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Biopsychosocial Efficacy of Online Laughter Yoga in Higher Education Staff during COVID-19

Morley, Sheriden

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By

Sheriden Morley

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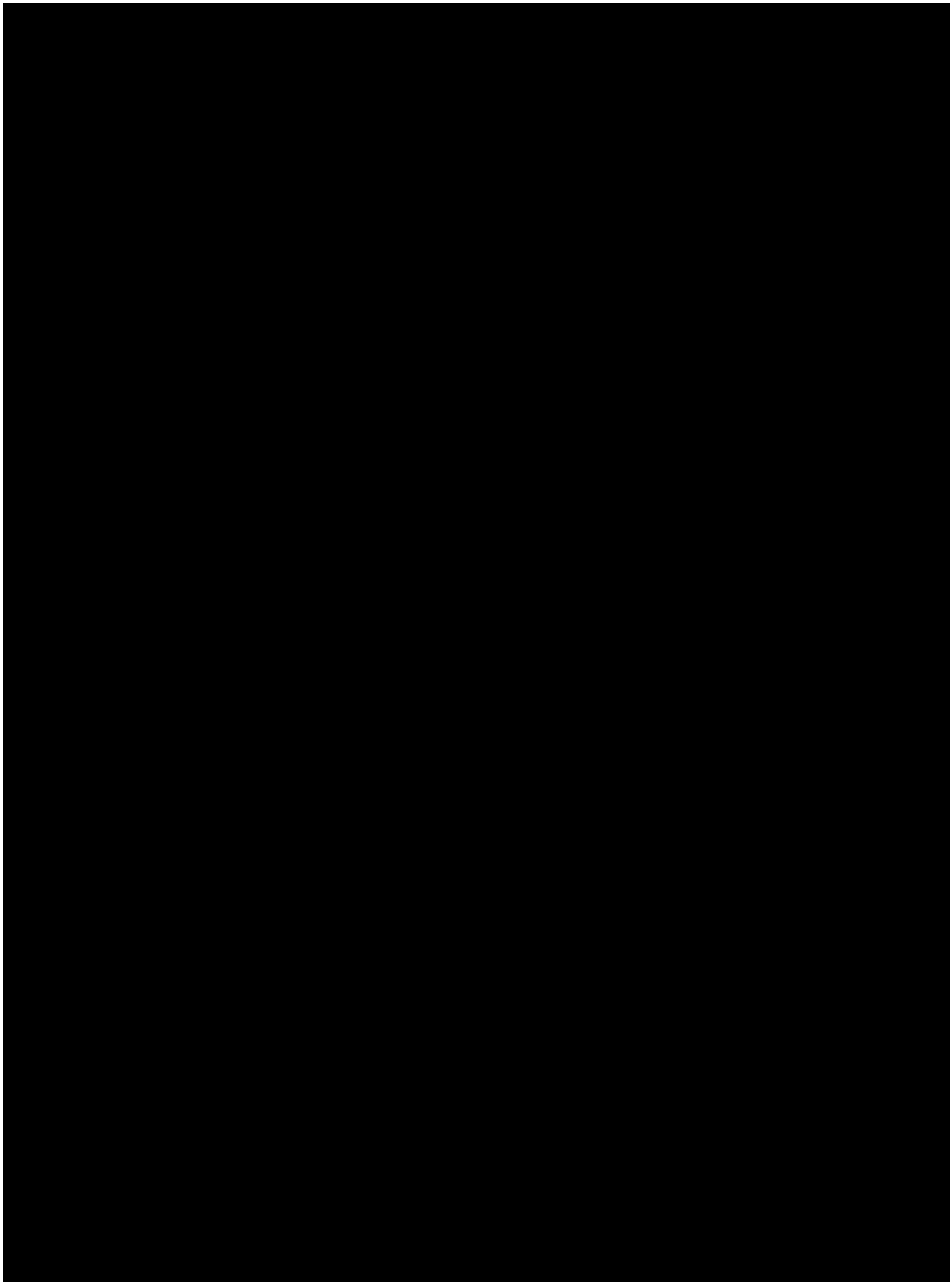

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Abstract

Poor mental health in the UK is a prevalent and growing issue. Before COVID-19, poor mental health presented a national problem with statistics suggesting a growing trend. Across the workplace sectors, those within the higher education sector, among other professional sectors, indicated a high risk of developing symptoms associated with depression, anxiety, and stress. When the COVID-19 pandemic occurred, Universities and schools closed, and the UK population had to self-isolate at home. During this time, social isolation became a key contributing risk factor to poor mental health - for those in higher education, this further increased the risk.

A systematic review exploring the effectiveness of online interventions within the workplace revealed potential for providing support and reducing symptoms associated with poor mental health. As online interventions do not breach COVID-19 violations (as they maintain social distancing) they may provide crucial support and treatment to those with poor mental health during the pandemic. In this research, the feasibility and efficacy of an online psychosocial based intervention known as Laughter Yoga was assessed for improving poor mental health in higher education staff at Coventry University. Laughter Yoga (LY) consists of combining deep breathing exercises, as found in pranayama yoga, and playful, childlike activities to trigger natural and spontaneous laughter. Findings from a systematic review, conducted as part of this research, indicates that LY presents psychological and physiological benefits associated with mental health.

To assess the efficacy of online LY for higher education staff, a two-arm randomised-control trial of LY and a wait-list control was conducted with participants receiving 1x 45 minutes sessions of online LY for 4-weeks through the online platform Zoom. Psychological measures of depression, anxiety, stress and insomnia were measured by the Depression, Anxiety and Stress Subscale (DASS-21. Lovibond and Lovibond, 1995b) and Insomnia Severity Index (ISI. Morin, 1993) at baseline, mid-intervention, post-intervention and 4-week follow-up. Diurnal measures (immediataely after awakening, 30 minutes after awakening, midday and before bed) of salivary cortisol were also obtained at baseline, mid-intervention, post-intervention, 4-week follow-up and immediately before

and after sessions one and four. Focus groups were also run following the completion of the study for those who took part in the LY sessions.

Overall, findings suggest that LY is a feasible and accepted online psychosocial based intervention that higher education staff would engage with and enjoy. Self-reported symptoms of depression and anxiety were significantly different between the groups post-intervention (p = .022 and p = .041 respectively), however, small effect sizes were calculated (0.209 and 0.320 respectively). No statistical significance was found for stress or insomnia at post-intervention or follow-up. However, there was a statistical significance for anxiety symptoms at follow-up (p = .020) in addition to a medium effect-size (0.625). Cortisol outcomes revealed no statistically significant acute or chronic differences between wait-list control (WLC) and Laughter Yoga (LY). Despite this, significantly large effect sizes were found for awakening (-.845) and 30-minute after awakening (-.875) at follow-up between the groups. Discrepancies between statistical significances and effect sizes of the LY intervention on psychological and physiological measures, alongside research limitations, warrants further research.

1 Background

1.1 **About the Author**

My interests began at A-Level when I studied Psychology alongside Biology and Health and Social Care. During this time, my interest in understanding human behaviour peaked and sparked my passion for a career within the field. Following my A-Levels, I continued to a BSc in Psychology at Aberystwyth University. It was here that I realised that I had a keen interest in mental health research, specifically the exploration of depression, anxiety, and stress. To continue developing my research skills and knowledge, I completed an MSc in Mental Health Research at the University of Nottingham. Nearing the end of my MSc, I came across a PhD Studentship at Coventry University which was advertised as '*Psychosocial Interventions for Depression*. After reading the proposed research of assessing the efficacy of Laughter Yoga (LY) for depression, I was keen to apply. Following a successful interview with Martin Bollard and Derek Renshaw, I have been working hard through unprecedented times to develop this research paper '*Biopsychosocial Impact of Laughter yoga; a randomised-control feasibility study'.* Originally, the research proposed assessing the impact of face-to-face LY for patients within a clinical setting. However, due to access issues, ethics and restrictions surrounding COVID-19, the following research explored the impact of online laughter yoga on higher education staff. Further justification of these changes to research procedure and participant demographic are provided.

1.2 **Author Positionality**

Over ten years ago, I was suffering from poor mental health (depression) and received treatment through the Child and Adolescent Mental Health Service (CAHMS). Although my experience with my general practitioner and CAHMS was neither beneficial nor

disadvantageous, I do not feel that my experience during my adolescence will present any researcher bias. In my experience, however, I did develop an appreciation and knowledge of mental health treatment pathways offered through the NHS. Some elements of conventional treatment did help to alleviate some symptoms associated with my depression, however, I felt that non-conventional group-based treatment such as cooking, knitting and art classes provided more benefit due to my circumstances. Overall, despite my experiences, I appreciate everyone experiences poor mental health differently and therefore benefit from different forms of therapy and treatment whether that be through conventional treatment pathways or alternative treatments. Therefore, I have a neutral position on the treatment of poor mental health.

I have previously attained a BSc degree in Psychology and an MSc in Mental Health Research – both of which have furthered my knowledge of poor mental health aetiologies and treatment pathways. In addition to aiding my knowledge, these degrees have also pushed me to recognise and appreciate the importance of critical analysis and evaluation within the field. Specifically, no one piece of research is without its procedural, methodological or ethical flaws and therefore the accumulation of findings surrounding a phenomenon should be considered rather than results from singular studies. In addition to my academic background and personal experiences, I have also worked closely with individuals receiving support and therapy for poor mental health. My experiences range from working with individuals in the community to low secure and medium secure psychiatric units (within the public and private sector). From my experiences of meeting individuals with a diagnosis, I found that reading around a disorder and the symptoms associated with the disorder promoted a reductionist standpoint – that is, you develop an expectation of what an individual with a particular diagnosis will be like. However, when you meet individuals with a diagnosis, they are so much more than their diagnosis and their

symptoms. They are human beings that crave to fulfil their life with or without the presence of symptoms. From my experiences, working closely with these individuals, and with my own experiences, my research interest lies predominately in ensuring poor mental health is perceived as beyond the eradication of symptoms and towards viewing the individuals as an entire being. Naturally, this perception aligns with the recovery model and holistic alternative treatments and therapies. Regardless, I have developed a critical, strategic and scientific mindset (primarily through my MSc) which pushes rigour, science and statics to support such research.

When conducting this research, I was curious to assess the efficacy of LY on poor mental health symptoms. As an alternative to a non-intrusive intervention that considers individuals in their entirety, I was hopeful that the intervention would be successful by presenting high levels of acceptance and statistically significant efficacy. However, as a researcher, I was also open to the idea that the intervention may not be accepted or efficient – the next step would be exploring reasons why by considering procedural or methodological issues.

1.3 **Laughter Yoga Training**

I received and completed full Laughter-Yoga (LY) training during the development of the research procedure (12 – 13th May 2018). The aim of attending LY training was to develop a deeper understanding of session structure, purpose and develop communications with people within the LY community. Although able, I felt that providing LY sessions as part of the research may have provided an element of researcher bias – therefore, an external instructor with previous experience working with a variety of groups provided the sessions. My LY training contributed to ensuring that the LY sessions provided met the core principles of LY and followed the session structure developed by the creator of LY (Madan Kataria).

1.4 **Thesis Structure**

The thesis begins by defining poor mental health. Following this, specific symptoms associated with depression, anxiety, and stress are discussed. Although it is possible to experience and meet the criteria of these disorders independently, they can exist co-morbidly with symptoms overlapping. Therefore, throughout the thesis, poor mental health refers to the presence of symptoms associated with any of these disorders. However, these disorders are also discussed and referred to independently when necessary. The prevalence of these disorders across the general population within the UK are discussed to highlight the problem. Focus is then given to specific workplace sectors with particular attention to the higher education sector with the exploration of statistical evidence.

To provide further understanding, and to approach the potential causation of poor mental health in the higher education sector, the aetiology of depression, anxiety, and stress is then discussed. The aetiology of symptoms associated with the disorders are explored through the three aetiological models – environmental, biological and psychological. Although there are numerous theories and research which attempts to provide one true consensus on poor mental health, this thesis provides theories that are deemed most relevant to the research demographic and research question. For instance, the focus is given to the impact of the higher education working environment as changes to the working environment, due to COVID-19, have appeared as a key contributing factor to poor mental health. Overall, chapter three aims to explore potential causations of poor mental health to consider the translation of theories and research into treatment pathways and support. Chapter four discusses and explores current treatment pathways through NHS and the limitations of such treatment pathways with consideration to the complexity of mental health

aetiology. Further issues are considered such as the impact of COVID-19 on treatment and support including the inability to receive or attend face-to-face sessions or therapy.

Chapter five explores ways to overcome such barriers including providing virtual support and treatment online. As providing treatment online appeared as a feasible method to provide treatment and therapy during COVID-19, a systematic review was conducted to provide further insight into the effectiveness of online interventions in the workplace. Although findings revealed the positive implications of introducing online interventions, it was apparent that interventions were primarily cognitive-behavioural therapy (CBT) based with no evidence of the assessment of group or psychosocial interventions. Due to the lack of psychosocial interventions, which provide an alternative treatment approach to CBT, the benefits of psychosocial interventions are discussed with consideration to the recovery and medical model.

Chapter six introduces the intervention assessed within this research – Laughter Yoga (LY). Laughter yoga is a psychosocial based intervention provided in a group format which presents a potential for improving mental health. The original protocol for the PhD proposed assessing the effectiveness of LY as a psychosocial intervention. Although elements of the original research protocol were changed, the assessment of the LY intervention for improving mood was maintained. Due to the novelty of LY, the chapter begins by clarifying what LY I - the biological and psychosocial underpinnings and mechanisms of the interventions are then discussed. To assess current research in the field, a systematic review was conducted to explore the feasibility and impact of the intervention on psychological and physiological symptoms associated with poor mental health. Findings from the systematic provide details such as target populations, research design,

psychological and physiological outcomes and qualitative output aided the development of the current research aims.

Chapter seven ensues justification for the research by reiterating the gap in the literature to clarify research aims. The research approach chosen to address these aims is then explored followed by research methodology and justification. Findings from the research are then presented in chapter eight firstly with participant retention and participant characteristics then psychological findings, physiological findings, and qualitative findings. Finally, the findings are discussed in chapter nine by firstly restating the context of the problem, how the problem was approached and whether the research questions had been answered. The paper then concludes with the strengths and limitations of the research, a reflective log and recommendation for further research.

2 What is Mental Health?

This preliminary chapter aims to a provide rationale and background. Firstly, mental health is defined and clarified. Specific symptoms of poor mental health including depression, anxiety, and stress are then discussed reflecting clinical diagnoses from current diagnostic manuals. The

prevalence of these symptoms within the general population of the United Kingdom (UK) will then be explored with comparisons across the various working sectors. Due to high prevalence of mental health within the Higher Education (HE) and professional sector, specific research of mental health among individuals working in Higher Education (HE) will then be assessed to highlight the pressing need for research in the field. Finally, a conclusive statement is provided to reiterate keys points within this chapter.

2.1 What is Mental Health?

According to the World Health Organization (WHO), mental health is "*a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community"* (WHO, 2004). The concept of mental health as an overall state of wellbeing, rather than solely the absence of poor mental health, considers that mental health, physical health and social functioning are interdependent. However, as argued by Galderisi et al (2015), this definition lacks specificity when identifying key positive feelings and functions that contribute to good mental health. For instance, negative feelings and emotions such as sadness, anger or discontent can be experienced by an individual with good mental health as these feelings are an anticipated and expected part of human life. Despite this, Galderisi et al (2015) argue that 'good' mental health has been conceptualized as an experience of purely positive emotion and a sense of mastery over the environment. They propose that mental health be defined as a *"…dynamic state of internal equilibrium which enables individuals to use their abilities in harmony with universal values of society. Basic cognitive and social skills; ability to recognise, express and modulate one's own emotions, as well as empathize with others; flexibility and ability to cope with adverse life events and function in social roles; and harmonious relationship between body and mind represent important components of mental health which contribute, to varying degrees, to the state of internal equilibrium.'* In addition, considering the key components of mental health, the proposed definition also considers the recovery model perspective in which the overall aim is to attain a valued and fulfilled life beyond the eradication of symptoms (explored in 2.10.3).

2.2 What is Depression, Anxiety and Stress?

Within the Diagnostic Statistical Manual of mental health disorders 5th edition (DSM-5 - also referred as DSM-V), depression is categorised as a 'mood disorder' alongside bipolar disorders. Mood disorders are broadly defined as distorted or inconsistent emotional states which may interfere with the ability to function (American Psychiatric Association, 2013). For depressive disorders, including major depressive disorder, persistent depressive disorder (dysthymia), premenstrual dysphoria, and medication-induced depressive disorder, the core symptomatology includes depressed mood most of the day, diminished interest or pleasure in activities, significant weight loss or weight gain, fatigue or energy loss, feelings of worthlessness, diminished ability to think or concentrate and reoccurring thoughts of death and suicidal ideation (American Psychiatric Association, 2013). These symptoms are consistent with the International Statistical Classification of Diseases – Classification of Mental and Behavioural Disorders (ICD-10) which is primarily used by the National Health Service (NHS) in the UK as the overarching diagnostic categorisation tool.

The ICD-10 (World Health Organization, 1992) describes depression as persistent low mood, loss of interest or pleasure and fatigue / low energy most of the time for at least two weeks (World Health Organization, 1992). Within both diagnostic manuals, the severity of depression can be diagnosed dependent on the frequency and intensity of symptoms. Fewer than 5 symptoms required for clinical diagnosis identifies as 'subthreshold depression', fewer than 5 symptoms - 'mild depression', some symptoms and functional impairment - 'moderate depression', and most symptoms with the interference of functioning, with or without psychotic symptoms- 'severe depression'. The ICD-10 (World Health Organization 1992) manual also considers the of somatic symptoms that may accompany symptoms of depression. For severe cases of depression, classified as individuals showing considerable stress or agitation with suicidal intent as a distinctive danger, psychotic symptoms may also be present which include auditory and/or visual hallucinations (World Health Organization 1992).

