husband to decide whether this is what she should expect.
. Imma xorta qeghda nghid (.) Dan l-ahhar qed nghid ma ghadniex nghaggel daqs qabel.	Her reasoning for why she is slower is not making sense to her.
Ma nafx jekk hux normali jew inkella.	Still undecided whether she is experiencing is normal.

Extracts	Interpretation
P: Ha nghidlek ta ghax joqghodu jghidu hafna.	There is a cultural expectation of retirement
Ha nghid tieghi jien kif nahsibha.	But I have a different experience to what is expected.
Sirt naf izjed lir ragel tieghi. U apprezzajt taf li dan hekk napprezzah izjed u qed nirrealizza kemm jaf hekk qabel lanqas kont ninduna ghax ma kienx ikolli hin. Ninduna kemm hu bniedem per eżempju qabel ma kontx naf illi jekk ghandna kel jifrah bil kelb jekk ghandna qattus, ghax qeghdin maqfulin minhabba fik, emm tghidtx kem jifrah bih jigifieri vera jaf ihobb. Irrealizzajt kemm jaf ihobb jiena zegi. Qed tifhimni? Jigu tfal tghidts kemm jifra. Veru hekk, qabel ma kontx naf li hu hekk. Le anzi affetwani hekk posittivament. Sirt naf kif inhu vera zewgi. Qed tifhimni?	Explaining the positive impact of retirement on her family relationships.

Lilly's story

Lilly was planning to retire within the next 6 months. She has been planning for retirement for the past 10 years. Her work, even though she enjoyed it, was seen to impede on her plans to exercise. She was pressured to fit everything in one day. This was not the case when she was younger, were she used to fit family errands and all her activities. She was more energetic. However, now this feels like stress. She attributes this to her ageing body. She feels her body is getting older and her energy levels and recovery are longer than before. Exercise has been part of her life since she was young. She recalls stories of her exercising since she was in her 20s and 30s when she started exercising regularly. It has always been in her to be active and exercise she was quick on her feet. Part of her wanting to be active and exercise is because she defines herself as wanting a challenge and be involved in different things. Comparing herself to other colleagues she thinks she is more active and involved. This is her way of keeping physically and mentally active. Exercise is an integral part of her life.

With the COVID pandemic looming near her retirement, Lilly decided to continue in 'employment'. When they were asked to work from home this provided her with the right opportunity to start with her 'retirement plan'. She had the time to be more active and was able to fit things better. Her retirement started without being retired. Even though retirement was something she looked forward to it still brought with it fear. The adjustment the change into something new was a challenge. Work provided a routine a motivation to be active. Being retired resulted in difficulty being motivated. She developed her own way of keeping motivated and cope with the change. Exercise was now possible with less pressure with retirement. COVID was another opportunity with ghost streets providing an excellent environment to exercise outdoors. However, now health problems started kicking in which were limiting her exercise ability. She needed surgery, developed hand problems. These were making exercise harder and more difficult to participate. The daily activities when not exercising were filled with mentally stimulating activities in sitting. She admitted that she is spending more time sitting compared to before. Even though she is actively carrying out purposeful, mentally stimulating activities these are all done in sitting.

Pre-retirement

Extracts	Interpretation
r: so you can start with your experience in physical activity p: so i would say, when i was in Malta i did think that much about it except, i came swimming and yes 9.) i did like mm activities with movement obviously in it. mm but i'd say when i was in early 30s	Long time ago, she has a history of doing and participating in exercises.
i was working for the MOD mm and they use to encourage us. the gym was nearby so in my lunch break i used to go to the gym and i used to have three quarters of an hour to an hour really. yeah and so that is when it all started and mm continued. so when the gym stopped haha.	Received support from work to start and take part in exercise.
it was early 40s and i decided to learn to ride the bike push bike.	Emphasising the length of

	time she has been exercising. Conscious decision to learn cycling as a result of her enjoying other type of exercise.
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Extracts	Interpretation
P; its always been in me. yes yeah. and i was very light on my feet from what i can remember. but i wasn't in my 20s really. i moved from malta aged 18. mm	Build on the previous experience that its always been in her to do exercise.
but i wasn't doing anything that much really. and.	She was physically inclined to be active
it was early 30s that i started going to the gym. but i did some aerobics before	However, not always as active as now compared to when she was young.
something i've always done i would say. yes mm bike always going sangly walking a lot.	Emphasising since being young.