Although no decision has been made for the implementation of ICD-11 within the UK, published in

May 2019, the NHS states that the latest release is currently being tested and reviewed through IC-11 field trials suggesting future implementation. Within the ICD-11 (World Health Organisation, 2019) few changes have been made to the clinical diagnosis of mood disorders such as depression. Changes include a requirement of a minimum of five of ten symptoms minimum, rather than the four of nine possible symptoms stipulated in ICD-10, thus increasing consistency with the DSM-5 and depressive symptoms are organised into three clusters – affective, cognitive and neurogenerative. Symptoms of fatigue are no longer considered sufficient as an entry-level symptom (as part of the neurovegetative symptom cluster) and require accompanying daily depressed mood or diminished interest in activities lasting at least two weeks. Hopelessness has been added as an additional cognitive symptom due to its strong predictive value for the diagnosis of depressive disorders (McGlinchey, Zimmerman, Young & Chelminki, 2006).

Anxiety disorders, including generalized anxiety disorder (GAD), social anxiety disorder (SAD), panic disorder and obsessive-compulsive disorder (OCD), are listed separately from mood disorders in the DSM-5. According to the DSM-5 (American Psychiatric Association, 2013), symptoms of anxiety may include excessive anxiety and worry, inability to control worry, restlessness, easily fatigued, difficulty concentrating, irritability, muscle tension and sleep disturbances. The DSM-V also exclude a diagnosis which could be attributed to physiological effects of a substance (e.g., medication, drugs) or an organic cause such as a medical condition (e.g., hyperthyroidism).

The ICD-10 categorizes anxiety disorders under ‘Neurotic, stress-related and somatoform (a disorder causing physical symptoms but with an unknown psychological origin) disorders’ and consists of ‘Phobic anxiety disorders’ and ‘Other anxiety disorders’ (F40 – F41). ICD-10 describes phobic anxiety disorders as the fear and avoidance of well-defined situations or objects (phobic anxiety); open spaces and crowds (agoraphobia); scrutiny from others (social phobia); or extremely specific objects or situations such as heights, thunder, spiders etc (specific phobia). Section F41 of the ICD-10, lists ‘Other anxiety disorders’ including panic disorder, generalised-anxiety disorder and mixed anxiety disorders. Diagnostic classification for generalised-anxiety disorder (GAD), the

most prevalently diagnosed anxiety disorder (NHS England, 2016), includes apprehension (worries about future misfortunes, feeling "on edge", difficulty in concentrating, etc.), motor tension (restless fidgeting, tension headaches, trembling, inability to relax) and autonomic overactivity (light-headedness, sweating, tachycardia or tachypnoea, epigastric discomfort, dizziness, dry mouth, etc).

Few changes are apparent for the clinical diagnosis of anxiety disorders in the ICD-11. Unlike the ICD-10, the distinction between phobic anxiety disorders and other anxiety disorders are eliminated in the ICD-11 in favour of the more clinically useful method of characterizing each anxiety and fear-related disorder dependant on the stimulus reported by the individual as 'triggering' (Barlow, 2004). Generalised anxiety disorder (GAD) is characterized by general apprehensiveness or worry that is not restricted to any stimulus – worry is listed as a core feature of GAD. GAD can also co-occur with any depressive disorder if symptoms are present independent of low-mood episodes.

Stress has no classification within the DSM-5, therefore providing no official clinical symptomatology, the Mental Health Foundation (2018) defines stress as the feeling of being overwhelmed or unable to cope as a result of unmanageable pressures. Stress is regarded as a healthy mechanism which is utilised to cope with internal and external stressors that occur in day-to-day life (Yaribeygi, 2017). When experiencing stress, several physiological changes occur to trigger the 'flight or fight response' e.g., fasten heartbeat, sweating, muscle tension, heightened senses. Those experiencing prolonged stress may experience these symptoms even when the internal or external stimuli has dissipated. Stress becomes a problem and can lead to further mental health and physiological issues when exposure is prolonged and reoccurring.

Within the ICD-10, stress is often listed with other mental health disorders as a co-morbid by-product. Like the DSM-5, stress is not classified as an independent diagnosable mental health disorder, however, within section F43 (pg. 118 – 122) of the ICD-10, 'Reactions to severe stress, and adjustment disorders', certain disorders are identifiable on the grounds of displayed symptomatology and known causative influences. Within this section, Post-Traumatic Stress

Disorder (PTSD) is listed and described as a ‘delayed and/or protracted response to a stressful event or situation (either short- or long-lasting) of an exceptionally threatening or catastrophic nature’ (pg. 120). Section F43.2 (pg. 121) describes ‘adjustment disorders’ as a state of subjective distress and emotional disturbance which interferes with social functioning and performance as the result of exposure to a ‘stressor’.

The ICD-11 provides clarity to the classification of stress due to grouping of Disorders specifically associated with stress. This grouping includes disorders such as reactive attachment disorder, disinhibited attachment disorder, PTSD and additional disorders, complex PTSD, and prolonged grief. Complex PTSD diagnostic criteria does not require a specific type of trauma for a diagnosis and consists of six symptom clusters - the three PTSD criteria of re-experiencing of the trauma, avoidance of trauma reminders, and heightened sense of threat (hypervigilance, startle response), and three disturbances of self-organisation (DSO) symptoms defined as emotional dysregulation, interpersonal difficulties, and negative self-concept. Prolonged grief disorder is differentiated from depressive episode or normal bereavement is categorized by an abnormally persistent and disabling response to death. Core symptoms include longing for and preoccupation with the deceased, along with emotional distress and significant functional impairment that persist beyond half a year after the loss of a significant other (Killikelly & Maercker, 2018). Acute stress reaction is not listed within the ICD-11 as it is no longer considered as a mental disorder but listed under ‘factors influencing health status or contact with health services.’

2.2.1 Depression, Anxiety and Stress – Triadic relationship

Clinical symptoms, as described in diagnostic manuals (DSM-V and ICD-10/11), associated with depression, anxiety and stress appear to overlap and often are found co-morbidly. Hatch et al (2018) conducted a UK-wide prospective cohort study and found that when symptoms of one psychological disorder (depression, anxiety or PTSD) are present, there is a 65% chance they will co-occur with symptoms of one of the other two disorders. One approach to explain this overlap is that those with depression and/or anxiety present an inability to regulate and process emotion and

present symptoms of stress as a by-product of such inability (Cisler et al, 2010; Dochnal, 2019). Due to the overlap of symptoms, and with consideration to this complex triadic relationship, depression anxiety and stress will be referred as mental health throughout this report. However, each disorder will be referred to independently when necessary.

2.2.2 Mental Health in the UK - General Population

In 2017, an estimated 16.9% of the adult (aged 16+) population met the clinical diagnosis for a common mental health disorder including depression, anxiety, mixed depression-anxiety, PTSD, phobias, and obsessive-compulsive disorder (Public Health England, 2020). For depression, statistics indicate a significant increase of prevalence in England between 2016/17 (9.1%), 2017/18 (9.9%), 2018/19 (10.7%) and 2019/20 (11.6%) (Public Health England, 2020). Between April 2019 – March 2020, the Office of National Statistics (ONS) conducted a UK-wide survey to re-assess life satisfaction, happiness and anxiety. Although depressive symptomatology was not assessed directly, findings from the 'life satisfaction' scoring contributed to potential prevalence. Personal wellbeing measures used to collect data included 0 – 10 scales with the following threshold to present dispersion in the data; 0-4 (low) 5-6 (medium) 7-8 (high) 9-10 (very high). On average, life satisfaction scored 7.6, happiness 7.4 and anxiety 3.2. In comparison with the same quarter the previous year, average life satisfaction reduced by 0.6% (7.72), happiness also decreased by 0.55% (7.57) and anxiety had increased by 0.1% (2.9). These statistics indicate that poor mental health across the UK, specifically within England, presented problematic prior to the COVID-19 pandemic with growing increases of depression and drop in life satisfaction and happiness.

The ONS (2021) report that 21% of adults (around 1 in 5) experienced some form of depression between January – March 2021 showing an increase from November 2020 (19%) and more than double before the COVID-19 pandemic (10%). Between July 2019 – March 2020, 51.94 million people within the UK were estimated to have depression with 90% experiencing no or mild symptoms and 10% moderate to severe. In November 2020, the overall estimate increased from 51.97 million with 81% experiencing no or mild symptoms and 19% moderate to severe. January –

March presented the highest estimated cases of 52.28 million with 79% experiencing no or mild symptoms and 21% presenting moderate to severe. The Opinion and Lifestyle Survey (2020 – 2021) also showed an increase in moderate to severe symptoms associated with wellbeing such as loneliness (52% to 62%), strain on work relationships (8% to 11%) and being unable to exercise as normal (33% - 40%) between June 2020 and January to March 2021. These statistics suggest that in addition to prevalence increase, severity of symptoms associated with depression and poor wellbeing also increased during the COVID-19 pandemic.

2.2.3 Mental Health - Workplace Sectors

Statistics from the Labour Force Survey (LFS, 2019), which includes data up to March 2020 from 37,000 households across the UK, indicate a growing trend of self-reported depression, anxiety or stress caused or exacerbated by work. In 2016/17, 1.5% of participants reported work-related depression, anxiety or stress which rose to 2.5% in 2019/20. Regarding industry group, public administration and defence, education and human health, and social work presented statistically significant higher rate of depression, anxiety or stress per 100,000 workers than the average for all industries (see figure one below).

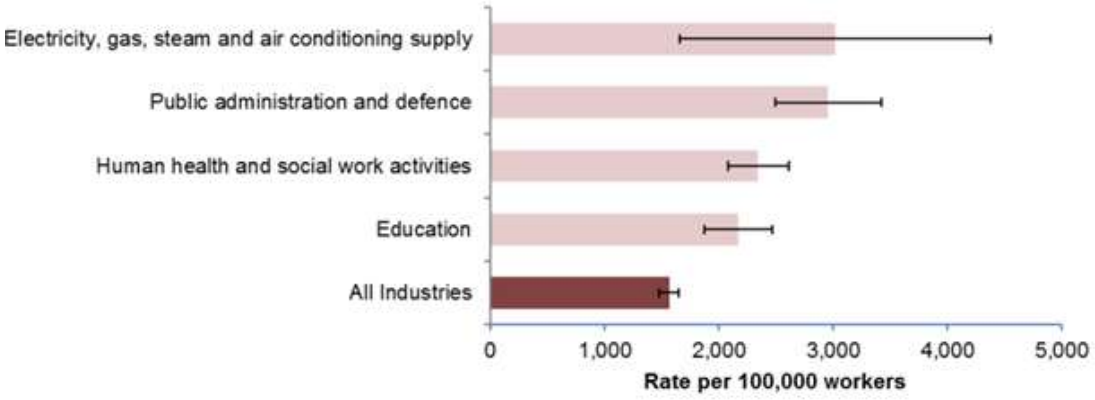

Figure One - *Work industries with higher than average rates of depression, anxiety or stress averaged 2017/18 - 2019/20 per 100,000. Taken from the Labour Force Survey (2019).*

Although the education sector presents the lowest average rates (2,170 per 100,000) it remains an industry that has overall statistically higher average rates of depression, anxiety or stress among

its workers compared to all industries. Professionals, classified as those with one degree or more in their field, also present higher rates of poor mental health (2,260 per 100,000. LFS, 2019). These statistics indicate that professionals within the educational sector are at high risk of poor mental health as a result of their work.

2.2.4 Mental Health - Higher Education (HE)

Morrish (2019) published a report (‘Pressure Vessels: The epidemic of poor mental health among higher education staff) which explored and highlighted the prevalence and risk factors of poor mental health among Higher Education staff (HE) within Universities across the UK. The report was developed between 2014-2018 and included 59 University institutions across the UK including Coventry University. High rates of referrals to counselling were found across all HE institutions with the highest increase of 316% (117 individuals to 487) between 2014 – 2018. Referrals to Occupational Health also presented an increase across all institution with the highest referral of 316% (71 individuals to 396). These figures suggest an outstanding increase in mental health referrals nationwide and emphasises the need for mental health services in higher education. Potential causations of this growing trend, as mentioned by Morissh (2019), may include the introduction of funding programs and frameworks such as the Browne Funding review arrangement (Browne et al, 2010) and the Teaching Excellence Framework, high-workload, burnout, job security and satisfaction and emotional labour (pages 8 – 10).

Dougall, Weick and Vasiljevic (2021) reported the mental health of university staff during the COVID-19 pandemic using survey data collected online between February - March 2021 from 1,182 staff employed across 92 UK universities. Key findings revealed that one in two university staff reported experiencing chronic emotional exhaustion (55%), worry (53%), and stress (51%) during the academic year 2020/21; one in two staff members

experienced high levels of anxiety (50%) – 1.5 times higher than the national average (as reported in the ONS Opinions and Lifestyle Survey, 2019) (32%) and one in two staff members experienced high levels of anxiety (50%) – 1.5 times higher than the national average (32%). Exploration of factors relating to wellbeing during this period found higher education staff reported that social inclusion, alignment between skills and task demands, policy makers, locus of control and feeling valued were contributing factors to mental health

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Morrish's (2019) report highlights the growing severity of poor mental health in HE staffs. Findings from Dougall, Weick and Vasiljevic (2021), collected during the COVID-19 pandemic, show that mental health was a key issue during the 2020 – 2021 academic year and significantly higher than other workplace sectors (as found by the ONS, 2020). These statistics indicate that poor mental health is high among UK university staff, which may have worsened by the COVID-19 pandemic, and therefore requires further attention.

This chapter provides a detailed description of depression, anxiety and stress as described by clinical diagnostic manuals such as the DSM-V, ICD-10, and ICD-11. The consideration of the triadic relationship between these disorders is mentioned to clarify they will be generalised and referred to as 'mental health ' throughout the report unless stated otherwise. Prevalence of mental health in the UK before and during the COVID-19 pandemic are explored through statistics followed by statistics for each work industry. As statistics indicate a high rate of depression, anxiety, and stress because of, or exacerbated by, work in the education and professional sector, this is explored through reports of mental health in HE developed before and during the COVID-19 pandemic. Findings report a significant increase in referrals for mental health support in the HE sectors prior to COVID-19 suggesting a pre-existing issue (Morrish, 2019). Dougall, Weick and Vasiljevic (2021) report that mental health during the COVID-19 pandemic was significantly worse in the HE sectors than for all other workplace industries (compared findings from ONS, 2020). Overall, this chapter provides justification for further mental health support in the HE sectors.

2.3 Aetiology of Depression, Anxiety and Stress

Although there is currently no one true consensus to the causation of depression, anxiety and stress, research indicates potential influencing factors which may increase the likelihood of developing symptoms. Three main theories, and aetiological models, are recognised within the literature which categorise such risk factors; environmental, biological, and psychological. In this chapter, these aetiological models will be explored and discussed to provide background and understanding to the causation of poor mental health . Due to an abundance of literature exploring causations of poor mental health , risk factors specifically associated with HE workers will be discussed alongside general risk factors that are relevant to the research.

2.3.1 Environmental Aetiology

Environmental aetiology of depression, anxiety and stress refers to risk factors within a familial-environment (our surrounding family) or individual-specific environment (trauma, long-term stress, relationship strife, significant loss etc) which may occur in early childhood and influence development in later life (England & Sim, 2009). However, within this sub-chapter, familial and individual environments specific to HE workers, will be discussed providing background to risk factors associated with this role. Job satisfaction, high workload, improving student experience and satisfaction will be discussed with consideration to the impact of the COVID-19 pandemic. COVID-19 specific risk factors will also be discussed including transitioning to online learning and working from home.

2.3.2 Job Satisfaction

Green (2021) states that job satisfaction is the most widely used measure of work-related wellbeing and is a useful predictor of turnover (Brown et al, 2012, Green, 2010). Job

satisfaction is an important attribute that all job sectors strive to achieve to maintain a high turnover rate, reduce absence, improve performance, and encourage extra-role behaviours (Oshagbemi, 2003). Results from a national survey, conducted across 78 UK-based Universities between January and May 2017 found that only 10.5% of academic staff were satisfied with their University management team (Woolston, 2017). Two-thousand four hundred respondents from the survey identified specific areas of concern, including excessive workloads, a lack of accountability among managers and mental-health difficulties resulting from toxic work environments and work overload (Woolston, 2017). Respondents also report pressure from managers to improve university scores on performance metrics such as the National Student Survey, an annual survey in which students score their universities on a variety of measures (further explored in sub-chapter 3.1.3 Improving Student Experience and Satisfaction) as contributing factors to job satisfaction (Woolston, 2017). The Teacher Wellbeing Index (TWI) (Education Support Partnership, 2019) also reveals that HE workers report their work/life balance, excessive workload and unreasonable demands are related to symptoms associated with poor mental health (e.g., behavioural symptoms, physical and psychological – including depression, anxiety, and stress) (Education Support Partnership, 2019).

The Teacher Wellbeing Index (TWI) (Education Support, 2020) indicates that during the COVID-19 pandemic, all symptoms associated with poor mental health increased more than 10% compared to the previous year (panic attacks, under-eating and high-blood pressure reported similar findings). The TWI (Education Support, 2020) suggests that increase in symptoms, are due to the rapid adjustment to online teaching required during the pandemic – the impact of transitioning to online learning is further explored in sub-chapter 3.1.4 Transitioning to Online Learning. Despite this, symptoms experienced which are linked to possible mental health issues (self-defined or suggested by someone else)

and formal diagnosis of mental health disorders (depression, anxiety, stress and exhaustion) remain indifferent compared to the previous year (pre-COVID). These findings suggest that HE workers are experiencing symptoms associated with poor mental health (e.g., insomnia, irritability, changes in appetite, tearfulness etc) during the pandemic, which they may not associate with mental health disorders. High levels of presenteeism found within the survey (93% report that they would come into work all, or most of the time when they are ill) may suggest that respondents could be underemphasizing symptoms to avoid missing work days.

2.3.3 High-Workload

Weinstein (2018) conducted a survey for University lecturers at a UK-based institute and found over half (50.8%) reported that their workload was unmanageable for a 35-hour contract with 49% reporting that their workload has increased over the last four years and 41% stating that their workload had a negative effect on their mental health. Pace, D'Urso, Zappulla and Pace (2021) also explored the perceived workload of university professors and evaluated related psychosocial risks, such as addiction to work, psychological distress, and work-life conflicts. Measures included the University's Work Environment Survey, the Dutch Workaholism Scale, and The General Health Questionnaire (GHQ). Significant links were found between academic workload and poor mental health (p = < .01) in addition to a mediating relation between academic workload, workaholism (compulsory), and general mental health (p = < .001).

Figure Two- Flow chart of academic workload, workholism, and general mental health (Taken from Pace, D'Urso, Zappulla & Pace, 2021)

The Teacher Wellbeing Index (Education Support Partnership, 2019) states that HE teachers report high workload as the major aspect of their job they disliked (also found in the previous survey – Teacher Wellbeing Index 2018). The high-workload was also the leading risk factor for educational professionals who were experiencing symptoms associated with poor mental health (Education Support Partnership, 2019). Seventy-one per cent of respondents reported that high workload was the main reason for considering leaving the profession.

Data obtained during the COVID-19 pandemic also indicates that excessive workload was a key contributing factor to mental health (Education Support, 2020). Sixty-two per cent of academic professionals reported that excessive workload was a contributing factor to poor mental health symptoms. However, excessive workload was reported to decrease by 6%, , in addition to a 7% decrease in unreasonable demands from managers, compared findings from the previous year before the pandemic (TWI - Education Support Partnership, 2019). Volume of workload remained the key contributing reason for academics to leave the profession (TWI - Education Support Partnership, 2019).

2.3.4 Improving Student Experience and Satisfaction

The Teaching Excellence Framework (TEF), introduced by the Department of Education (2017) to HE institutes across England, encouraged, and recognised excellent teaching standards in higher education (HE) environments. HE institutions were rewarded with TEF ratings of provisional, bronze, silver, or gold; those with a TEF rating may charge up to £9,250 tuition fees (£250 more than those without). Ratings were awarded based on teaching, learning and outcomes for its

students. Morrish (2019) suggest that this pressure from higher management to perform rigorously policed turnaround times for the marking of exams and coursework will elicit further stress and impact mental health .

Watson (2011) states the original hierarchy of excellence is three-tiered and includes excellence in research, excellence in teaching and excellence in service to communities. Perkins (2018) claims the TEF framework increases measurement and metrication of teaching which may threaten to identify and/or create conflict within identity due to its potential to disrupt this present hierarchy of excellence. Perkins (2018) conducted semi-structured interviews at a research-intensive University in England and found HE educators perceived the TEF as an issue for identity. An associate professor state:

'[TEF] is going to add to what is already a very difficult job. Expectations will rise, and it is going to cause more conflict around identity. [It will] just exhaust people really in terms of they thought they had it sorted (…) in their heads, they knew how to do well, (…)' (Perkins, 2018. Page 13)

Other participants stated that HE educators have an incredible range of skills to keep balance interpersonal, personal, and research interests which will have a direct conflict with the TEF requirement of further balancing research and teaching (Perkins, 2018. Page 14). As professional identity has a part to play in maintaining mental health (Brown & Coopland, 2015), threats to identity and sense of worth can have a detrimental impact. Interviews by Skinner, Leavey & Rothi (2019) with HE educators in England found that many teachers felt they were failing their profession, due to conflict and identity of their role leading to perceptions of worthlessness and impotence manifesting in frustration and anger, lack of motivation, and great dissatisfaction (Skinner, Leavey & Rothi, 2019).

As suggested by Morrish and reported by HE educators in Woolston (2017), pressure by managers to improve university scores on performance metrics such as the National Student Survey (NSS) also contribute to mental health . The NSS includes 27 core

questions relating to student experiences such as quality of teaching, learning opportunities, assessment and feedback, academic support, organisation and management, learning resources, learning community, student voice, and overall satisfaction. To enhance overall student satisfaction, HE educators are responsible these domains of student experience which may require additional duties, further adding to work-load.

Pressure to achieve high standards from management may also encompass fears of job loss associated with NSS results. One respondent in Watermeyer, Crick, and Knight's (2020) research, which explored affliction and affordances from online migration of teaching and learning, stated:

'As a worker on a precarious contract, I will be under increasing threat of job loss in response to economic implications of loss of recruitment. Lower student satisfaction will result in lower NSS results and negatively affect recruitment. Senior management have deemed online teaching lightens the workload for academic staff(it does not) and have already encouraged department heads to let associate/part-time staff go.' (Watermeyer, Crick, and Knight's, 2020, page 635)

Pressure of results from NSS surveys, and acknowledgement that results may lead to job loss, is a key cause of concern alongside perceived threats associated with online teaching.

2.3.5 Transition to Online Learning

Due to COVID-19, face-to-face learning was suspended in Spring 2020 requiring rapid transition to full online teaching through Virtual Learning Environments (VLE) such as Moodle, Blackboard and Aula (as used in the UK). Although VLE 's was used prior to COVID-19, for tasks such as providing handouts and to communicate information, educators were now required to deliver all elements of modules online (Bryson & Andres, 2020). In addition to presenting issues for students, such as technological diversity and reduced one-to-one time, this abrupt need for adaption to virtual online content also presented issues for HE educators impacting mental health .

Marek's & Wen Chi's (2021) global exploration of teacher experiences converting face-to-face classes to online distance learning (ODL) found high variability of positive and negative experiences of the transition suggesting individual differences. Research indicates that perceptions of the transition may influence the positive or negative experience of the transition. Daumiller et al (2020) assessed the association between attitudes towards the shift of teaching face-to-face to online with motivation, burnout, and engagement as well as the impact on student learning experiences. They reported that educators who perceived the transition as a threat showed significant levels of burnout in the last semester (.63) with students also reporting a poorer learning experience (-.43). On the other hand, those who perceived the transition as a useful and positive challenge appear to show no change in burnout or change in student's learning experiences. Hjelsvold, Nykvist, Loras, Bahmani and Krokan (2020) also found that across fifty-six educators, most participants (66.7%) viewed the transition as a positive pedagogical challenge that encouraged sharing and support among other colleagues.

Preparedness, confidence, support from the institution and afflictions also influence negative experiences of the transition (Watermeyer, Crick, Knight, & Goodall, 2020). Data collected from 1148 academics working in UK-based Universities, found 50.5% of respondents felt unprepared to deliver online learning, teaching and assessment and 39.4% feeling unconfident in their ability to facilitate their role (Watermeyer, Crick, Knight, & Goodall, 2020). Watermeyer, Crick, Knight, & Goodall (2020) concluded that online mitigation engendered disturbances to HE educators' pedagogical roles which had an impact on their personal lives. A respondent from this research stated:

'*Balancing teaching online- 24 hours a week with a 2-year-old at home on my own is a huge challenge. This is disrupting the learning environment not only for my students but also my son. My professional and personal role are blurring, and I have not got time to successfully do both the best of my ability.*' (Bryson & Andres, 2020, Page 635)

Another respondent from the research states that they are '*worried*' they must prove they can deliver everything online as the government will '*use it as an opportunity to scale back universities in the UK*' (Page 635). Participants in Watermeyer, Crick, Knight, & Goodall (2020) also describe that the workload accompanying the transition of all teaching and learning online succeeds 'normal' teaching as additional tasks, such as finding and uploading additional online resources to support online assessments, engaging in pastoral care (including assisting students to adapt to online learning and assessment), online preparation, contingency planning, and keeping up with several online discussions, are required.

Online 'virtual' lectures and seminars were provided through video-telephonic platforms and software during the pandemic. Although beneficial to encouraging engagement with students (Bryson & Andres, 2020), video-telephonic platforms present additional issues for HE educators. 'Zoom', for instance, is a video-telephonic communications platform that allows individuals to connect with others via microphone and video. 'Zoom' has been utilised across many higher-education sectors to provide an online learning experience. The programme has several features to support the development of virtual learning environments such as allocation to breakout rooms for group discussion, screen sharing and interactive elements such as writing and drawing. Additional functions include the ability to mute audio, mute all participants and turn off the video. The phenomenon 'Zoom fatigue', has emerged from the literature which describes *'…tiredness, anxiety, or worry resulting from overusing virtual videoconferencing platforms*' (Widerhold, 2020. Page 237). One potential causation for 'Zoom fatigue' is the lack of synchronicity between the speaker and listener requiring more cognitive effort to restore synchrony (Keetels and Vroomen, 2012) - any delay (even a few milliseconds) between words spoken and words received lead to disruption of natural synchronicity. Widerhold (2020) states a lack of social cues and communication, that we would usually receive from non-verbal cues during face-to-face, may elicit also further distress. As participants can mute themselves and hide their video during Zoom meetings, understanding and responding to social cues is an issue. Rivkin, Moser, Diestel and Alshaikh (2020) indicate that educators report losing self-determination during online lessons, via video-telephonic platforms, as they are dependent on student's responses during lectures and

seminars which is difficult when students are muted and hidden.

2.3.6 Working from Home

Oakman et al (2020) reviewed twenty-three papers between 2007-2020 which explored the mental and physical health effects of working from home (WFH). They concluded that mental health, associated with WFH, was dependant on various moderators such as demands within the home environment. Golden (2011), included in the review by Oakman et al (2020), reported the impact of strain-based family-to-work conflict and work-to-family conflict were associated with levels of exhaustion. Another study by Eddleston and Mulki (2015), also included in the review, found that individuals WFH reported unique challenges such as their work role embedding into their family role becoming physically and psychologically intrusive. Eddleston and Mulki (2015) draw upon the boundary theory which suggests simultaneous and continuous availability for work and family may breed conflict for remote workers due to lack of physical, spatial boundaries (Kreiner, Hollensbe, & Sheep, 2009).The boundary theory also recognises that clear boundaries are made, and required, between work and family to distinguish the two 'spheres' that need to be managed and negotiated to maintain balance (Clark, 2000, page 751).

Qualitative findings from Eddleston and Mulki (2015) show that the integration of work and family through WFH can be physically and psychologically challenging as boundaries are broken or blurred. Some respondents state that family members, referred as 'border breakers' by Eddleston and Mulki (2015), would disrupt them during working hours to undergo family roles such as cleaning or washing triggering work-to-family conflict (WLC) (Eddleston and Mulki, 2015, page 357). However, higher workload contributed the most to WLC as respondents explained how their organisations expect constant availability. One respondent stated:

'*We have a little green light that says I am on, I am working. So, all my boss has to do is look at my system and see if my little green light is on and instant message me . . . throughout the day. And if I respond, he knows I'm working and if I don't he might wonder where I am*.' (Eddleston and Mulki,

2015, page 358).

Eddleston and Mulki (2015) also found that perceptions of constant availability when working from home led to overworking and inability to effectively transition between work and family. Overworking, and inability to 'switch' whilst WFH is a consistent issue within the literature (e.g. Grant, Wallace, and Spurgeon, 2013; Felstead and Henseke, 2017; Grant, Wallace, Spurgeon, Tramontano, and Charalampous, 2019). Gambhir (2020) found overworking whilst WFH remained an issue during the COVID-19 pandemic and was associated with negative mental health . Dunn (2020) describes her experiences of a communications Professor WFH. She describes her experience of the collision between '*professor guilt*' and '*mum guilt*' during COVID-19 and illustrates struggles between gendered expectations of childcare, familial obligations, home maintenance and her role as a Professor and mentions an overwhelming obligation to work hard to maintain her job, avoid letting her students down, avoid being perceived as intellectually inferior, avoid being another statistic and prevent becoming a failure to her partner, children and herself.

In this chapter, environmental aetiologies influencing poor mental health were explored focusing on HE educators. Job satisfaction, a measure used to assess work-related wellbeing, contributes significantly to the wellbeing of HE educators. Before the pandemic, statistics reveal high rates of employees unsatisfied with their jobs and management team. During the pandemic, symptoms associated with poor mental health increased more than 10%, attributed to the rapid transition of online learning. High workload presents as a contributing factor to poor mental health before and during the pandemic, however, some research indicates that workload decreased (*TWI* - Education Support Partnership, 2019). Pressure to improve the student experience and satisfaction present an issue before the pandemic exacerbated by migrating teaching and learning online during the pandemic. Transition to online learning and working from home both present as key influential risk factors. Findings suggest that the teaching environment before and during the COVID-19 pandemic can increase the likelihood of developing symptoms associated with poor mental

health . The next sub-chapter discusses biological risk factors with a focus on HE educators.

2.4 Biological Aetiology

In this sub-chapter, biological theories of poor mental health in HE educators are explored. Firstly, the allostatic loading theory is discussed with consideration to the impact of high workload. Research exploring the impact of stress on the endocrine system, with specific focus to processes within the hypothalamic-pituitary-axis (HPA-Axis), is then discussed. The subchapter finalizes by highlighting issues, such as disruption to the circadian rhythm and sleep disorders, due to disruption to HPA-Axis processes.

2.4.1 Allostatic Loading

McEwen and Stellar (1993) describe allostatic loading as the operating range of the bodies vital functions to deal with daily challenges. McEwen and Stellar (1993) proceed to describe allostatic load as strain on the body from the constant state of increasing and decreasing functionality increasing the risk of psychological and physiological diseases. McEwen and Stellar's (1993) model of allostatic loading illustrates the process of an individual perceiving a stressful event (internal or external), processing this stimulus as a 'threat' or 'not a threat' which translates to biological responses such as triggering of the endocrine system, leading to a physiological response e.g., stimulating cortisol release from the adrenal glands via activation of the hypothalamus-pituitary-adrenal (HPA) axis. McEwen and Stellar (1993) argue that individual differences, such as genetics, gender, and development identity, may differ stress responses to environmental challenges. Those who often perceive environmental challenges as 'threats with unknown source 'experience high levels of helplessness (anxiety induced) and vigilance (anxiety induced) in addition to the continuous secretion of hormones from the endocrine system leading to cardiovascular issues, increase risk of seizures, lower metabolism, and increased risk of developing chronic stress.

McEwen and Stellar (1993) state those most at risk of the negative implications of allostatic loading are those experiencing occupational stress due to high workload. Hintsa et al (2014) found associations between high allostatic load (due to high workload), burnout (p= .003), cynicism (p=.031) and decreased professional efficacy (p=.007) across 3283 workers independent of age, sex, education, occupation, and psychological distress. Hintsa et al (2014) also revealed that depression explained 60% of this association suggesting partial overlap with co-occurring depressive symptomatology. These findings indicate that allostatic loading from high workload contributes to burnout, cynicism, efficacy, and symptoms associated with depression regardless of occupation. As explored in sub-chapter 3.1.2 High-Workload, HE educators experience high-work load before and during the COVID-19 pandemic increasing their likelihood of allostatic loading and its negative implications.

2.4.2 Hypothalamic-Pituitary-Axis

The hypothalamic-pituitary- axis (HPA-axis) consists of three key regions; the hypothalamus, anterior pituitary gland and the adrenal gland which works with the sympathetic nervous system to govern responses to intrinsic or extrinsic stress (Pariante & Lightman, 2008). When exposed to perceived stress, the hypothalamus secretes corticotrophin-releasing factor (CRF) which triggers the release of adrenocorticotrophic hormone (ACTH) from the anterior pituitary glands which finally stimulates the release of the gluco-corticoid 'cortisol' from the adrenal glands. Due to heightened circulating concentration of cortisol (as well as adrenaline) as a response to a stressful stimulus, physiological changes occur such as increased blood pressure, heart rate, respiratory rate, arousal, alertness and dampening of the immune response; this physiological phenomenon is known as the 'fight or flight' response (Chrousos and Gold, 1992). When working accordingly, the HPA-axis provides the energy and focus needed to deal with an acute crisis. However, when the HPA-axis remains activated, long-term psychological issues can occur such as chronic stress (a term referring to individuals who experience the

physiological response of a threat despite no threat being present or after a threat has passed) and depression.

Langelaan et al (2006) compared HPA-axis functioning between ‘burned out, ‘work engaged’ and ‘healthy workers’ through obtaining saliva cortisol over three consecutive workdays and one non-workday. Although a significant effect was found between morning awakening cortisol between workdays and non-workdays (p = < 0.001), no statistical difference was found between the groups suggesting no difference in HPA-Axis activity between ‘burned out, ‘work engaged’ and ‘healthy’ workers. Bayes, Tavella and Parker (2021), however, concluded that sustained activation of the HPA-Axis throughout the day was associated with burnout leading to increased allostatic load, depression, poor sleep quality, reduced cognitive function and higher mortality rate. As Bayes, Tavella and Parker (2021) research involved a literature review of research including the general population with varying biomarkers of HPA-Axis, their findings provide evidence that HPA-Axis activity throughout the day can be influenced by burnout often associated with work.

Shackleton (2021) states that, as stress is a complex state which affects multiple systems in the body, a multivariate approach that objectively measures these changes in response to acute, intermittent, and chronic stressors is needed in occupational research to develop stress management. Findings from Shackleton (2021) show that, although limited in number, studies that utilise biomarkers (e.g. urine and blood) can accurately detect biomarkers associated with stress. Shackleton (2021) suggests more research including biomarkers (referred to as metabolomics) are required to further understand, detect, manage, and reduce occupational stress.

2.4.3 Circadian Rhythm

Circadian rhythm refers to physiological changes, primarily the secretion of cortisol/melatonin and the regulation of body temperature, that occurs across a 24-hr period. These physiological changes are influenced by the 'zeitgeber' daylight and controlled by the hypothalamus. For those with depression, and those experiencing prolonged or chronic stress, 'normal' diurnal physiological changes that occur are disrupted. Normal cortisol circadian rhythms involve a tide of cortisol in the morning (to assist with awakening and triggered by the sun) which then slowly decreases throughout the day and reaches a low level at night to prompt sleep.