Extracts	Interpretation
p: yes and i cycle to work, and mm what i hope from retirement	Routine exercise is already in pace Identifies that she has a plan for retirement
is i will actually mm cycle go to different villages its a towing bike what i have, its an ebike before i had mm the normal bike,	The plan includes carrying out exercises
mm i did have arthritis pretty badly. but i still carried on. painful as it was.	The importance of exercise in her life and even though it was difficult because of her belief she continued to exercise
now that i have an e-bike i've got my mind at rest. i'm better now with my mm arthirtis through the stem cells mm but also the fact knowing that if i've got hill mm and its wearing too much on the joints then the battery soon kicks in.	In her will to continue and be active she identified ways to cope to continue doing what she enjoys.

Extracts	Interpretation
p: i mean i can do more if i have the time. if i retired i am to do more.	Retirement is seen as an opportunity.
that my priority. retirement is for me to do more.	Exercise is an important part of her plan

if my health allows me i will do more mm r: do more?	The plan is based on whether her health allows her to be active. Only foreseen barrier is health
p: i want a balance in life. its not just activities i have to use my head. i go to.	Work is not allowing her to have the balance she wishes therefore retirement will provide this.
i'm constanly going into things that other people would not dream of!	The need to be active
like i'm being, like i use to administer my sister who is disable mm and i was her curator for 10 years and mm i do databases. so i want my brain to be working i'm the administrator of the block i took it upon myself that mm i'm not e (.) i think in me is a matter of (.) its not a matter of me.	Identifies herself as different from other people as being more energetic and wanting to be involved in different activities not just exercise.
i do want the control if it effects me. i don't want to control any body. else but where, if it is mm if its finances or whatever i need to know exactly what is going on and they have given me so much hassle trouble these other administrators that i took it upon myself that i will do it. but to do it you have to go in depth and ensure that you are doin it the right way.	The motivation is for her to be in control of things.
so yeah i want to be occupied brain wise as well. looking to do some may.	Wanting to be active physically and mentally. Exercise is part of her 'active' lifestyle.

Extracts	Interpretation
p: yeah. i think my problem been is that if this stops i am scared that i will get depressed i don't know how to cope with it i think (.) but (.) if something happen to my brain or if something happens to me physically then i just dont know. i would just go (u:m) so there is a negative side to this as well (.) i think. r: what do you think..	Exercise is an integral part of her life. Which she would grieve if she lost the ability to carry on exercising.
p: cos it depressed me when i was in pain with actiities and it really it was to the that that. I (...) (teh) i did want to (...) i didnt want to life! i thought no! if this is (.) i dont want to (.) no! mm (..) it came to mind and that is the truth (.) yeah (.) so hey bit it will happen one day that i will be stuck may be in a wheelchair i don;t kow, dont know	Identifies the importance of exercise for her health. She is aware that with her decreasing health she is likely to stop exercising when she gets older.

Extracts	Interpretation
<p>p: i hope not! i've been waiting and waiting mm so that i've always for the last eee 10 years if only I had more to do to come swimming more to, cycle, mm i use to play Badminton bytheway before as well. in fact that is how i met. cos i left malta mm age 18 and i was introduced to playing badminton in and go back in 76 and ee we didn;t have any gym over her except in military ermm the RAF and so i was one of those who was trying to get a work permit in those days. mm to work in the UK and they said 1st question is do you play badminton? (laugh)</p>	<p>The expectation for retirement. The plan has been there for 10 years.</p> <p>Highlights her plan and the different activities she wishes to undertake. It's always been in her to wanting to exercise and continue improving her abilities in sports.</p>
<p>r: thanks to sport p: i i like it, i wanted more of it and i knew that in malta we had no gyms and the only way i could play badminton is by getting with someone british who would take me to the ftm and play badminton and that is how we met actually.</p>	<p>Exercise being part of who she is.</p>
<p>r: ok.. very interesting p: and that is connected as well isn't it (laugh) it was in me, and when i said to you that in my 20s i didn;t do much i did actually, yes yeah</p>	<p>Its been part of her life for so long that she cannot remember when she started being so active.</p>
Extracts	Interpretation
<p>p: should be easier what i expect from retirement is that i will</p>	<p>Retirement is seen as an opportunity to plan her activities.</p>
<p>.. i am getting tired fitting everything in well</p>	<p>Unable to cope with the different activities she has.</p>
<p>before i always had a very busy planning, organise, family, cos i had the family as well and finding the times, but as you get older you, your tired you don't have quite as much energy as much as you had. the resilience is not as much. mm as you're old and I'm feeling more now past the 60. i can feelin it that I'm slowing down, i use to fit in much more in a day than i do now.</p>	<p>Compared to previously when she was younger. She feels her ability to cope now is less. The reason is because she is getting older.</p>
<p>so i hope that retirement will make it easier then more difficult it will be easier for me to organise the activities that i'd want.</p>	<p>Reaffirms retirement as an opportunity for her difficulty.</p>