Disruption to the awakening cortisol response (also known as cortisol awakening response, ACR or CAR) is frequently identified as a key biomarker of stress and poor mental health (Law & Clow, 2020). Dedovic & Ngiam (2015) propose that a heightened awakening cortisol response indicates anticipation of stressors. They argue that research such as Langelaan et al (2006) and Schlotz et al (2004), which found statistically significant differences in ACR between working and non-working days, indicates disruption to the ACR (increased cortisol secretion) due to anticipation of a stressful working day. However, research also indicates that perceived stress and anxiety can dampen (present no statistical changes) or present a negative correlation with the ACR. Du et al (2013) found self-reported perceived stress and anxiety in healthy young men had a negative correlation with the ACR. They concluded that long-term sustained stress reduced HPA-Axis activity affecting the ACR.

Hoyt et al (2021) also found that heightened ACR concentrations can predict worse mental health over time. However, they argue that overall diurnal cortisol profiles are more effective for predicting health consequences which include ACR, an overall decrease of cortisol throughout the day and concentration before bed. Research indicates that sustained activation of the HPA-Axis throughout the day, presenting slow reduction of cortisol

throughout the day, is associated with depression, anxiety, and poor sleep quality (Armer, 2020; Bayes, Tavella and Parker 2021). Doane et al (2011) found no statistical significance between ACR and depressive symptoms but did find significance between depression and cortisol before bed. These findings support the notion that diurnal profiles should be considered to predict poor mental health compared to focus on one cortisol index.

Disruption to cortisol secretion before bed incites depression, anxiety, stress, and sleep-related disorders such as insomnia (Doane et al, 2011, Feder et al 2004, Herriot, Wrosch, Hamm & Pruessner, 2020, Sladek, Doane & Breitenstein, 2020). Findings from Cropley, Rydstedt, Devereux and Middleton (2015) suggest work-related rumination in the evening influences morning and bed-time cortisol. Cropley, Rydstedt, Devereux and Middleton (2015) claim that rumination, also known as preservative cognition, prolongs stress-related physiological responses influencing diurnal cortisol. Cropley, Rydstedt, Devereux and Middleton (2015) found that those who ruminate often before bed present significantly higher cortisol secretion at night and a flattened CAR response compared to 'low' ruminators. Across the sample of full-time teachers within the UK, work-related issues were reported as the key topic of rumination (Cropley, Rydstedt, Devereux and Middleton, 2015).

Rumination, or cognitive preservation, often occurs in the evenings and is associated with insomnia, poor mental health, and overall wellbeing. Although there is conflict within the literature whether insomnia is prodromal to poor mental health, or poor mental health is prodromal to insomnia, there is an evident relationship suggesting symptoms of insomnia can increase risk depression, anxiety and stress (Raw & Clow, 2020). Tubbs et al (2020), for instance, explored the relationship between insomnia and depression in a non-clinical community sample and found that high scores of insomnia symptoms, as measured by the Insomnia Severity Index, increased the prevalence risk of all individual depressive symptoms by 8 – 15%. As research indicates that insomnia is a key issue in HE educators (Dutta, 2021; Mesquita & Singatullin, 2019), the impact of the HPA-Axis

functioning on psychological symptoms and insomnia should be considered to assess mental health .

2.5 Psychological Aetiology

In this sub-chapter, four psychological theories are explored providing further understanding to poor mental health in HE educators. The diathesis-stress theory suggests individuals possess pre-dispositional traits to poor mental health which are triggered by stressful life events. Individual differences, such as coping mechanisms, may influence an individual's response to stimuli regardless of pre-dispositional traits. The ability to utilise coping mechanisms to deal with stressful life events and prevent poor mental health is explored. Issues in emotional processing and regulation are then discussed to highlight issues surrounding subconscious adverse coping strategies. The importance of emotional intelligence (EI) within the educational sector, and the implications of low EI on mental health, concludes the sub-chapter.

2.5.1 Diathesis Stress Model

The term 'diathesis' refers to an individual pre-dispositional vulnerability of developing a mental health disorder and 'stress' refers to an external stressful life event (Zuckerman, 1999). Therefore, the diathesis-stress model explains mental health and its trajectory as the result of an interaction between an individual's predisposition and stressful life events. In its early work, the diathesis-stress model was used to describe the onset of schizophrenia, however, recent research has shifted towards exploring the development and trajectory of mood disorders such as depression.

The diathesis-stress theory for depression states that stressful life events, such as acute life events, chronically stressful life circumstances and exposure to adversity in childhood,

can trigger depression in those who may be vulnerable due to certain pre-dispositional cognitive, interpersonal or personality characteristics (England, 2009; Colordo-Conde et al, 2017). Cognitive models suggest that depressed individuals interpret events and circumstances in an excessively pessimistic and self-critical manner with perceptions of helplessness and hopelessness about changing or improving their situations (Alloy et al., 2006; Gibb et al., 2006). Research also indicates that certain personality traits, including openness, conscientiousness, agreeableness, and neuroticism may also be linked to pre-dispositional vulnerability to disorders such as depression (Boyce, Wood and Brown, 2010; Barnhiofer and Chittka 2010; Yoon, Maltby and Joorman, 2010). It is argued that genetics can only be partially accountable for personality traits and cognitive models. Nurture, referred as care and protection from others whilst growing, also contributes, transacts, and interacts with the development of personality (Kandler & Zapko-Willmes, 2017).

Individual differences, however, can influence an individual's response to stimuli, regardless of their pre-dispositional traits. Some individuals, for instance, can successfully utilise certain coping mechanisms they have developed to deal with life's daily challenges and stresses which may prevent the development of poor mental health (e.g., Mohamed & Baqutayan, 2015). Montaya and Summer (2021), who published '*eight dimensions of wellness for educators*' state that one dimension, named the emotional dimension, requires the ability to be aware, accept, express and manage emotions effectively through coping mechanisms and maintaining healthy relationships to maintain good mental health . The following sub-chapter explores research surrounding coping mechanisms to maintain good mental health in the educational sector.

2.5.2 Coping Mechanisms

Coping mechanisms also referred to as ‘coping strategies, are described as cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the individual (Lazarus & Folkman, 1984). According to Lazarus and Folkman (1986), there are two forms of coping mechanisms - problem-focused coping (behaviours such as confrontation, seeking social support, plan full problem-solving) and emotion-focused coping (self-control, seeking social support, distancing, positive appraisal, accepting responsibility, escape/avoidance).

Despite the general ability of coping mechanisms to deal with external or internal demands, research suggests that certain cognitive coping mechanisms may influence the development of depression, anxiety, and stress. Dysfunctional coping mechanisms increase the likelihood of developing depression, anxiety, stress, and poor overall wellbeing. Research indicates dysfunctional coping mechanisms are apparent in those with high-stress jobs such as in managerial and administration, law enforcement and the educational sector (Ortega, Brenner, and Leather, 2006; Xianyu and Lambert, 2006; Chang et al 2006; Guppy and Weatherstone, 2007; Antoniou, Ploumpi and Ntalla, 2013). Macintyre, Gregersen and Mercer (2020) assessed the coping strategies of teachers during the COVID-19 pandemic and found that positive psychological outcomes (wellbeing, health, happiness, resilience, and growth during trauma) correlated positively with approach coping and negatively with avoidant coping.

Avoidant coping strategies, such as denial, behaviour disengagement and self-distraction, were consistently correlated with stress, anxiety, anger, sadness, and loneliness. Macintyre, Gregersen and Mercer (2020) also found that avoidant coping increased as stress increased suggesting that there may be a cost to using avoidant coping strategies. Klapproth, Federkeil, Heinschke and Jungmann (2020) further explored teacher coping

strategies during COVID-19 and found teachers choice of coping strategy was dependant on the stressor. Functional coping strategies, also known as approach strategies, were associated with the perception of low motivation from the parents and the school's low level of organisation. Dysfunctional, or avoidant strategies, were associated with high-student workload, digital competency, own level of organisation and the school's level of low organisation (Klapproth, Federkeil, Heinschke and Jungmann, 2020). As coping mechanisms require conscious controlled processes, they are malleable to change, adaptation and growth (Gross and John 2003; Compas et al 2014). The development of new functional coping mechanisms, as a response to stressors, can avoid or decrease the risk of poor mental health . Coping mechanisms can be self-taught or can be acquired through therapies and treatments e.g., cognitive-behavioural therapy (Wesner et al, 2014).

2.5.3 Emotion Processing and Regulation

Unlike coping mechanisms, which only require controlled processes, emotional processing and regulation include automatic and controlled processes which may be conscious or sub-conscious and are difficult to alter (Gross and John 2003; Compas et al 2014). Within research, varying theories describe how humans process and regulate emotions. The 'Cannon-Bard theory' suggests that once aroused by an external stimulus, we simultaneously have a conscious experience of emotion and undergo physiological changes e.g., when encountering a lion, we experience fear and physiological changes of fastening heart rate, trembling, sweating etc (REF). The Schaeter-Singe theory argues a two-factor theory in which we encounter a stimulus (e.g., a lion) we experience arousal and then use rationality to attach a label to that arousal (e.g. that lion is dangerous) resulting in an appropriate emotion (fear) (REF). However, it is agreed that emotions are developed and regulated through the process of experiencing a stimulus, whether that be an event,

object, situation, sensation or thought, paying attention to this stimulus, interpreting this stimulus, and responding with an emotional or physiological reaction.

Experiential avoidance (EA) is a subconscious adverse regulation strategy to stressors in which deliberate efforts are made to control or escape excessive negative evaluations through avoidance of thoughts, feelings, and experiences (Hayes Strosahl & Wilson, 1999). EA disrupts normal emotional processing as negative emotions, feelings and experiences are not 'dealt with' and therefore suppressed. Kashdan et al (2006) state that experiential avoidance, although presenting minimal consequences in the short term, may become an issue when enormous time, effort and energy is devoted to managing and controlling negative emotions and events. EA presents a key role in teacher distress, mental health, . Hinds et al (2014) found that EA acts as a mediating factor between stress student relations and depression, emotional exhaustion, depersonalisation, and personal accomplishment. Similar findings from Galhardo, Carvalho, Massao-Cardoso and Cunha (2020), which utilised the Teachers Acceptance and Action Questionnaire (TAAQ; Hinds et al., 2015) to assess EA, found a significant correlation between EA and depression anxiety and stress symptoms as measured by the depression, anxiety and stress scale (DASS-21; Lovibond & Lovibond, 1995).

2.5.4 Emotional Intelligence (EI)

Emotional intelligence (EI) is defined a competency that can help individual to recognise and manage his own emotion and identify others' emotion and build good relationship with them (Furnham 2012). Research indicates the impact of EI capacity on mental health, wellbeing, and work performance varies across the working sectors. Bond and Donald-Feilder (2004) assessed the relative importance of psychological acceptance and emotional intelligence (EI) to workplace being. They found that across 290 United Kingdom workers, EI did not significantly predict any wellbeing outcomes. Similarly, Lindebaum and Jordan (2012) also found that EI only partly moderates the

relationship between mental health and some- but not all - aspects of job performance. Participants within these studies worked within the finance, accounting, human resources, and administration sector. Due to the nature of such working sectors, EI is not utilised or required therefore does not present a significant influence on mental health or work performance. For other roles, such as teaching, EI has a significant influence on mental health and work performance. Molero et al (2019) revealed that due to the stressful nature of the job role, teachers report the need to develop higher levels of emotional intelligence as a coping mechanism to prevent the development of maladaptive emotions. Ismail, Nopiah and Rasul (2020) also found significant relationship between EI and work performance across 1186 vocational teachers in Malaysia with lower EI presenting a negative impact on performance. They argue that teachers require certain aspects of emotional intelligence, such as self-awareness, self-regulation, motivation, and empathy to fulfil the teaching role. In addition to work performance, high EI is needed in education to maintain positive life outcomes reducing occupational stress, reduce burnout and improve psychological health (Vesely, Saklofske and Leschied, 2013; Krishnan and Awangm, 2020). Zysberg, Gimmon and Robinson (2017) suggest that EI may also play a mediating role between stress and burnout in educators. They found stress had a positive correlation with burnout which was mediated by EI. These findings suggest that educators with high EI can utilise stress to their advantage to avoid burnout.

Research indicates that EI interventions, that aim to improve and enhance EI, are effective for reducing poor mental health (Delhom, Satorres and Melendex, 2020). Delhom, Satorres and Melendex, (2020) assessed the impact of an EI intervention which consisted of providing information on adaption and emotions, emotional introspection, awareness, concepts of bidirectionality, empathy and assertiveness, habitual behaviour patterns, emotional repair skills, coping strategies and emotional regulation. In comparison to a control group, participants who took part in the EI intervention presented an ability to use adaptive coping strategies and decrease the use of maladaptive strategies, as well as reducing hopelessness and depressive symptoms. These findings suggest that EI can be improved and enhanced through interventions which introduce coping mechanisms to deal with stressful events.

2.6 Discussion

In this chapter, causational factors of poor mental health in educators have been explored. Causational factors were grouped into three aetiological models: environmental, biological, and psychological. Research indicates that environmental factors, associated with working in the educational sector, includes low job satisfaction, high-workload, and pressure to improve student experience and satisfaction. During COVID-19, additional risk factors such as transitioning to online teaching and learning and working from home, increase the risk of poor mental health . Biological research indicates that environmental stressors, as mentioned above, may trigger biological processes associated with poor mental health . The allostatic loading theory states that high-work load and job stressors increase allostatic loading (physiological response to stressors) leading to poor mental health . However, McEwen and Stellar (1993) state that individual differences, such as genetics, gender, and development identity, differ stress responses suggesting individuals present varying allostatic loading capacities.

Nevertheless, research exploring the hypothalamic-pituitary- axis (HPA-axis) indicates that despite individual differences, humans experience physiological responses to stress such as secretion of hormones e.g., cortisol. Although these concentrations vary between individuals, they appear as an effective biomarker for detecting symptoms of poor mental health. Specifically, those with symptoms associated with depression present disrupted cortisol secretion (when compared to 'healthy' individuals) immediately after awakening (awakening cortisol response. ACR). Disruption of cortisol concentrations at night may also indicate mental health issues associated with work-related rumination and insomnia. Shackleton (2021) states that the use of biomarkers (blood, urine, saliva) is imperative in future research exploring mental health required to further understand, detect, manage, and reduce occupational stress. Biological research indicates that response to environmental stressors elicit a biological response.

The diathesis-stress model, coping mechanisms, emotion processing and regulation and emotional intelligence are psychological theories which bridge the gap between environmental stressors and biological response. Psychological theories and research propose that psychological responses to the environmental can mediate and control biological responses subsequently preventing poor mental health. It is suggested, through theories such as emotional processing, regulation, and emotional intelligence, that individuals present varying capability of regulating and processing emotion associated with exposure to a stressor or stimuli. Although these processes are subconscious, research indicates the risk of poor mental health can be reduced through the development of positive coping mechanisms and improving emotional intelligence. Overall, this chapter illustrate that environmental, biological, and psychological theories all contribute towards the development of poor mental health in educators. In the next sub-chapter, current treatment pathways will be discussed.

2.7 Treatment Pathways

2.7.1 Introduction

In this sub-chapter, the first point of contact in the healthcare system is explored highlighting issues associated with initial mental health diagnosis such as subsyndromal symptomatology, over-diagnosis, and pharmacological treatment. The Improving Access to Psychological Programme (IAPT) is discussed to highlight the promotion of psychological therapies for treating poor mental health . Statistics indicate reduced contact with mental health services and an increase in anti-depressant medication prescriptions during the COVID-19. The implication of these statistics is explored with consideration to overcoming barriers associated with accessing mental health support and treatment.

2.7.2 General Practitioners – Mental Health Diagnosis and Treatment (UK)

General practitioners (GP's) are the first point of contact in the healthcare system and therefore play a crucial role in the detection and treatment of mental health disorders. GPSs detect and

diagnose mental health conditions, such as depression, anxiety and stress, by referring to criteria in manuals such as the DSM-V, ICD-10 or guidelines developed by the National Institute for Health and Care Excellence (NICE). However, research indicates that GP's ability to detect mental health disorders through speculation alone lacks sensitivity (Carey et al, 2014). Carey et al (2014) suggests that unassisted detection of depression increases diagnostic inaccuracy which can be avoided by utilising screening tools such as the Patient Health Questionnaire (PHQ-9. Kroenke, Spitzer & Williams, 2001). Costanti et al (2021) argue a two-stage screening process for depression, including a semi-structured diagnostic interview and a PHQ-9, is necessary to accurately detect poor mental health in patients. Despite recommendations, screening for mental health issues in primary care is not currently recommended in the UK (NICE, 2019).

Lack of mental health screening in the UK may contribute to misidentification or inability to effectively recognise symptoms of depression often leading to under and over-diagnosis (Mitchell, Vaze & Rao, 2009). Under-diagnosis of disorders, such as depression, may attribute to GP's focus on somatic symptoms which often accompany depression e.g. lack of energy, sleep disturbance, changes in appetite and general aches and pains (Tylee & Gandhi, 2005). It is estimated that in two-thirds of patients with depression, somatic symptoms dominate the clinical picture and are frequently attributed to an organic cause rather than psychological distress (Tylee & Gandhi, 2005). Reluctance to diagnose due to beliefs that depression is stigmatizing (Barley, Murray, Walters & Tylee 2011), uncertainty of the relationship between mood and social problems (Barley, Murray, Walters & Tylee 2011), and inability to distinguish between definite, subsyndromal depression may also contribute to under diagnosis (Mitchell, Vaze & Rao, 2009).

2.7.3 Subsyndromal Symptomatology

Subsyndromal disorders (also referred as subthreshold or minor psychiatric disorders) are characterised by the presence of symptoms associated with a disorder which do not meet full diagnostic criteria as listed in the DSM-V or ICD-10 (Hantke, 2015). Subsyndromal symptoms increase the likelihood of developing a 'full' identifiable and diagnosable mental health condition

(e.g. depression - Lee, Stockings, Harris and Doi, 2019). Although there is currently no treatment for subsyndromal symptoms, NHS online suggests that individuals experiencing subsyndromal symptoms should 'wait and see' whether the symptoms get better by themselves, exercise, or seek self-help - including self-help books, online cognitive behavioural groups or local psychological services (NHS, 2019). Although no treatment is currently provided specifically for subsyndromal symptom, therapies such as cognitive-behavioural therapy (CBT) and interpersonal therapy (IPT) can be accessed via the Improving Access to Psychological Therapies (IAPT) programme which allows self-referral (GP referral is not required) – the role of IAPT and the impact of COVID-19 will be further explored in sub-chapter 4.5.

2.7.4 Overdiagnosis and Pharmacological Treatment

Over-diagnosis of mental health conditions by GPs in the UK presents additional issues. When diagnosed with a suspected mental health condition such as depression, Roger and Oliver (2001) state that GP'S prescribe antidepressants as they consider this as their only option due to perceived lack of psychological therapy or other specialist services. Further research suggests that prescription guidelines of antidepressants are not always followed by GP's and doses are too low over a short period of time (Manning and Marr 2003; Wang, Wilkinson and Agius, 2017; Herzog et al 2017).

Around 61.9 million anti-depressant items were prescribed in 2016 which rose to 64.7 million items in 2017 (Public Health England, 2018). Although anti-depressants appear un-effective for those experiencing mild depression, (Ellis & Smith 2002; Fournier et al 2010), around 67% of antidepressants prescribed by GP's in the UK are prescribed to those with mild depression, with 30% for moderate depression and only 3% for severe depression (Martinez et al 2005) suggesting potentially incorrect or over-prescription.

Financial costs, adverse effects impact on work and family life, perceived burden and social stigma are adverse effects associated with anti-depressant prescription (Sher, McGinn, Sirey & Meyers, 2005; Ilyas & Moncrieff, 2012; Cartwright, Gibson, Read, Cowan & Dehar, 2016). In the UK, the cost of antidepressant medication totted to £171, 050, 172 in 2018 (Results from Chemist 4 U

survey conducted in 2018). Currently, the cost of one prescription item in the UK is £9.35 (as of April 2021). According to the Regional Drug and Therapeutics Centres, yearly anti-depressant treatment in the UK can cost between £11.83 (Citalopram, 20mg – most commonly prescribed) and £7, 819.50 (Trimipramine, 75mg – not prescribed in primary care).

Side-effects from anti-depressant medications, such as selective serotonin reuptake inhibitors (SSRI's), can include agitation, feeling or being sick, dizziness, blurred vision, low sex drive, difficulty in achieving orgasm during sex or masturbation, and difficulty in obtaining or maintain an erection (NHS, 2018) Severe side effects of anti-depressant medication include treatment-worsening suicidal ideation which can occur in the first few weeks of use. Zisook et al (2009), found clinical correlates of the worsening or emergence of suicidal ideation during SSRI treatment of depression. 1909 patients treated with Citalopram (10-60mg/ day for 12-14 weeks) 5% (90 individuals) experienced worsening of symptoms by their first-post baseline visit (Zisook et al, 2009). Courtet, Nobile and Lopez-Castroman (2017) found that particular subgroups (those with severe depression with early age of onset, past history of suicide attempts or suicidal tendencies when treated with previous antidepressants, comorbid misuse of substances, personality disorders and psychosocial adversity) present an increased risk of self-harm/suicide when taking antidepressants.

Dependence on anti-depressants to relieve symptoms is also a key issue with pharmacological treatments. Although anti-depressants alleviate symptoms associated with mental health conditions, such as depression and anxiety, the causational element behind the development of symptoms (e.g. high workload, bereavement etc) are often not approached. Therefore, once a course of anti-depressants has ended, there is a high-risk of relapse and remission (Geddes et al, 2003; Papakostas, Perlis and Seifert, 2007; Psychological therapies (e.g. CBT) are often provided adjunctive to pharmacological treatment to ensure coping mechanisms can be developed and utilised once a course of medication has finished preventing risk of relapse (Breedvelt et al, 2021). Unlike pharmacological treatment, psychological interventions and therapies can be accessed at any time, do not require a clinical diagnosis and do not induce harmful side effects.

2.7.5 Improving Access to Psychological Therapies (IAPT)

The Improving Access to Psychological Therapies (IAPT) program was launched in 2008 to improve accessibility and quality of mental health services across England. The motivational circumstances for the development of IAPT have roots in a wide range of clinical and political developments. McHugh and Barlow (2012) state one key development was findings from a systematic review which strongly supports the use of psychological therapies, especially cognitive behavioural therapy (CBT), for treating mental health disorders. Economists and clinical researchers also agreed that improving access to psychological therapies would reduce other depression-and-anxiety related costs, such as welfare benefits and medical costs, further aiding development of IAPT (Layard, Clark, Knapp & Mayraz, 2007). In addition to CBT, IAPT also promotes the use of other talking therapies, (e.g. interpersonal therapy aka IPT) counselling and provides self-help information.

IAPT can be accessed through telephone, e-mail or online and allows self-referrals, community or voluntary referrals, and primary/secondary care referrals allowing those with subsyndromal symptomatology to access support. As IAPT services can be accessed by anyone at any time, they have the potential to be preventative and therapeutic. Services also have the flexibility to be used independently or alongside ongoing treatment and medication.

2.7.6 Impact of COVID-19

Due to implementation of COVID-19 policies, face-to-face psychological and counselling clinics were suspended adding greater risk to those currently receiving treatment and to those that may require it. Although IAPT services continued self-referrals and therapies were provided via online platforms such as Skype or Zoom or over the phone to replace face-to-face interventions - group sessions and therapy had also been paused. During the COVID-19 period, statistics reveal a significant decrease in contact with adult mental health services. The average monthly number of new referrals to adult mental health services (UK) between April 1, 2020, and Aug 31, 2020 (283 338) decreased by around 10% from the corresponding period in 2019 (314 885) (Armitage,

2021; NHS Digital, 2021: Mental Health Services Monthly Statistics). Coventry and Warwickshire NHS Trust report an 8.75% decrease of people in contact with mental health services between January 2019 and January 2020. However, anti-depressant prescriptions made in general practice between April 1, 2020, and Sept 30, 2020, was 38,609,032 ninety-four percent higher than the corresponding period in 2019 (NHS Digital, 2021: Practise Level Prescribing).

These statistics indicate that during the COVID-19, when psychological therapies were less accessible, individuals relied on pharmacological intervention to reduce symptoms associated with poor mental health . In addition to the negative implications of pharmacological treatment, as mentioned above, individuals who rely on medication may not develop the necessary coping mechanisms and strategies needed to develop resilience. Additionally, once restrictions of COVID-19 are lifted, symptoms associated with poor mental health may dissipate as people return to work, rebuild relationships, regain social connections, and return to 'normality'. However, treatments such as anti-depressants cannot be ceased immediately and must be steadily reduced (over a 4-week period) to avoid withdrawal (NHS Digital. Stopping or coming off antidepressants). Therefore, the burden of pharmacological treatment during COVID-19 could present subsequent long-term issues.

2.7.7 Discussion

Within this chapter, issues with obtaining mental health support and treatment through the NHS pathway prior to COVID-19 have been discussed and explored. Key issues include under diagnosis of mental health disorders due to inability to recognise symptoms or subsyndromal symptomatology and over-diagnosis of disorders leading to over-prescriptions as subsequent retaliation. Additionally, this chapter illustrates the negative psychological, physiological, and financial effects of pharmacological treatment highlighting the need for psychological treatments.

Poor mental health has drastically increased in the UK as a result of the COVID-19 pandemic. Although psychological therapies continued virtually, either online or through the phone, statistics suggest contact with adult mental health services drastically reduced whereas anti-depressant

prescriptions surged suggesting a potential issue. Although individuals are actively seeking help for mental health, pharmacological treatment pathways and antidepressant medication may present long-term issues and negative repercussions. Within the next sub-chapter, the effectiveness of providing virtual treatment and therapy online will be explored. In addition to online interventions ability to provide virtual support and treatment without breaching COVID-19 isolation policies they also surpass otter barriers faced through conventional treatment pathways.

2.8 Online Interventions for Mental Health in the Workplace

Within this chapter, the advantages of providing online interventions and programmes to improve mental health will be explored. Firstly, the potential of online workplace interventions to surpass barriers faced through conventional treatment pathways will be illustrated with supporting evidence from the literature. As online interventions provided within the workplace (including working from home) may reduce the impact of job-related work stressors, findings from a systematic review was conducted by Morley, Bollard and Bressington (2020) assessing the acceptability and effectiveness of online interventions in the workplace are reported. The implications of these findings are discussed leading to exploration of psychosocial interventions, recovery versus medical model, and group-based psychosocial interventions.

2.8.1 Overcoming Barriers to Accessing Mental Health Support

As discussed in chapter four issues may arise when seeking treatment and support for mental health through conventional treatment pathways. Although self-referral to psychological therapies may avoid issues associated with approaching GP's, mental health screening (a requirement of IAPT services) may prevent those with subsyndromal symptoms for seeking further treatment and support. During COVID-19, perceived strain on the NHS also is as a barrier for seeking support and treatment. Nana, Morgan and Williams (2021) state that perceived altruism, the principle of moral concern for others, explains drastic reduction of NHS service use across all treatment areas. They

state that the notion ‘Stay Home, Protect the NHS, Save Lives’ resonated across social media leading to altruistic, yet self-destructive, behaviours such as avoiding support and treatment offered by the NHS (Nana, Morgan and Williams, 2021). Paton, Hills & Hedge (2021) also suggest that reduction in referrals to psychiatric services are attributed to altruistic avoidance of putting “pressure on the NHS”.

Online interventions, that are not affiliated with the NHS, may reduce altruistic avoidance behaviours and encourage help-seeking behaviours for those with poor mental health . As online interventions do not require a clinical diagnosis, referral (self or otherwise) or mental health screening, they can be accessed by anyone for therapeutic or preventative measures including those with subsyndromal symptomatology. Additionally, as the majority of the population are working from home during the lockdown, online interventions are easily accessible and adaptive to working hours (no requirements to leave their place of work to attend a separate location at a set time).

In the next sub-section, a systematic review exploring online interventions in the workplace (including working from home) to improve mental health will be discussed. The aim of this systematic review is to gain deeper insight surrounding the logistics of utilising online interventions, the feasibility of such interventions, engagement, retention, and overall effectiveness for improving mental health related symptomatology. The systematic review was conducted March – June 2020 Therefore, no research had been released which explored the impact of online interventions during COVID-19. Studies within the review were conducted prior to the COVID-19, however, still provide insight into feasibility and effectiveness.

2.8.2 Systematic Review Exploring Online Interventions in the Workplace

The aim of this systematic review was to evaluate the acceptability and efficacy of online interventions (pre-COVID-19) within in the workplace to improve mental health. As online interventions and therapies are easily accessible and allow maintenance of social distancing, they

hold the potential to be a crucial tool for maintaining good mental health for employees during COVID-19. Inclusion criteria for participant demographics, intervention type and comparisons remained broad to allow exploration of the data. However, studies which predominantly explore individuals with co-morbid physical difficulties were excluded. Interventions and therapies which are provided in an online format during working hours with the intent to improve mental health were included in the review. Key outcomes from the research included quantitative and qualitative measures of mental health symptoms (as measured by clinical symptoms). Only studies which used a randomised-control trial design (RCT), including at least one control arm (wait-list control, treatment as usual, attentional intervention) were included in the review. The systematic review was conducted between March – June 2020.

2.8.3 Methodology

A systematic review of randomized-controlled trials was conducted according to the recommendations specified in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement and flow diagram. The Cochrane Risk of Bias tool 2.0 (RoB 2.0) was used to assess bias and establish quality across the studies. One reviewer independently assessed the eligibility of articles (published between 2000 - 2020) and performed data extraction. This process was then reviewed and verified by two researchers (MB and DB) independently – no discrepancies were found. The protocol was prospectively registered with PROSPERO (CRD42020198641).

Search Strategy

The databases searched included SCOPUS, Science Direct, PsycINFO, MedLine, AMED, PsychArticles and Google Scholar. Initial database search took place June 29th, 2020. Search terms were as follows:

Mental Health OR	AND online therapy OR	AND workplace OR
Depression	Online Intervention	
Mood	Cyber-therapy	Occupational health Work

Anxiety	E-health	Workplace
Wellbeing		Employee
Mental Illness		Work-related
Psychological Wellbeing		

Table One *- A table listing search terminology used in the review.*

Titles and abstracts identified through the search strategy were examined, and relevant articles obtained for assessment. Another search was conducted on July 20th, 2020 to identify and consider any new articles published during the period between the original search of the literature and the point of publication.

Types of Studies

This review only included randomized controlled trials which are fully reported, written in English and published in peer-reviewed journals.

Participants and Study Settings

Participants who were classified as ‘employees’ within any working sector were included in the study. Studies which predominately explored interventions for individuals with co-morbid physical conditions were excluded. Study settings include interventions conducted online whilst in the workplace.

Interventions

Intervention criteria remained broad to allow exploration of different approaches. Interventions that were provided in the workplace with the aim to improve or prevent poor mental health where included in the review.

Comparison Group

Only studies with a control group of ‘treatment as usual’, ‘no intervention’, ‘wait-list control’ or an ‘active control’ were included in the review.

Outcome Measures

Studies had to report at least one valid and reliable measure of mood, or clinical psychiatric symptom of mental health including depression, anxiety or stress as described in the DSM-5.

Data Extraction and Synthesis

Study characteristics were extracted independently by one reviewer using a template created specifically for the review. The finalised table ensured a randomised-control design and extracted information relating to the studies variables, control group, quantitative and qualitative data, main outcomes and study limitations. Data was then summarized and independently checked by a secondary reviewer. Discrepancies were discussed and resolved within the research team – no discrepancies were found.

Quantitative Analysis

Acceptability

To assess acceptability, a separate table was developed to calculate retention rates across the studies. Retention rate (%) was calculated as follows:

$$\frac{\text{N= participants who completed all measures}}{\text{N= participants recruited x100}}$$

Analysis Strategy

To assess effectiveness, study outcomes were categorised into three groups; depression, anxiety and stress. These three categories seem are classified as ‘mood disorders’ in the DSM-5 which can affect mood. Immediate effectiveness of the intervention was assessed through analysis of timepoints T0 (baseline measures) and T2 (or other timepoint immediately after the intervention). To assess long-term effectiveness of the intervention, analysis was also conducted on changes between T0 and T3 (or last follow-up session).

Effect sizes were calculated independently from data extraction of each paper and reviewed by the

review team. Morris (2008) effect size= d_{ppc2} was calculated for pre and post-test / follow-up means between intervention and control group. Meta-analysis was planned, however, due to heterogeneity of outcome measures and intervention characteristics, we were unable to standardised measures and perform analysis.

Quality Checklist

The Cochrane Risk of Bias tool 2.0 (RoB 2.0) for individually randomized parallel group trials (RoB 2.0) was used to assess varying degrees of bias across the studies.

Review Process

Author (Year)	Bias Arising from the Randomization Process	Bias Arising due to Deviation from Intended Interventions - effect of assignment to intervention	Bias Arising due to Deviation from Intended Interventions- effect of adhering to intervention	Bias Due to Missing Outcome Data	Bias in Selection of the Reported Result	Overall Bias
Aikens et al (2014)	Low	Low	Low	Low	Some Concerns	Low
Allexandre et al (2016)	Some Concerns	High	Low	Low	Some Concerns	Some Concerns
Billings et al (2008)	High	High	High	High	High	High
Bolier et al (2014)	Low	Low	Some Concerns	Low	Some Concerns	Low
Ebert et al (2014)	Low	Low	Low	Low	Low	Low
Feicht et el (2013)	Some Concerns	Low	Low	Low	Low	Low
Phillips et al (2014)	Low	Low	Low	Low	Low	Low
Ruwaard et al (2007)	Low	Low	Low	Low	Some Concerns	Low

Thiart et al (2015)	Low	Low	Low	Low	Some Concerns	Low
Umanodan et al (2014)	Some Concerns	Some Concerns	Low	Low	Some Concerns	Some Concerns
Wolver et al (2012)	Low	Some Concerns	Low	Low	Some Concerns	Low

The search strategy initially identified 14,559 articles across the 7 databases. Once database filters, such as subject area, article type, year, methodology, publication were applied to suit the inclusion criteria and duplicates removed, 719 articles remained. Subsequently, 27 studies meeting the inclusion criteria were read, finally resulting in 11 articles being included in the review.

Table 1 - *Cochrane Risk of Bias Tool 2.0 ratings for each study included in the review*

Results

Cochrane Risk of Bias Tool

The revised Cochrane Risk of Bias tool 2.0 'Template for Completion' was used to assess risk of bias and assess quality across the studies (see table one below). To assess overall bias score, studies with green potential markers for all of the signalling questions were scored as 'low', studies with up to half red potential markers were scored as 'some concerns' and studies with over half red potential markers were scored as 'high' overall risk of bias. Each study received an overall risk-of-bias judgement for each category including; Bias from the Randomisation Process, Bias Arising due to Deviation from Intended Interventions - effect of assignment to intervention, Bias Arising due to Deviation from Intended Interventions- effect of adhering to intervention, Bias Due to Missing Outcome Data and Bias in Selection of the Reported Results.