Extracts	Interpretation
<p>r: so basically getting rid of the work activity it will allow you more nergy to do activity. the lack of daily routine.</p> <p>p: becuase it causes me stress. well if you call pressure or stress!</p>	Work at her age is causing her extra pressure as she is unable to cope with her planned activities.
<p>thats my stress i am not able to put in, like ive been swimming i dont have the time to chat with the locals. i dirim dirin change back,</p>	Her expectations with retirement.
<p>cos i got so many other things to do but i don't have the time. at the moment, but i can take it more at my own leisure i plan to go on the bus, mm the environment i believe in keepin the environment clean and havin, i've always driven cos you don't have time to get a bus anywhere. i hate shopping mm but then i can go on the bus cos i got more time</p> <p>r: ok</p>	Business with the different activities she plans.
<p>p: and we plan may be go walking we experiment with that but because we go to gozo we do that in the wnter cos i hate the sun ,, and (.) so it has to be (.) gozo so called winter in malta when you can get it. and mmm i don't mind the raint i don't mind the wind. its more the heat that i don't like but what we do we get in the car go to gozo and we start. we stop we take snacks with us and mm walking we do two and a half hours walks.</p> <p>r: ok</p> <p>p: i mean there and back. two and a half hours and then we have a snack, drink get in the car drink, drive somewhere else and then walk and that what we do yeah! my husband does that as well. mm and then we just have dinner and get the ferry back. that is something that we do and</p>	Her dream, her plan for retirement.
<p>i hope we have more time for that. that is what i want from retirement. not doin it trying to fit it in when there a carnival holiday or and the Christmas holiday i go to the UK with the family so. but again we do walking there as well so.</p>	Her hope is retirement being more time

Post-retirement

Extracts	Interpretation
<p>P: yeah, so maybe it was more. Yeah, I mean I was itching to retire</p>	Urgency to leave work and start a new routine.

so that I have more time...too. Uh, for the outdoor. But I'm full of cold, but I will be going swimming today. Mmm I'm feeling better. If I'm feeling very tired and that I won't go. But I'm feeling better still with a cold. But I would go swimming I believe. It will. (gesturing) It will help me clear it. I've done this before so (.)	Retirement was seen as an escape to implement her plan and have more time for exercise.
R: OK, P: it's my how I see it and I know you worse when I went swimming and I've got a cold. It depends if I've got the flu. I'm not going, yeah, but I feel today well enough, although maybe you can hear me that I've got a cold yeah, banged up, but uhm, but I think I'm over the worst. So yeah, that's my mentality.	Her perspective and mentality on how to approach exercise.

Extracts	Interpretation
You're still very active as it used to be before? P: and that's what I get upset. I'm getting older, I slipped mmm I went to rinse my feet and it was it. It was in the summer, September and I hurt my wrist.	Getting old is slowing her down and limiting her activity as recovery is slower.
I take because I'm getting older. I take a long time to recover. R: OK, P: and I still can't use my the wrist to the thumb. Mmm It takes an awful long time to get. Uhm, back together that stopped me from cycling.	Highlighting the limitation of her injuries which she attributed to her age.
But I did Cycle I bend. I put support on it and I managed to find ways of changing the grip 'cause using the thumb was the problem.	Perseverance to continue exercising.
Uhm, but I still cycled. I think I did about 30 K's. Uhm, R: OK, P: noo we have done 54, 55 K two in one right. Yeah! So. And two.	Highlight her achievements even though she is injured.

Extracts	Interpretation
How was your first day of retirement is and how did you feel? P: Very difficult to say. It is the first day to me. The first day was when. Mmm The school was shut. Because of COVID. And that's where my retirement started, really. I went back to school working only for. Uh, what a beginning of October. I think it was. It's not. We went back up until Christmas time, so I only	Due to COVID the transition from work to retirement was not specif. she went into retirement but still received a pay. She used the covid opportunity to adjust slowly within retirement.