Bias Arising from the Randomization Process

Studies which explicitly mention a random allocation sequence, concealment of allocation sequence until intervention assignment and present lack of discrepancy of baseline measures between intervention groups were given an overall bias score of 'low'. Some examples of random sequence generation included using computer algorithm (Aitkens et al 2014), a computer software programme (Boiler et al 2014) or a computer-based random integer generator (Ebert et al 2014). A red potential marker of 'PN' (potentially no) was given to Allexandre et al (2016) for signalling

question 1.1 as randomisation of participants through stratification of day and night workers was mentioned, however no further details of the randomisation is provided. Billings et al (2008) appeared to lack mention of allocation sequence randomisation or concealment of allocation. Although no discrepancy was found between baseline measures of intervention groups, Billings et al (2008) scored an overall 'high' risk of bias due to concerns of randomisation (1.1 & 1.2). Regardless, this study remained in the data analysis as it is stated in the abstract and research design that participants were randomly assigned to a control or experimental condition. Umanodan et at (2014) also lacked description of any details regarding a randomisation process leading to a potential 'high' risk of randomisation bias. Despite this, this study also remained the data analysis as a randomisation process is suggested throughout with mention of a 'cluster' randomisation in the methodology.

Blinding of Participants – Detection Bias

Studies which used an 'attentive' or 'active' control arm were scored low for detection bias. Research using an 'attentive' or 'active' control arm reduces detection bias as participants will be unclear on whether they are receiving the true experimental arm or not. Unclear risk of bias was given to most studies which included a 'wait-list control' or 'treatment as usual' control arms. Due to the nature of the intervention, participants may be aware of the condition they have been allocated too – although the impact of bias is unclear. Allexandre et al (2014), Billings et al (2014) and Umanodan et al (2014) were scored a high risk of detection bias due to a high risk of bias from allocation concealment. If participants are aware of allocation, due to a lack of concealment, bias of detection may also present an issue (see table one below).

Incomplete Outcome Data

Most studies presented all outcome data and retention rates at timepoints T0, T1, T2/ T3. Billings et al (2014) failed to report number of participants at baseline or pre-test and therefore was given a high-risk of bias.

Selective Reporting

Low-risk bias studies reported all outcome measures and were not explicitly funded by a supporting company or organisation. Unclear risk of selective reporting bias was given to studies which are funded by companies or organisations that may desire a particular outcome. Billings et al (2008) presented a high-risk of selective reporting bias as outcome measures (participant totals) were not reported. Overall, most studies presented a low or unclear risk of bias except for Billings et al (2008). However, all studies remained in the systematic review.

Participants and Recruitment

Direct e-mail was the key recruitment strategy followed by letters through the post and recruitment through management. Participant samples ranged from n= 90 (Aitkens et al 2014) to n=637 (Phillips et al, 2014) with an average of n= 272. No complex participant inclusion criteria were included across the studies – except Thiart et al (2015) who required participants presenting symptoms of clinical insomnia and work-related rumination. The ability to access to internet and a computer was a key criterion to ensure access to the intervention/s.

Participant Demographics

The average age for participants across all studies for all interventions was 42.6 years with a range of 38 – 48.4 years (see table four). Interventions predominately featured female participants (67%) compared to males (35.1%) regardless of intervention type or job sector. However, 95.1% of participants in Umanadon et al (2014) were male. The most common jobs sectors recruited were Educational (Ebert et al, 2014; Thiart et al 2015) and Accountancy, Banking and Finance (Feicht et al 2013; Wolver et al 2012).

Table 2 - *Participant Demographics and Work Industry. NR: Not reported*

	Age (mean years)	Gender (%) F	Gender (%) M	Work Industry

Aikens et al (2014)	NR	NR	NR		Engineering and Manufacturing
Control:	NR	NR	NR		
Allexandre et al (2016)	38.4	83.8	16.2		Marketing, advertising and PR
Control:	40.5	85.2	14.8		
Billings et al 2008	NR	70.5	91		NR
Control:	NR	NR	NR		
Bolier et al (2014)	38	82.6	17.4		Healthcare
Control:	42	77.1	22.9		
Ebert et al (2014)	46.4	83.3	16.7		Educational Sector
Control:	47.8	84	16		
Feicht et el (2013)	36.8	75.9	24.1		Accountancy, Banking and Finance
Control:	37.6	61.7	38.3		
Griffiths el at (2016)	44.4	70.6	29		Public Services and Administration
Control:	44.6	76.6	23.4		
Phillips et al (2014)	42.2	55.3	42.7		Transport, Health and Communication
Control:	47.2	47.6	50.1		
Ruwaard et al (2007)	44	57	43		All sectors
Control:	42	68	22		
Thiart et al (2015)	48.4	67.2	32.8		Educational Sector
Control:	47.6	81.3	18.7		
Umanodan et al (2014)	39.7	4.9	95.1		Engineering and Manufacturing
Control:	38	9.9	90.1		
Wolver et al (2012)	42.7	81.1	18.9		Accountancy, Banking and Finance
Mindfulness:	44.3	77.1	22.9		
Yoga:	41.6	73.3	26.7		
Average:	42.6	67	35.1		

Intervention Type

All experimental interventions used within the studies applied one of six different underpinning psychological mechanisms. These include cognitive behavioural therapy, mindfulness, psychoeducation, stress management and 'alternative' treatments. Interventions range from 30min – 1 hour and lasted between 5 – 8 weeks apart from Wolver et al (2012) whose intervention period last 12-weeks (see table four).

Cognitive Behavioural Based Interventions

Cognitive behavioural-based interventions were the main type of online intervention used across the studies. Billings et al (2014) Boiler et al (2014), Ebert et el (2014) and Phillips et

al (2014) utilized cognitive behavioural techniques within their interventions to improve mental health. For instance, Billings et al (2014) use a web-based multi-media health promotion programme designed to management of stress and mood through cognitive-behavioural techniques such as goal setting, problem solving, identifying and testing negative thoughts, relaxation, and time management. Phillips et al (2014) used a programme called 'MoodGym' which is described as an 'interactive self-help book which helps you to learn and practise skills which can help to prevent and manage symptoms of depression and anxiety.' (MoodGym.com). Thiart et al (2015) also used a cognitive-behavioural based intervention specifically used for treating insomnia (CBT-I). In this study, an intervention known as GETON +9y utilised therapeutic techniques such as sleep restriction, stimulus control, sleep hygiene and cognitive interventions with supplemented techniques from behavioural activation, metacognitive therapy (MCT), gratitude research and research on boundary management. The aim of this research was to improve sleep-related issues associated with work-place strain and therefore the intervention specifically targeted symptoms of insomnia.

Outcome Measures – Depression

To measure depression as an outcome, studies used a variety of clinical tools and scales including; Centre for Epidemiologic Studies Depression Scale, Brief Symptom Inventory, Visual Analogue Scale, The Depression Literacy Scale, Beck Depression Inventory, Patient Health Questionnaire 9 (PHQ-9), DASS-42 and Brief Job Stress Questionnaire (BJSQ – subscales of psychological distress, avoidance and suppression). Although DASS-21/42 and Beck Depression scales are often referred to in clinical practise to diagnosis depression, as symptoms reflect diagnostic criteria the the DSM-IV, the most common tool to measure depression across the studies was the Centre for Epidemiologic Studies Depression Scale which was used by Billings et al (2008) and Ebert et al (2014). The Centre for Epidemiologic Studies Depression Scale consists of 20 questions, relating to symptoms of depression, that require an answer of 4 choices 'Rarely', 'Some or

a little of the time', 'Occasionally or a moderate amount of time' and 'Most or all the time'. Scores range from 0-60 with 60 indicating 'greater' depressive symptoms.

Outcome Measures – Anxiety

To measure anxiety, scales included the Beck Anxiety Scale, The Beck Anxiety Inventory, Brief Symptom Inventory (BSI), DASS-42, The Depression Stigma Scale (DSS-personal subscale) and the Penn-State worrying questionnaire.

Outcome Measures - Stress

The Perceived Stress Scale (PSS) was the most common tool to measure stress as an outcome across the studies (4 out 7 studies). Other tools include the Symptoms of distress scale, Perceived Stress questionnaire, Stress Warning Signals Scale (SWS), the General Anxiety Disorder-7 tool (GAD 7), and a subscale of the DASS-42.

Retention Rates

Follow-up periods varied from 1 month – 36 months post-study (Feicht et al, 2013 and Ruwaard et al 2007 respectively). Regarding correlation between follow-up time (e.g. 6-months) and retention rate for intervention groups, a one-tailed Pearson correlation analysis revealed no significant correlation (.25) suggesting in the case of studies reviewed, follow-up time did not influence participant retention. Retention immediately post-test varied from 53.8 – 97.2% with a mean of 69.1%.

Table 3 - *Retention rates of intervention groups at T1 and T2. NR - Not reported*

Study	Recruited (n)	Post-Test – T1 (n)	Retention Rate (%)	Follow-Up-T2 (n)	Months	Retention Rate (%)
Aitkens et al (2014)	44	36	81.8	31	6	70.5
Allexandre et al (2016)	54	27	50.0	33	4	61.1

Billings et al	309	NR	NR	NR	NR	
Boiler et al (2014)	579	138	23.8	NR	6	NR
Ebert et al (2014)	75	69	92.0	66	6	88.0
Feicht et al (2013)	85	77	90.6	68	1	80.0
Phillips et al (2014)	318	171	53.8	102	4	32.1
Ruwaard et al (2007)	177	150	84.7	150	36	84.7
Thiart et al (2015)	64	61	95.3	16	6	25.0
Umanodan et al (2014)	142	138	97.2	131	3	92.3
Wolver et al (2012)	186	76	40.9	76	1	40.9
Mean:	**171**	**96.3**	**74.4%**	**74.6**	**8**	**66.7%**

Effect Size

To assess the short-term and long-term magnitude of the intervention, effect Size d_{ppc2} sense Morris (2008) was calculated for depression, anxiety and stress outcomes at T1 (immediately post-test) and T2/3 (follow-up) for each study.

In accordance with recommendations from Morris (2008), d_{ppc2} values of 0.20, 0.50 and 0.80 were identified as small, medium and large effect size respectively. Large effect sizes appear more apparent immediately post-intervention with effect sizes decreasing at follow-up. These findings indicate the short-term and long-term impact of the interventions.

Table 4 *- Effect size ($dppc^2$. Morris 2008) calculated for measures of depression, anxiety and stress outcomes immediately post-intervention and follow-up. * Moderate effect size. ** Large effect size. UC: Unable to calculate.*

	Outcome (Measure)	Intervention Effect Size= d_{ppc2}	Follow-up effect Size= d_{ppc2}
Aikens et al (2014)	Perceived Stress Scale (PSS)	*-0.68	-0.572
Allexandre et al (2016)	Perceived Stress Scale (PSS)	**-0.79	-0.269
Billings et al 2008	Centre for Epidemiologic Studies Depression Scale	UC	UC
	Beck Anxiety Scale	UC	UC
	Symptoms of Distress Scale	UC	UC
Bolier et al (2014)	Brief Symptom Inventory (BSI) - depression subscale	*0.684	0.36
	Brief Symptom Inventory (BSI)- anxiety subscale	0.07	-0.105
Ebert et al (2014)	Centre for Epidemiologic Studies Depression Scale, CES-D ≥16	*-0.625	-0.414
	Perceived Stress Questionnaire	-0.411	-0.411
Feicht et el (2013)	Visual Analog Scale (VAS)	**0.99	**0.975
	Stress Warning Signals Scale (SWS)	-0.475	*0.546
Phillips et al (2014)	Perceived Health Questionnaire 9 (PHQ-9)	0.05	-0.182
	General Anxiety Disorder Scale (GAD)	*-0.504	-0.292
Ruwaard et al (2007)	Depression Anxiety Stress Scales (DASS-42) - Depression subscale	-0.378	UC
	Depression Anxiety Stress Scales (DASS-42) - Anxiety subscale	-0.11	UC
	Depression Anxiety Stress Scales (DASS-42) - Stress subscale	*-0.66	UC
Thiart et al (2015)	Penn State Worrying Questionnaire	**-0.846	**-0.925
Umanodan et al (2014)	Brief Job Stress Questionnaire (BJSQ) Psychological Distress	UC	0.192
	Brief Job Stress Questionnaire (BJSQ) Avoidance and suppression	UC	-0.147
Wolver et al (2012)	*(Mindfulness)* Epidemiological Studies Depression Scale (CES-D)	0.199	NR
	(Mindfulness) Perceived Stress Scale	*0.514	NR
	(Yoga) Epidemiological Studies Depression Scale (CES-D)	0.202	NR
	(Yoga) Perceived Stress Scale	0.52	NR

2.8.4 Discussion

The aim of this systematic review was to explore online interventions previously used in the workplace (pre-COVID-19), assess acceptability and compare effectiveness for improving symptoms of poor mental health associated with depression, stress and anxiety. Firstly, the overall quality of evidence provided to answer this research question will be explored. Following this the following questions will be addressed: (1) are online interventions accepted among employees in the workplace? (2) Can online interventions be utilised effectively to improve mental

health? – will be discussed.

Overall Quality of Evidence

Although all studies appeared to follow the randomised-control trial procedure, deemed a rigorous way to assess cause and effect relationships (Hariton and Locascio, 2018), the quality of evidence provided between the studies varied. For instance, the Cochrane risk of bias tool 2.0 highlighted key issues across the studies that may impact risk of bias, validity of findings and subsequent quality of evidence. One key issue was the lack of fully reporting the randomisation process including lack of details regarding a randomisation process and no details of allocation concealment until assignment of intervention (Allexandre et al 2016; Billings et al 2008; Feicht et al 2013; Umanodan et al 2014). Providing a pre-specified analysis plan that was finalized before unblinded outcome data was available was also a key issue across all the studies.

In addition to risk of bias found by the Cochrane risk of bias tool (2.0), data abstraction and analysis found lack of reporting participant demographics. Although in some cases these findings were not essential for the research outcome, e.g. Aitkens et al 2014 did not report gender percentages, this data provides deeper understanding of the participants and allows further research. Additionally, not all studies appeared to include follow-up measures beyond immediately post intervention (Billings et al 2008, Ruwaard et al 2007; Wolver et al 2012) impacting the ability to calculate effect size and long-term effectiveness of the intervention. Corresponding authors were contacted via e-mail to retrieve missing outcome measures; however, this yielded no responses.

Are online interventions safe, feasible, and accepted among employees in the workplace?

No studies reported any physical or psychological adverse effects because of the online interventions provided. Additionally, all studies enabled participants to receive the

experimental intervention during the research period (wait-list controls). However, no studies have mentioned the use of additional support networks or procedures to ensure the safety and mental wellbeing of the participants. As the participants may be presenting symptoms of depression, anxiety and stress, researchers have an ethical duty to support participants throughout the research process and once the research has ceased. Further studies such ensure the safety of participants with additional mental health support and/or mental health support procedure.

Recruitment of participants through e-mail is to be the most convenient and effective method. Although all potential participants were sent the research invitation via e-mail, certain variables of influenced the type of participants who took part in the research. For instance, it should not be taken for granted that all employees have access to a computer and internet. Additionally, the frequency of which employees check e-mails may vary (those who read e-mail less frequently may have missed the research application deadline). As a result, there are potential limitations of this convenience-based sampling.

Recruitment via e-mail, however, does allow access to a large cohort of potential participants. Despite large sample sizes, there is an evident discrepancy between female and male participant ratio regardless of job sector. However, Umanodan et al (2014) presents 95.1% of male participants which may be explained by socio-cultural factors such as low female labour force participation rates in China (International Labour Organisation, 2020).

When drawing upon research, the evidence is conflicting and contradictory regarding mental health and help-seeking behaviours among men and women. For instance, research indicates that men are less likely to seek help regarding their mental health then women (Addis and Mahalik, 2003), potentially due to restrictive emotional development taught through social and cultural gendered norms (O'Neil, 1981; Sullivan, 2011; Sullivan et al, 2015). Research by House et al (2018) also reveals that men are more like to hold the view that depression should be dealt with in private rather than seeking help which may contribute to low male participant rates in mental health research. However, males accounted for three-quarters of suicide deaths in 2019 within the UK and continue to surpass female suicide rates (Office for National Statistics; Suicides in England and Wales; 2019

registrations). Working age males (45 – 49 years) present the highest suicide demographic across both genders between ages of 10 – 90+ years, followed by females aged 45-49 years old, suggesting more mental health support is needed for this age range. Interestingly, results from this systematic review reveal participants fall just below this age range with an average of 42.6 years. Regarding acceptance of mental health interventions in the workplace, further exploration into ways in which such interventions and support are described to appeal to cohorts maybe beneficial for recruiting male participants. For instance, emphasis on the privacy of taking part and receiving help from online interventions may encourage male participation.

Acceptance of online interventions in the workplace may also be influenced by length of intervention. In this review, interventions ranged from 30 min – 1 hour and lasted between 5 – 8 weeks (except from Wolver et al (2012) whose intervention ran for 12-weeks). Feicht et al (2013) and Umanadon et al (2014) presented the highest retention rate of participants with intervention running between 7 – 8 weeks suggesting an ideal intervention period for retention. An 8-week intervention period also is a standard intervention length for research trials assessing the impact of face-to-face cognitive-behavioural sessions for individuals with clinical depression (i.e. Driessen and Hollon, 2011). As the sessions run for a maximum of 1-hour a week and can be accessed at any time, this ease and convenience may increase acceptance of the intervention; however further research is warranted.

Can online interventions be utilised effectively to improve mental health?

Overall, online inventions in the workplace may present benefits in reducing mental health symptoms relating to depression, stress and anxiety as findings reveal some large effect sizes at post-test and follow-up measures. However, the strength of such interventions and overall effectiveness for improving mental health in general is inconclusive and requires further investigation.