<p>had. Well October November, December working three months working and I was relieving at a time but still the hours were in school but from January the year before, UM. To me that was my first day of retirement.</p> <p>R: OK</p> <p>P: yeah, when did they pull? I was getting paid. But for me it's just a matter of being paid the rest of it. It was as if I was.</p>	
<p>I was like a bird coming out. Get out of the cage. I just couldn't have enough of the outdoor at this time.</p>	<p>Retirement was a relief for her</p>
<p>While everyone is fearful of COVID and I was so pleased that people were not out and about and I am out outside, I longed for it.</p>	<p>COVID provided her with an opportunity to be more active outside.</p>
<p>As I said, you know I'd say at least seven years before I've waited for retirement so that I enjoyed my work. But I also. Knew I want more time. ee for the outdoor.</p>	<p>The plan was better than she expected.</p>
Extracts	Interpretation
<p>R: It's a new beginning. I enjoyed what I had, but now it's time for a change.</p>	<p>Retirement is seen as something new, something fresh which she eagerly awaited. She acknowledges that she enjoyed work, but it was time for a change.</p>
<p>And it is not easy 'cause you have to think. But I was preparing myself.</p>	<p>Even though this was something she looked forward to adjustment was not easy. The feeling of having to adjust brought about fear, uncertainty.</p>
<p>I think when I spoke with you I was already had a plan of things. And in fact I didn't do. A lot of it was fear that I was not going to be able to adjust.</p> <p>I'm going to have too, too much time in my hands and I'm gonna be bored. And if Lilly is board, uh, and uh. So yes, uhm, it's still there. 'cause I I got a phone call it pending and that means I can go in there and look and it is a list of things. What I could be doing in case 'cause then here (point to her head). It goes blank. It's very hard to get motivated, and if it's written down, at least you say OK, well then I go. So that was on the worst scenario I would look at that and start.</p>	<p>She identified ways how to keep herself busy and active which this keeps her motivated. Finding motivation is difficult for her if she dose not feel busy.</p>
<p>I always I (.) I always enjoy learning. So if there isn't the outdoor and it's still time there, 'cause if I am not well because that's what I see now as I get older and I I can't do. I I keep getting injuries through, What I do</p>	<p>Refers to her having to change plans due to her deteriorating health. But exercise is changed with meaningful activities which</p>

physically, and then that stops you from doing things, mmm And it gets me down. But then I used that time to uhm. Learn, things, anything that I'm always willing to learn. So yeah. I would teach myself if necessary. Google these days you can find so much stuff you know.	are sedentary.
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Extracts	Interpretation
P: Yes, yeah. And one thing I learned is if you get older my body physically it gets. I get injuries and then I take a long time to recover. Alright, and also a medically, yeah I need an operation here so that is what gets me down.	Through experience she is feeling that as she ages physically she is regressing and this is impacting her recovery from injuries.
God knows how long it's going to and I've been putting it off. I've put it off and they took me off the list in the end. And every time it's because, oh, that means six weeks not swimming. Which was stupid. I did have some stem cells and they said to me that they it wouldn't work if I have it at the same time as this and ah, and now I'm back on the list and it's coming back on again. Uh, in I think January.	Health problems are becoming more of an issue as she gets older. With recovery being longer.
So I'm preparing myself. I won't be able to. Uhm, ride (.) The bike I won't be able to swim. 'cause I got six weeks I think. Wrapped up a knowing me uhm, I'm very slow to recover so yeah. That gets me down, but what can you do? Yeah.	This is impacting her exercise participation which puts her down.

Sean's story

Sean is a manager and is planning on retiring within the coming year. He is still undecided on when to retire he is still evaluating his options and identify when to retire. Sean finds the daily routine important for him. He tried to be active at work even though his work is sedentary. When possible, he tries to avoid sitting time and carries out walking activity. On his off-days Sean considers himself a hands-on person. He tried to carry out DIY activities and tries to be as active as possible and limit sitting time. He uses TV to relax daily. For him there is a distinction between physical activity and exercise. He tried to be active but dissociates himself from 'now-a-days sport culture. He was not brought up in a sports culture and finds it difficult to integrate exercise in his daily routine, he lacks motivation for it and does not prioritise it. He finds that lack of support from his workplace does not help in exercise engagement. However, when exercise is part of a social event he is willing to participate. According to Sean exercise is something which you learn to do when you are young and become part of you, you either have it or you don't, it is difficult to include it when you are old. Sean views retirement as a challenging

step for him as he is still unsure what to expect and do in his free time.

Retirement was the next step for Sean, his friends were retiring, other members of staff were as old as his children, he has been working for 40 year, it was time. On retirement he found that the lack of motivation for exercise continued and increased further. His exercise participation continued to decrease. He found retirement challenging and is still adjusting to it. The initial period was described as a long holiday, but then there was the realisation that his work routine is not longer there. This made him take up new role within his family, he is increasing his domestic work and other DIY activities which included physical activity. COVID made retirement more difficult for Sean, he was planning to do voluntary work but was unable to. This made it more difficult for him to find purpose in his daily routine. In addition, social exercise activities were restricted which could have results in him participating in less exercise. For Sean retirement was a period where he has more time to reflect due to less alienations from work. This made him realise more about his ageing body and his physical abilities. His physical ability has been decreasing with age but up until retirement he did not realise it was much as he was always active with the next working day. Now that he lacks purpose he is feeling this further.

Pre-retirement

Extracts	Interpretation
P: generalment gurnata tax xoghol inqum filghodu fil 5.30 ta filghodu tibda (.) ifhimni tigi hawn f 6.15 ix xoghol u tibda ir rutina tieghek tax xoghol. igifieri, ghandek gurnata, ghandek hafna giri hawnekk igifieri mhux ftit. Kuruturi u giri -	Highlight the routine within the day.
ma jdejjaqni xejn li jkolli li ikolli certu qadi flok inhalli il haddiehor nghanlu jien ghax nuzah bhala mezz ta naqra ezercizju, fuq ix xoghol tieghi. Igifieri ikun hem qadi generalment mmur naghmlu jien. halli nghid ghamilt naqra (.) x jismu. Il bqija imbaghad wara meta anispicca mix xoghol imbaghad nghid daqshekk, issa gneralment fix xitwa. Fix xitwa ikun dalam u ma nsibx hin. pero fis sajf generalment wara ix xoghol jew immur dik in nof siegha, nofs siegha mixi. jien Naghmel dik l mixja ta nofsiegha kemxejn naqra mhux slow, naqra fast, fast pace, qed tifhimni, imma fis sajf ghax fix xitwa fix xitwa titlaq min hawn fid dlam pjutost u ma insibx hin. Il bqija il gurnata tal frank, franka tkun aktar attiva.	Attempts to be active during work. He tried to be active and limit amount of sitting time. Work is considered activity enough for the day.
Generalment inhobb naghmel hafna xoghol ta l idejn, igifieri ix xoghol ta maintenance u affarijiet hekk nghanilhom jien.	His activities are DIY activities and hands on activities.
igifieri ma tantx nhobb inqatta hin bil qeda jiena igifieri, kelli nghanel kollox quddien bank ma noqodx.	He tried to be as active as possible and limits sitting time.
R: ok P: Igifieri mhux il hin tieghi u ma ghandix siesta wara nofs inhar, igifieri tibqa ghaddejja il gurnata. Imbaghad qisa sa 6 imbaghad wara naqa television u affarijiet hekk, relax. dik	He uses TV watch as relaxation after 6.

qisni l gurnata.	
Extracts	Interpretation
P: Motivazjoni ifhimni, motivazjoni l iktar ghax, u forsi il mentalita illum illum hemm drive aktar li	He dissociates himself from nowadays sports culture.
I exercise huwa parti mill hajja li huwa (..) bzonjuz. Qed tifiemni. Kultant naqra ghass zejzed ikun. p: kultant?	Exercise is not part of his routine. There is a difference between exercise and physical activity for him.
r: ghass. Ma issibx time management. Time management importanti nahseb jiena na tantx i advocate time ghal ezercizju, hemm cans ta aktar! R: kif kont qed titkellem tidher li int aware ta l importanza ta l ezercizju P: Hafna hafna R: igifieri in nuqqas ta motivazjoni xi tkun li ma tghamilx	Reason for lack of exercise is time management and explanation which and it not being part of his routine.
P: Jew ghax ma insibux dik il push. dik n naqra. Hawnhekk ma ghandekx gym ma ghandekx fejn tmur. Ara per kazu ghandna ghandna group hawnhekk li mmoru darba fix xahar immorru nghamlu mixja. Haddiema ta XXX igifieri, tobba kull gradi. igifieri Nghamlu fuq 15 il kilometru. Per kazu il gimgha l ohra 15 il kilometre igifier fast pace, eh dik naghmluha darba fix xahar.	There are environmental barriers which he identifies that could limit his exercise engagement.
Araaaa ikun hem xi jimotivak - ghax ha niltaqaw - ha naghmluha. Jekk toqghod tigi wahdek ma tattendix xi grupp x imkien fejn l isports huwa xi haga importanti ma taghmilix	He requires the right push to exercise which is the social side for him.
Extracts	Interpretation
P: Ma tantx. Ifiemni (.) ma kienx, ma kienx hemm qisu xi haga dawshekk importanti fil hajja li l attivita fizika jew tkun (.)	No event which made him start exercising.
kif taqbad tghida, jew tkun inklinat lejn l isports aktar tkun inklinat lejn cetu xoghol jew li taghmel li.	Exercising is a personal inclination which start since we are young.
Illum tara Hafna zaghzagh illum ghandhom hafna opportunitajiet. Qabel ahna konna limitati. Ifiemni trid tqis, qed nitlkelmu	Previously not an important part of the culture.
I exercise ma tibdix taghmlu meta tikber. L exercise jikber mieghek, tifiemni.	Change is not possible when you are old.
Dak iz zmien ma tantx konna - naqra football, basketball tifhimni, ma kienx hemm dawn, Illum hawn ara kemm ghandhom sports centres u imbarazz iehor. Ma kelnix dak iz zmien ahna.	Dissociated himself from the culture of exercise.