Cognitive-behavioural based interventions were the main type of intervention used across the

studies. Cognitive-behavioural therapy (CBT) is an evidence-based psychological therapy often used to treat anxiety, depression and stress. In clinical practice, CBT is often provided as face-to-face sessions that aim to change negative cognitions associated with situations, thoughts, emotions, physical feelings and actions through talking therapy (NHS – How it works. Cognitive Behavioural Therapy, 2019). However, online CBT sessions are an emerging trend, promoted through the NHS (NHS apps library), for individuals who would rather use a computer and have minimal contact with a therapist. Previous research also supports the effectiveness of online cognitive-behaviour therapy, also referred as 'intherapy'. For instance, Ruwaard, Lange, Schrieken and Emmelkmaps (2011) systematic review of online interventions found that reductions in primary symptom severity were significantly larger with intherapy in comparison to the experimental controls over 9 studies. In this review, however, cognitive-behavioural based therapy-based interventions do not appear superior over other interventions although further research is warranted.

2.8.5 Limitations

Baseline Symptomatology

One thing to consider is potential influence of poor mental health scores at baseline between the studies. For instance, in Thiart et al (2014), participants presenting clinical symptoms of insomnia at baseline showed a significant improvement at post-test ($d_{ppc2=}$ -.846) and at pre-test ($d_{ppc2=}$ -.925). Although improvements may be a result of the intervention, change in symptoms may also be due to regression to the mean or 'natural' recovery and improvement. However, as a meta-analysis was not conducted on the data, findings from this study are not influential on the conclusive findings and further statistical analysis is need.

Outcome Measures

Regarding outcome measures for depression, The Centre for Epidemiologic Studies Depression Scale (CES-D) appeared the most common tool despite previous research questioning the scales factorial validity and scoring. For instance, Carleton et al (2013) state that researchers and clinicians

should be cautious in interpreting results from the CES-D due to the differential item function being identified as inflating scores in female respondents. Additionally, a Rasch analysis of the CES-D scale by Gay, Kottorp, Lerdal and Lee (2015) also found that eight items within the scale demonstrated differential item functionality relating to gender and race. Due to a high percentage of female respondents across the studies (average of 67%), depression scores from The Centre for Epidemiologic Studies Depression Scale should be analysed with caution. Another psychometric limitation of the CES-D which requires attention, is the overlap between symptoms of depression, anxiety and stress. Moon et al (2017) found that higher scores on the CES-D (18 or above) may indicate the presence of anxiety disorders as well as depression. Although the symptoms between the two disorders overlap, they are two separate diagnosable disorders distinguished by the DSM-5.

The ability to accurately measure stress as an outcome measure also presents its limitations. As 'stress' is not clinically classified as mental health disorder there are no symptomatology to refer to which ensures validity. Stress may also be considered a natural and normal psychological and physiological response to demands or threats that we encounter (What is stress? - Stress.org.uk). However, it is prolonged exposure to stress which may cause the development of a mental health disorder, such as depression or anxiety, and therefore an important outcome measure to assess mood .

Quantitative Research

Quantitative research has many strengths as it provides consistent, precise and reliable data. However, quantitative data lacks the ability to understand the complex nature and context of phenomenon such as individuals' experiences of mental health . All studies included in this review lack qualitative input which may have provided further insight into experiences of mood , thoughts and feelings of participating in the intervention and constructive criticism.

Self-reported Psychological Symptoms

Another limitation to consider within the studies is the lack of biological measures to compare and support self-reported subjective measures. For instance, research indicates that individuals with high levels of depression present elevated cortisol in their blood, urine and saliva which suggests a biological outcome variable for those with depressive symptoms (Nemeroff & Vale, 2005; Pariante & Lightman, 2008; Dienes, Hazel and Hammen, 2015). Feicht et al (2013) was the only study to include a biological measure of saliva cortisol. In this study, a small subgroup of participants provided saliva samples across three timepoint during the day, immediately after awakening, 30-min after awakening and before bed, alongside psychological measures at T0 and T1. Although analysis found a statistically significant different between self-reported psychological measures between the intervention and control group, analysis on the saliva samples revealed no statistically significant difference between groups. The strength of combining self-report and biological markers is the comparison of objective and subjective measures. As found in Feicht et al (2013), individuals may report improvements in symptoms to 'please' the researcher, also referred as 'demand characteristics', but may not show improvements in biological markers associated with mental health which suggests a conflicting lack of physiological response.

2.8.6 Conclusion

Online interventions to improve mental health in the workplace appear to present an array of advantages and limitations. For instance, one advantage is the ability to surpass logistical barriers associated with conventional mental health support such as awareness and accessibility. As revealed by the systematic review discussed (Morley, Bollard and Bressington, 2020) large cohorts of participants can be accessed online (between 90 – 637 participants) suggesting awareness and potential ease of intervention accessibility. However, no research assesses or measures participant's experiences of awareness and accessibility therefore further research is warranted. Another advantage is the appeal of online interventions for those who prefer minimal contact with a therapist and those who prefer using a computer – however, further research regarding this is needed. Regardless, the lack of face-to-face contact required for online therapy poses as a crucial benefit during the COVID-19 pandemic. Findings from this review also indicates that online interventions pose generally high average retention rates for short-term (74.4%) and long-term

(66.7%) use suggesting a degree of acceptability. Effect sizes also show some significant improvements in reported symptoms before and after the interventions, utilising tools such as the Perceived Stress Scale, Brief Symptom Inventory and DASS-42.

The systematic review also presents and highlights several limitations that require consideration for further research. Quality of research, such as full reporting of randomised-control trials are consistent limitation across the research which potentially reduces quality of data - participant demographics and outcome measures at follow-up appear as a key issue. Further randomised-controlled trials which fully report participant demographics and all outcome measures are needed to provide valid data. Ethical issues are also a consideration as no studies within the review mention the development or utilisation of a support framework to ensure the safety of participants. As the interventions focus on improving poor mental health , participants may require further support if the intervention exacerbates symptoms or participant develop new symptoms.

Issues and limitations are also apparent within the research procedures. For instance, as mentioned above, symptoms of depression, anxiety and stress often include both psychological and physiological symptoms. However, only one of the studies within the review included a biological outcome. The combination of self-reported subjective measures and physiological objective measures, such as salivary cortisol analysis, may provide further insight and potential correlations surrounding the phenomenon. Furthermore, no study uses mixed-method approach incorporating qualitative data. In addition to allowing the exploration of participants thoughts, feelings and experiences of the intervention, qualitative data may approach questions regarding logistics of the interventions (e.g. awareness and acceptability) and provide constructive feedback.

Lastly, consideration should be given to the interventions themselves. All interventions and programmes were provided solely on a one-to-one basis – that is, no group-based interventions were assessed. Although one-to-one interventions sessions present certain benefits, group-based programs and interventions provide a therapeutic social element. As social isolation and loneliness is a key contributing factor to poor mental health during the COVID-19 pandemic, research

exploring online group-based interventions is essential. Additionally, despite research suggesting that cognitive-behavioural based (CBT) psychosocial interventions presents no superiority over other psychosocial interventions in areas such as efficacy, no other psychosocial interventions appear to be thoroughly assessed (Turner et al, 2020; Jones, Hacker, Cormac, Meaden & Irving, 2012).

2.9 Group-Based Psychosocial Interventions

Interventions and therapies provided in a group-based context decreases loneliness, increases social inclusion, improves quality of life, promotes autonomy and promotes self-efficacy (Koudenburg, Jettern & Dingle, 2017). These benefits draw from interactions and social connectedness experienced within a group. Ma et al (2021) explored the effectiveness of interventions for reducing subjective and objective social isolation among those with mental health problems. They found a combination of treatments including online interventions, online interventions and telephone support, face-to-face group interventions, face-to-face individual therapies, and combined group and individual formats. Ma et al (2021) revealed that group-based interventions, including peer support groups and humour-based therapy, presented statistically significant increases in self-esteem and social contact with peers in comparison to control groups (Castelein et al 2008; Gelkopf, Sigal and Kramer, 1994). However, individual-based interventions and mixed-format interventions found no statistical significance in objective social isolation outcomes. These findings highlight the benefit of group-based therapies for improving subject and objective measures of social isolation.

Group-based interventions also improve symptoms associated with poor mental health such as depression and anxiety. Nagy and Moore (2017) found twenty-four studies which assess the impact of social interventions for depression with seventeen studies reporting significant reduction of depressive symptoms. Of the seventeen, three studies included group-based activities such as group-based interpersonal therapy (IPT), a resilience reintegration programme and group-based exercise. Despite a high-rate of drop-out (17.55), Thimm & Antonsen (2014) found that cognitive behaviour group therapy appeared effective for treating depression with 44% of patients presenting

significant improvement post-intervention.

Qualitative data, from Aubry et al (2021), indicates that women with depression enjoy the shared experiences within a group-based context which enhances the feeling of safety and impact of the group interventions. They also report to prefer a synchronous group-based intervention over a technology-based or asynchronous alternative for depressive symptom management. However, Coto-Lesmes, Fernandez-Rodriguez and Gonzales-Fernandez (2020) argue that group-based acceptance and commitment therapy (ACT) for depression and anxiety is less effective than cognitive therapy and cognitive-behavioural therapy (CBT). Despite this, they claim that group-based ACT provides psychological flexibility which acts as a mediator for improvements in anxiety and depression symptoms.

Alternative group-based therapies are also beneficial for mental health . Bennington, Backos, Harrison, Reader and Carolan (2016) found that group-based art therapy gave older adults the opportunity to explore emotions, thoughts, and memories safely within a group which increased participant's well-being and encouraged social connectedness. 'Dramatherapy' also presents beneficial for adults with poor mental health (Bourne, Andersen-Warren and Hackett, 2018). Bourne, Andersen-Warren and Hackett (2018) report improvements in social interaction, improved self- awareness, empowerment, and social interaction across twelve studies exploring 'dramatherapy' with no indicative negative side effects. Shannon, McGuire, Brown and O'Donoghue (2020) also found that a group-based exercise intervention had positive effects on mental health symptoms (associated with psychosis), quality of life and functioning,

Laughter-based group therapies, such as laughter yoga (LY), encourages individuals to engage and laugh with others to develop social connections (Hatchard & Worth, 2021). Unlike group-based treatments, such as CBT or IPT, laughter-based therapies rely on

laughter to create social relationships and connections with others. Hatchard & Worth (2021). Hatchard & Worth, 2021) conducted semi-structured with individuals actively, and regularly, taking part in LY. Through thematic analysis (Braun and Clarke, 2006), several themes were identified including the social benefits and connectedness involved in LY. One participant stated that LY made them '…*more receptive to socially bonding'*. Another stated that "*Laughing is quite a I dunno intimate, is that the right word? It's quite an intimate thing to do [laughing] with somebody. It's not something you do with people you've never met before, and there's quite a lot about making eye contact".* They suggest that laughing with someone, with the added element of eye contact, is an intimate act that you wouldn't usually do with '*people you have never met before'*. From these qualitative findings, Hatchard & Worth (2012) developed a flow-chart illustrating the 'Laughter Yoga journey' as described by participants (see figure three below). In this figure, connectedness is as a key element for growth, positive emotions, and advocacy (see figure three below) highlighting the importance of the group-based context of LY.

Figure Three *- Taken from Hatchard & Worth (2012) pg. 7. A flow chart illustrating the 'Laughter Yoga Journey' across time.*

Overall, this chapter summarises that online interventions within the workplace are accepted, feasible and effective for improving symptoms associated with poor mental health . During COVID-19, social isolation is as a key contributing factor to poor mental health. As group-based psychosocial interventions involve social interactions and building social connections, which may prevent social isolation, it is proposed that further research to assess the acceptance and effectiveness of online group-based psychosocial therapies is required. Laughter-yoga (LY) is a group-based psychosocial intervention with the potential to be provided online. Research indicates that LY presents several benefits for mental health by developing strong connections within the group. In the next chapter, the psychological underpinnings of LY will be discussed followed by a systematic review exploring the effectiveness of LY for improving mental health .

2.10 Laughter Yoga: Group-Based Psychosocial Intervention

Laughter yoga is a group-based psychosocial based activity that may hold the potential to improve and prevent poor mental health within the workplace. In this chapter, Laughter Yoga (LY) will be defined by its underpinnings to provide a further understanding of the biopsychological mechanisms involved. A systematic review that explores the impact of LY in the workplace on depressive symptomatology and cortisol will then be discussed to highlight the impact of LY on psychological and physiological measures. Finally, the chapter will conclude by summarising what LY entails, the benefits of LY, and what current research demonstrates.

2.10.1 What is Laughter Yoga?

Laughter Yoga (LY) is an emerging intervention that incorporates the use of simulated laughter to trigger 'natural' and spontaneous laughter. Laughter is simulated through short childish activities often including physical movement and making light of mundane or stressful tasks such as receiving an expensive phone bill (an activity in which the participant pretends to receive an expensive phone bill and laughs at the amount). According to Madan Kataria, the founder and developer of laughter yoga, 10-15 minutes of deep 'belly laughter' is enough to reap the full health benefits of laughter. He argues that even if we are not in the mood to laugh, we can trigger natural laughter through the motion of fake laughter as 'motion creates emotion'. LY has become increasingly popular worldwide, with more than 8,000 laughter clubs in existence across 100 countries (LaughterYoga.org, 2017). In addition to the act of laughing, LY also consists of self-appraisal techniques and deep breathing exercises known as pranayama. When translated from Sanskrit, pranayama refers to 'prana' life energy and 'yama' control. During pranayama, inhaling and exhaling is purposely sequenced to control the timing, duration, and frequency of breath. In addition to

several health benefits such as reducing blood pressure, heart rate and improving lung function research suggests that pranayama may also decrease stress, improve sleep quality, and improve overall wellbeing through mindfulness (Pramanik, Pudasaini, Prajapati, 2010; Jones, Hacker, Cormac, Meaden & Irving, 2012; Shankarappe, Prashanth, Nachal & Varunmalhotra, 2012). In laughter yoga sessions, pranayama is used as a 'grounding' technique and to decrease heart-rate and blood pressure after high-intensity physical exertion and/or laughing (*Why is it called laughter yoga – the yoga element* – Retrieved from https://laughteryoga.org/why-is-it-called-laughter-yoga-the-yoga-element/, 2021).

2.10.2 Psychological Underpinnings

Psychological underpinnings of laughter yoga (LY) include developing coping mechanisms, socialisation and building relationships which contribute to improve mood, wellbeing, and quality of sleep. When exploring the feasibility and efficacy of LY, clinical tools which are used to measure symptomatology relating to poor mental health may not truly capture the entirety of experiences and feelings surrounding the intervention. The perception that mental health cannot be quantified through tools and assessment falls in line with beliefs surrounding the recovery model.

2.10.3 Recovery Model

The recovery model approach views recovery beyond returning to the premorbid level of functioning. Unlike the medical model, the recovery model approaches recovery as a journey that focuses on the person not just their symptoms which make include ups and downs that are a part of life (Jacob, 2015). The recovery model aims to help those with symptoms of poor mental health look beyond mere survival and existence and encourage them to give their lives meaning through doing life to life tasks and developing relationships.

Within this model, recovery is often referred to as a process, an outlook, a vision, a conceptual framework or a guiding principle (Davidson, 2005; Ramon et al 2007; Stickley and Bonney, 2008).

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Alternative therapies, such as music, art, drama, yoga and laughter-based therapies (such as laughter yoga), align with principles associated with the recovery model. Unlike psychological or pharmacological treatments, alternative therapies are not necessarily linked directly to assessing and improving symptomatology. Nagendra (2013) claims that yoga-based therapies may help poor mental health in at least five ways; calming, increasing awareness of oneself and one's surroundings, increasing the attention span, acceptance and adaptability and a sense of security. Laughter-based interventions, such as laughter yoga, have found to improve life-satisfaction, decrease loneliness, improve quality of life, improve mood, and reduce symptoms associated with depression and anxiety, reduce blood pressure, improve cortisol level, and improve sleep quality suggesting an array of beneficial psychosocial outcomes not are directly associated with specific symptomatology (Kuru Alici & Arikan Dönmez, 2020). Therefore, the psychosocial

impact and effectiveness of laughter yoga has been captured in previous research through a combination of clinical questionnaires and qualitative data collection such as interviews.

Hatchard and Worth (2021) conducted semi-structured interviews with nine laughter yoga clubs across the UK to explore and understand experiences and perceptions of laugher yoga. Through reflexive thematic analysis they revealed eight themes including stress release, coping and socialisation. Participants describe how laughter yoga works as stress release allowing them to let go of life's stressors. One participant claims that laughter yoga is *"…a great release that laugh; it's almost as if you're laughing out your troubles*". Hatchard and Worth (2021) state that laughter yoga make work as a stress relieving experience through protective and health promoting behaviours which may induce positive emotion which acts as stress buffers (Fredrickson, Tugade, Waugh, & Larkin, 2003; Richman et al., 2005). Another participant described using laughter yoga as a '…*tablet to cope with life´* and a *'…monthly coping infusion'* suggesting the use of laugher yoga as a coping mechanism to deal with daily stressors.

Similar findings were reported by clinical nurses who participated in eight 30-min laughter yoga sessions (Lynes, Kawar, Valdez and Regina, 2019). Through semi-structured interviews and content analysis, themes such as increased relaxation, stress relief and increased socialisation among co-workers emerged. However, no significant differences were found in data from the Maslach Burnout Inventory (MBI) and the Professional Quality of Life Scale (ProQOL-IV) conducted at preintervention, postintervention, and 8 weeks following the intervention between the LY group and control group indicating potential conflict within the data.