Extracts	Interpretation
P: Heq ha nghidlek, nixtieq li naghmel. Imma kultant tghid hafna u l affarijiet jigu differenti. Igifieri ma nafx. Emmimni qed nara big question mark ghax li tghid moghod u li taghmel moghod. Li tghid ha immur naghmel xi haga moghod u fir rejalta generalment tibda b hafna entuzjazzmu in the long run. Jien qed nibza li l irtirar hija xi haga stramba.	Negative outlook towards his future retirement. It is unclear for him how life will be in the future.
Qed nara xi haga li hija, li tkun trida ghax trid tieqaf tistrieħ xi darba. ghax ix xoghol taghna hawnhekk hija xi haga mhux karita, mhux hekk risponsabilta kbira. Pero xorta, qed nibza, qed narah li gej vojtt kbir qed tifhimni. Issa skond kif se jimpatjak psikologikament. Jekk psikologikament int tibda happy ifhimni li li tghid isma, issa ghandi il hajja,	Retirement is a yes and no things for him.
Ghandi iz zmien tieghi, ha naghmel xi haga ghalija. qed Tifimni issa naraw ghax hija big question mark kif ha immorru. Tinsiex li inti hajatek kollha kien hem raguni.	It will give him an opportunity to have more time for self.
Studjat, ilhaq, hdimt, hdimt, hem xi haga. F daqqa wahda inti se issib vojtt quddiem hekk, jien hekk qed li. F daqqa wahda inti gejn redundant, inti ma ghadex impjegat, inti anzjan.	But he will suffer from lack of purpose.
Int il pajjiz ha jghidlek bniedem anzjan inti, anzjan! heq eq l istorja qed iddoqq differenti issa. lejn bdejt niehu xi pilloli tal presjoni fimt. Issa skond l psychologija mohhok kif se jahdem.	It's a societal statement that you are now old.

Extracts	Interpretation
P: Qed nibza li il hajja f daqqa wahda kienet mimlija u f daqqa wahdi tigi vojta. Inti ghandek sense of belonging bhalissa. Ghandek il post tax xoghol, ghandek il possizjoni tieghek, hemm xi haga looking forward.	Fear of not having a purpose of losing his need. Work provides a purpose.
F daqqa wahda kuljum tqum id dar. Hobbiex ma tantx Ghandi jiena.	No plan of what to do once work stops.
Igifieri I'm not looking forward li issa Ghandi ic cans se naqta il hin tieghi,	Not something he looks forward to.
ghax l hobby tieghi kien ix xoghol hawn hekk qed tifhimni. Issa f daqqa wahda x se jigri. Se jkun bizejjed mottiv jien naqbad mmur nohrog ha nghamel l ezercizju. Dik il biza tieghi jiena.	No active side outside his work.

Post-retirement

Extracts	Interpretation
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P: Ifhimni bhala esperjenza l-ewwel tkun bhal qisek qed tistennija imma imbaghad issib qiesu dik il bidla f daqqa filli inti qed tqum ghax xoghol u filli ghandek rutina filli issib qiesu certu vojt.	Show that retirement was not a full approved decision. Finding himself in a situation which he is not really looking forward to.
F daqqa ifhimni ghal ewwel ftit gimghat ma tibdiex tirrijalizza ghax qiesek ghadek holiday. Inti qiesek ghadek waqaft mix xoghol. Ghadek frisk mix xoghol. Tiftakru. Imma meta imbaghad x hin jibdew ghaddejjen certu xhur tibda tirrijalizza li hemm bidla.	The change into retirement is a gradual one starts with a feeling of a short holiday and then after a while you start realizing that this will be new norm.
Hemm kambjament fil hajja. L-ewwelnet filli kellek xi haga ghalxiex biex qisek tahdem tqum. Hdimt ghalijha hajtek kollha f'daqqa wahda spiccat. Qed tifhimni f'daqqa wahda int anzjan. Qed tifhimni. Differenti.	There is a realization phase that a change is happening.
Il hajja tinbidel. Tinbidel hafna. Il perspettiva tibda tara l –affarijet min angoli differenti nara jiena. Il hajja rajta jiena inbidlet f daqqa. Qisu ghandek switch. Cupp tfejt u xeghelt.	Emphasizes the change experience. You realize about the losses.
Qed tifhimni filli kien hemm qieek ghalxiex thares il quddiem. Ha nqum ghax xoghol, ghandi hekk, ghandi hekk qed tifhimni.	Finds himself with no purpose.
F daqqa wahda trid tipprowa tara biex ha timla daww il hinijiet. Ghandek hin iktar tieghek qed tifhimni.	Attempts to adjust, the adjustment is forced.

Extracts	Interpretation
R: U dil bidla hassejta mil –ewwel gurnata jigifieri? P: Le le mhux mil-ewwel. Ghax ghall –ewwel qiesek ghadek ifhimni qiesek ghadek bil holidays. Qiesek ghadek ifhimni (.) ma bdejtx toghmod ir realta.	Described the feelings of the dealing with the change.
Ghadek ma bdejtx thoss il vojt. Qed tifhimni. Bil mod. Qisu wara li jibda diehel iz zmiem imbagahd tibda tirrealizza li l –hajja issa nbidlet. Mhux mil-ewwel.	A moment of realisation.
Jigifieri qisek hadt xahar long leave qisek ghadek vaganza. Fil bidu ghadek vaganza. Qed tifhimni. Qisek tkun ghadek ferhan. Issa m'intiex xoghol aktar ghal bidu. Imma imbaghad tibda tirrealizza li hemm meaning iehor. Ifhimni. L –affarijet narahom rajthom imbidlu hafna jien.	Holiday period the initial phase, then there is a change in perspective
Inbidlu hafna u fis sitwazzjoni tieghi per kasu hassejt hafna n nuqqas tal pazjenti tieghi. Hassejtu. Naf li ghadhom hemmhekk ghadhom qed jghixu fid dar.	What makes it difficult is missing work

Jigifieri kelli relazzjoni tajba hafna magghom. Jigifieri qed tifhimni. (eemmm) U kollegi u affarijiet hekk qed tifhimni ma tibqax tiltaqa u taghmel.	Dealing with the losses
Dil kwistjoni tal covid iktar kompliet aggarvat l –affarijiet. Fejn konna nohorgu tiltaqa ma tibqax hux minhabba s sitwazzjonu. Allura il bidla imbaghad thossa. Imbaghad hemm tinduna.	The influence of unexpected things such as COVID

Extracts	Interpretation
P: Il gurnata ifhimni tipprova taghmel ifhimni.	Effort involved in adjusting.
Jien perkazu il mara tahdem ghadha, tahdem u t-tfal ghadhom mieghi allura nipprova ngħin naqra fix xogħol tad dar.	The change in physical activity is a result in the change in role.
Imbaghad trid tiehu certu responsabilitajiet int, tifhimni. Per kazu naqra xogħol tad dar, naqra qagħdi u affarijiet hekk. Naqra hobbies. Forsi noqghod nilghab naqra il garage u affarijiet hekk. Qed tifhimni.	Your initiative to adjust.
Timlija hekk il gurnata. Gurnata b gurnata.	Spare time which you need to give purpose to.

Extracts	Interpretation
R: Xorta hassejtu l bzonn li tghid isma nieqaf? P: Tindun.	Realisation that something must change and its time for your retirement.
Għax l-ewwl haga huwa diffiċli taccetta li qed tikber qed tifhimni. Tibda tghid il listrina dinja, anki bniedem ikellmek. Kemm ilek hawn? 40 sena.	Realisation of ageing through social interaction.
Tirrejalizza anke jibdew gejjien l-istaff gdid, 18, 20 sena. Daqs it tfal tieghi, daqshom jew ikbar. Qed tifhimni. Sakem tirrejalizza li kbirt li il hajja qed tinbidel mhux haga.	Comparison with previous life.
Imma imbagħd trid taccetta. Tghid isma issa wasal iz zmien. Sehemhi tajtu. Ma jiddispjaciniex min sehemhi. Ma joddispjaciniex milli ghamilt. Jigifieiri xogħoli jghidirli li tajtu mil ahjar li stajt ifhimni. Ma għandiex regrets.	Need for acceptance of the new life.
Imbagħd tghid isma wasal iz zmien li li (....) tara lil shabek ukoll jibdew sejr in. Il kollegi tiegħek. Konna group flimkien qed tifhimni. Tarhom qed jispiccaw. Qed tifhimha.	Social aspect of other people retiring make you release that it is time to retire.
Tghid issa mela wasal tieghi issa. Its my time now to give up.	Let go unwillingly.

Extracts	Interpretation
P: l-istess baqa, jekk ma traskurajt naqra. Flok insib hin aktar kultanat aktar nitghazzen. Issa tghid ghandi l hin kollu tieghi tibda tahseb li ha zzid. Nahseb l-inizzjativa hemm baqghet. Hallejta warajja.	Lack of motivation to exercise.
R: Mil ewwel imma jigifieri jew ipprivajt izjed naqra exercise fil bidu imbaghad f daqqa wahda P: Ma zidtx ma zidtx, ma zidtx.	Connect to pre-retirement exercise was not a priority.
R: Qabel forsi kont tmur timxi? Ghadek taghmila dik il mixja? P: Ftit imma naqqast.	An overall decrease according to him

Extracts	Interpretation
P: Jien nahseb l-abilta tieghek l-esercizzju, l-ewwel net dan d drive irid jigi minnek l taghmil ghax cans hemm. Ghax ma tkunx trid u is sahha. Is sahha ma tibqax li tkun. Issa tghidli xi naqra aches l-hawn u l hemm jibdew gejjien. Jew naqra irkubtejk jew naqra hekk. Qed tifhimni.	Ageing and decreasing physical strength.
Allura l abilita tieghek ta l-esercizzju ma tibqax l-istess. Tista timmodifika ta jigifieri. m inhiex nggid li x jismu. Tista timmodifika imma s sahha ma tibqax l-istess.	Ability decreases with ageing.
L-energija li kien ikollok qabel. Mhux min mindu irtirajt, mhux f sena se tmur daqshekk lura. F sena. Imma imbaghad iktar ma jghaddi iz zmien tibda tghid, tirrealizza li naqqast dak in naqra, ma tkunx ghadek avventuruz daqs kemm kont. Qed tifhimni.	Part of the ageing process and not retirement.
Fejn qabel kont tasal sa hemm illum tasal s'hawn.	Comparing to previous levels of activity.

Extracts	Interpretation
P: Ijja ghax ikollok inqas aljenazzjonjoet ghax inti ix xoghol certu responsabbilta. Jiena kont ix xoghol niehdu mieghi d dar.	Retirement makes it more obvious.
Tghidli x jigifieri tiehdu mieghel id dar. Per kazu x se nippjana l ghada. X ghandi ghal hemm u x maghndies ghal hemm. Jigifieri kien ikolli hafna hin.	Working life.

Ifhimni issa ghandek hin aktar li tkun x tahseb. Qed tifhema.	Free time part of retirement.
Qabel kien ikollok aktar ghaljenazzjoni ghax x xoghol kien fih certu responsabbilta. Qed tifhimni?	Work as a distraction as being busy.

Extracts	Interpretation
P: Ismaghni din hija transition, hawn min jghaddi minna u qiesu mhu xejn..	Talking form his personal experience.
Titkellem ma shabek. Kif sejjer. Eh jien immnalla tlaqt. Jien qieghed bomba. Jien immur l ghalqa immur hemm immur nonsob jew per kazu immur qed tifhimni din hija.... U hemm minn idum naqra.	Adjustment period.
Tghaddi alla hares le, alla hares nibqa sejjer biha hajtek kola. Qed tifhimni. Meta imbaghad qiesek issib the right way jew tghid hawn qieghed issa. Meta taccetta kull individwu sitwazzjoni differenti	Still adjusting and is trying to reach acceptance.

Extracts	Interpretation
...It's a personal journey. Ghax jien qabel ma kontx u lanqas kien jghaddili min mohhi qed tifhimni. Kien hemm drabi li gieli kont nghid igri nispicca, xbajt. Imma imbaghad qed tifhimni. It's a personal journey.	Unexpected event even though it was planned before.
Once you are in it imbaghad tinduna x inhuma s side effects. Issa jew tajjeb jew anqas tajjeb.	The ugly side of retirement.
Qed tifhem u s sitwazzjoni giet naqra prekarja ghax minhabba din il covid lanqas tista tghid ha mmur naghmel gurnata volontarjat. Jien kieku lest kont immur nghid ghamilt gurnata.	Lack of purpose which needs to be filled.