Conflict between quantitative and qualitative findings also appears in Bressington et al (2019). Despite a significant decrease in depression, as measured by the depression, DASS-21 depression subscale, in the LY group immediately following the intervention, no significant difference was found between baseline to 3-months and follow-up. Additionally, no significant difference was found between the LY group and control group for anxiety or stress (as measured by the DASS-21 anxiety and stress scores). However, inductive thematic analysis (Braun and Clarke, 2006) on the

qualitative data found that participants reported experiencing several benefits of the intervention such as stress relief, relaxation, and the positives of a group-based context. One participant stated that laughter yoga *"…teaches you the techniques of releasing the stress such as appraising positively to yourself by saying "very good very good!"* and that it '… *helps people with illness to alleviate emotions …release stress"*

2.10.4 Physiological Mechanisms

Laughter Yoga (LY) may provide biological benefits that can prevent or reduce symptoms associated with poor mental health . In addition to reducing blood pressure through pranayama, one benefit stated on the official Laughter Yoga website (www.laughteryoga.co.uk) is the ability to reduce blood cortisol. As illustrated in sub-chapter 3.2 *Biological Aetiology*, high concentrations of cortisol are found in individuals experiencing depressive symptomatology. Although cortisol, and other related stress hormones, can be utilised successfully in certain situations, prolonged stress and cortisol secretion can be damaging over time. It is claimed that cortisol concentrations can drop significantly before and after a Laughter yoga session suggesting immediate and acute cortisol reduction (www.laughteryoga.co.uk).

Despite a lack of substantial research measuring cortisol as a physiological outcome measure, available research suggests that taking part in LY may reduce cortisol concentrations at immediate pre-test and post-test. Fujisawa et al (2018), for instance, revealed a statistically significant drop in blood cortisol concentrations immediately before and after a laughter yoga session in healthy university students. Ozturk & Tezel (2021) also found that healthy nursing students presented a significant decrease in salivary cortisol at pre-test and post-test. Heo, Kim, Park and Kil (2016) found that reported quality of life and mood (p = .013) and salivary cortisol did reduce before and after the laughter yoga sessions, however, when compared to the control group, salivary cortisol reduction was not statistically significant (LY: p =.534, Control: p =.937). Meier, Wirz, Dickinson and Pruessner (2021) also assessed the impact of laughter yoga on salivary cortisol, alpha amylase

and subjective stress compared to a control. Although salivary cortisol did not significantly reduce post-test in comparison to the control group, those in the laughter yoga group presented an attenuated cortisol stress response when exposed to the Trier Social Stress Test for Groups (von Dawans, Kirschbaum & Heinrichs, 2010) suggesting a buffering of the endocrine stress response. Although findings from research may indicate the potential of laughter yoga to reduce acute cortisol and buffer the endocrine stress response, there are several limitations to consider. Oztruk and Tezel (2021), for instance, only found significant decreases in cortisol for laughter yoga sessions 5, 7 and 8 (eight session were provided in total). Similarly, Tanaka, Tokuda, Ichihara (2018) only found significant decreases in cortisol after four sessions of LY. These findings suggest that several sessions may be needed to reduce cortisol questioning the validity of findings from Fujisawa et al (2018) and Heo, Kim, Park and Kil (2016).

Another consideration is the impact of influential external variables on cortisol secretion. As mentioned in sub-chapter *3.2.4 Circadian Rhythm,* cortisol concentrations change throughout the day in accordance with the circadian rhythm. In addition to variation throughout the day, cortisol concentrations may vary between days and can be influenced by stress exposure, physical activity, and nutrition (Tomiyama et al, 2010; Heaney, Carroll and Phillips, 2014). One potential way to account for external influences is to establish baseline cortisol measures for each participant – that is – measure participants (including control group) salivary cortisol concentrations prior to the laughter yoga sessions. However, to accurately develop baseline cortisol measures, and to consider variation in concentrations throughout the day, cortisol samples would be required at significant points in the day in which cortisol drastically changes. When referring to the circadian rhythm, this includes four time points 1) immediately after awakening 2) 30-min after awakening 3) midday 4) before bed. When coupled with pre-test and post-test cortisol sampling, full-day cortisol samples obtained before, during and after the laughter yoga sessions could provide more insight into the short-term and long-term impact of LY on salivary cortisol.

2.10.5 Discussion

In this chapter, laughter yoga (LY) has been defined and clarified with exploration of psychological and biological underpinnings. Psychological benefits of LY may include the development of coping mechanisms, increased socialisation and building of relationships which, , improves mental health . However, it is argued that LY may provide further benefits which are not quantifiable through clinical tools and assessments taking a recovery model approach to treatment. LY is as an effective alternative treatment to poor mental health which is apparent through exploration of qualitative research. Research also indicates that LY may present physiological benefits associated with mental health such as the reduction of cortisol. As high concentrations of cortisol are associated with stress and depression (as explored in 3.2 Biological Aetiology) significant reduction of cortisol secretion indicates that LY may hold potential to improve physiological responses. To further explore the psychological and biological impact of LY, a systematic review was conducted between September 2018 – March 2019 by Sheriden Morley, Martin Bollard and Daniel Bressington. Findings from this review are presented in the next chapter.

2.10.6 Biopsychosocial Impact of Laughter Yoga; psychological symptoms and salivary cortisol – a systematic review

The aim of this systematic review was to assess the effectiveness of the laughter yoga (LY) intervention on psychological measures of mood, specifically depression, anxiety and stress, and physiological measure of stress via salivary cortisol. As research exploring LY is relatively sparse, inclusion criteria remained broad to include a variety of sub-groups.

The systematic review aimed to approach the following research questions:

1) Do individuals receiving the Laughter Yoga intervention present a statistically significant

improvement in self-reported mood (depression, anxiety or stress) compared to a control group?

2) Can laughter yoga significantly decrease salivary cortisol concentrations (chronic and acute)?

2.10.7 Methodology

A systematic review of randomized controlled trials assessed the impact of group-based LY on depressive symptomatology and salivary cortisol was conducted. As advised by an information scientist at Lancaster Library, Coventry University a meta-analysis could not be performed due to lack of quantitative research and overall research (meeting 20/07/2020). The review methods were agreed in advance and adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The protocol was prospectively registered with PROSPERO (Ref: CRD42018109644)

Eligibility Criteria

Types of Studies

This review only included randomized controlled trials which are fully reported, written in English and published in peer-reviewed journals.

Participants and Study Settings

Participant eligibility included adults (aged 18+) with or without a clinical diagnosis of depression. Participants with a comorbid psychiatric disorder (e.g. bipolar and depression) were excluded from the study. Studies including participants with co-morbid physical illnesses remained. All studies were eligible for inclusion irrespective of the setting.

Interventions

Studies which reported the effects of group LY sessions were included regardless of the intensity or frequency of the sessions. However, only studies which included the three keys elements of laughter yoga were included; 1) deep breathing exercises 2) childlike playfulness 3) laughter exercises. Studies which did not provide laughter yoga in a group format were excluded from the

study.

Comparison Group

There were no restrictions on the type of control or comparative group. Studies were excluded if no comparative or control arm was included.

Outcome Measures

Studies had to report at least one psychological measure of mood or depressive symptomatology as measured by a valid self-report or clinical scale OR measure salivary cortisol measures pre and post-intervention. Corresponding authors were contacted via e-mail to retrieve missing outcome measures, however this yielded no responses

Literature Search Strategy

A systematic search was conducted on articles published between 1995 - 2019. Studies were identified from seven electronic databases (Cochrane Library; PubMed; Medline; SCOPUS; CINAHL; AHMED; ASSIA). References list from each study were also manually searched for full-text research which meets the criteria. Title and abstract searches were made using the keyword (laughter yoga). The broad search term of 'laughter yoga' was implemented as Laughter Yoga is a niche intervention. Initial searches of 'laughter yoga' yielded around 20 – 25 research articles from each database and therefore specific search terms were not required (see appendix one). All full-text articles were then screened for eligibility ready for data extraction and analysis. Studies which did not meet the inclusion criteria were excluded from the review.

Data Collection Process

Data was extracted independently by one reviewer using a template created specifically for the review (see appendix two). Data was then summarized and independently checked by a secondary reviewer. Discrepancies were discussed and resolved within the research team.

2.10.8 Results

Overall the search yielded 173 records across the seven databases. From initial screening, 50 articles were duplications, 67 irrelevant, 8 letters, 11 reviews, 3 commentaries and 1 without an abstract were excluded. 30 articles remained for abstract screening and eligibility (see appendix two). 8 articles met all inclusion criteria however 3 articles appeared to be research protocols with no published data and therefore were excluded. For the five remaining RCT's which met all of the inclusion criteria, the Cochrane Risk of Bias Tool for Randomized Controlled Trials was implemented as shown below:

Table 5- *Cochrane Risk of Bias Tool for Randomized Controlled Trials*

	Shahidi et al (2010)	**Fukuoka et al (2016)**	**Memarian, Sanatkaran & Bahari (2017)**	**Fujisawa et al (2018)**	**Bressington et al (2018)**
Random Sequence Generation	Unclear	Low risk	Unclear	Low risk	Low risk
Allocation Concealment	Unclear	Low risk	Unclear	Low risk	Low risk
Selective Reporting	Low risk	Low risk	Low risk	Low risk	Low risk
Blinding of Participants and Personnel	Unclear	Unclear	Unclear	Unclear	Low risk
Blinding of Outcome Assessment	Unclear	Unclear	Unclear	Unclear	Unclear
Incomplete Outcome Data	High risk	Unclear	Unclear	Unclear	Low risk
Overall Quality:	Poor Quality	Fair Quality	Poor Quality	Fair Quality	Fair Quality

Shahidi et al (2010) and Memarian, Sanatkaran & Bahari (2017) identified as 'unclear risk' for random sequence generation and allocation as there was insufficient information regarding sequence generation process and allocation concealed to permit a judgement. Fukoka et al (2016) identified as a 'low risk' for random sequence generation as sealed envelopes were used to randomise allocation. However, for allocation concealment, the risk is 'unclear' as it is not clearly stated whether envelopes were sequentially numbered, opaque and sealed. Bressington et al (2018) scored 'low risk' for random sequence generation and allocation as randomisation was

implemented through a randomisation service by a researcher not otherwise involved in the study. Similarly, Fukuoka et al (2016) also scored ‘low risk’ for sequence generation and allocation as randomisation included a random number generation. For selective reporting, all studies identified as low risk as study protocols were readily available with primary and secondary outcomes that are of interest in the review.

All studies, except Bressington et al (2018) were scored as an ‘unclear risk’ for blinding of participants and personnel as the issue was either not addressed or insufficient information was provided to permit judgement. Although Bressington et al (2018) did not implement blinding, lack of blinding was due to practicalities of the study and the author is confident the outcome would not be influenced. All studies presented an ‘unclear risk’ for ‘blinding of outcome assessment’ as no studies addressed this issue.

Regarding incomplete outcome data, Shahidi et al (2010) rated a ‘high risk’ as the attrition rate was not fully reported. 10 participants who left during the study were not account for. Bressington et al (2018) scored ‘low risk’ as all data outcomes and attrition rates were reported. The remaining studies presented an ‘unclear risk’; although all outcome measures are reported, attrition rates are not fully addressed. In accordance with the Cochrane Risk of Bias grading system, three of studies were deemed ‘fair quality’ and the rest ‘poor quality’ and therefore evidence generated by the included studies is weak.

Results of Included Studies

Overall, participants across the four studies which assess the impact of Laughter Yoga (LY) on mood included older adults aged between 55 – 80 years old. Two of the four studies included participants with symptoms of depression at baseline (Shahidi et al 2010 and Bressington et al 2018). All studies implemented a randomized-control trial design to establish a cause-effect relationship between Laughter Yoga (LY) and physiological and psychological symptoms. Consequently, all studies included a control group which varied from treatment as usual (TAU) to

an exercise programme (Fukuoka et al 2016, Memarian, Sanatkaran & Bahari 2017 and Bressington et al 2018). Shahidi et al (2010), however, implemented a three-arm RCT which involved laughter yoga, exercise therapy, and a TAU control group. An advantage of using a three-arm study is the ability to assess and compare the two key components of LY; exercise and laughter.

Due to a lack of data, a meta-analysis / meta-synthesis could not be performed on the studies included. One suggestion (as advised by an information scientist at Lancaster Library, Coventry University) was to standardized measures (develop z-scores) across the studies to conduct the analysis. However, not enough information was provided to standardize measures. Alternatively, each study has been analysed individually to assess the impact of laughter yoga on depressive symptomatology, stress, anxiety, and salivary cortisol measures. Study characteristics are summarised in appendix three.

2.10.9 Results of Individual Studies

Effects of Laughter Yoga on Depression, Anxiety and Stress Symptomatology

Although instruments and tools to measure depression, anxiety and stress varied among the studies, all measures were taken pre and post-intervention (see study characteristics appendix three). Findings from Fukoka et al (2016) reported no statistically significant differences between depression symptoms (as measured by the Self-rating Depression Scale) and symptoms of anxiety (as measured by the State-Trait Anxiety Scale) at baseline and post-intervention between the LY group and control group. Memarian, Sanatkaran & Bahari (2017), revealed a statistically significant difference reduction in anxiety for those receiving the Laughter Yoga intervention (M= - 2.83) versus the control group (M=.50) (U=136, Z=3.76, p =.000). Findings from Shahidi et al (2010) found statistically significant improvements in General Depression Scores (GDS) when comparing those receiving the Laughter Yoga intervention to the control group (p =.0004). However, there was no significant difference in GDS scores between the LY and exercise group (p > .05).

Findings from Bressington et al (2018) indicated a statistically greater decrease in depression

(DASS-21 – depression scale) and greater improvements in mental health related quality of life (MCS of SF12v2) than the control group from baseline to immediately following the intervention (p = .023 and p =.034 respectively). However, there were no statistically significant difference in the change in depression and mental health quality of life from baseline to 3-month follow-up between the two groups (p = 0.223). No significant difference was found between anxiety and stress scores (measured by DASS-21) between the LY group and control group at any follow-up time point.

Effects of Laughter Yoga on Salivary Cortisol

Fujisawa (2018) measured and compared saliva cortisol and saliva / DHEA ratio before, immediately after and 30-minutes following a laughter yoga (LY) session to an active control (spontaneous laughter triggered through a comedy movie) and a control group (reading a book). Findings revealed that both the group receiving LY and those watching a comedy movie exhibited a significant decrease in cortisol concentrations by time, whereas the reading group did not (p = 0.173). However, DHEA concentrations was insignificant for the LY group (p = 0.517), but significant in the comedy movie (p = 0.016) and reading groups (p < 0.001). C/D ratios in the reading group but was not different from that the comedy movie group, but significantly higher than that of the LY group (p = 0.002)

2.10.10 Discussion

In conclusion, it is apparent that few randomised-control trials have been conducted which assess the impact of Laughter Yoga for depressive symptomatology in individuals with symptoms of depression at baseline. To date, only two RCT's have been conducted and fully reported (Shahidi et al 2010 and Bressington et al 2018). Even fewer research has been found which assesses the physiological impact of LY on salivary cortisol measures. Additionally, no research has been conducted which measures and assess the psychological and physiological impact of the intervention despite the link between mental health and physiology.

Fukoka et al (2016) found no significant difference in depressive or anxiety symptoms before or after the intervention when compared to the control group (TAU). Similarly, Bressington et al (2018)

also reported no statistically significant difference in anxiety or stress scores pre / post intervention when compared to a TAU group. These findings would suggest that LY may not present effective for symptoms of anxiety which is often a prerequisite for depression. Despite this, Memarian, Sanatkaran & Bahari (2017) found a statistically significant difference in anxiety scores pre and post-intervention compared to a control group (p=.000). However, as Memarian, Sanatkaran & Bahari (2017) is classified as a 'poor quality' research paper, the conclusive findings from this study are weak.

Interestingly, findings from Shahidi et al (2010) and Bressington et al (2018), both of which used participants with symptoms of depression at baseline, both reported a statistically significant improvement in depression and mental health related quality of life (Bressington et al 2018) before and after LY compared to a control group. However, in Shahidi et al (2010) participants receiving an exercise-based intervention also reported a statistically significant improvement and participants in Bressington et al (2018) did not report significant improvements at follow-up (3-months).

2.10.11 Conclusion

In conclusion, this review suggests that Laughter Yoga, as developed by Madan Kataria (1995), may have some benefits in improving depressive symptomatology in individuals presenting symptoms at baseline. However, findings implicate that LY may be just as beneficial as exercise and may only have a short-term impact. There is also very limited evidence that LY may also impact salivary cortisol which is linked to low mood and depressive symptomatology. Further randomized controlled trials that include participants with depressive symptomatology at baseline, which includes psychological outcomes as a primary outcome and assesses the physiological impact, are required to further understand the mechanism of laughter yoga and establish its impact on improving mood.

2.10.12 Research Published Post-Review

In the above systematic review '*Biopsychosocial Impact of Laughter Yoga on Depressive Symptomatology, and salivary cortisol; a systematic review'* data was collected and analysed

between August 2018 – March 2019. After completion of the review, further research was published which explored the psychological and physiological impact of Laughter Yoga. One key contributing factor to the influx of research exploring Laughter Yoga is the impact of COVID-19 which occurred in early 2020. As a result, research exploring mental health - primarily interventions preventing or reducing symptomatology has drastically increased. In this sub-section, research published after the initial review date will be included and explored with consideration to research assessing online Laughter Yoga. This section aims to ensure that all research which explores the impact laughter yoga is explored.

2.10.13 Target Population and Sub-groups

Following the completion of the above review, nine studies were found to be published which explore the psychological and physiological impact of Laughter Yoga. Among these studies, target populations and sub-groups included nursing students and patients with co-morbid health conditions such as heart disease, cancer and kidney failure. The key aim and justification of these studies primarily concern the improvement and reduction of symptoms associated with depression, anxiety, stress and sleep - Ozturk & Tezel (2021) additionally explored the impact of laughter yoga on pain tolerance for patients undergoing haemodialysis. Some studies assessed psychological and physiological outcomes primarily salivary cortisol and beta-endorphin (blood plasma).

2.10.14 Laughter Yoga Interventions and Control Groups

Across the nine studies, laughter yoga (LY) sessions took place for a minimum of 30-minutes and ranged between 1 – 32 sessions. Despite variation in sessions provided, all sessions appear to follow the LY outline set by the founder, Madan Kataria, including:

1. Warming Up – clapping, chanting, moving, smiling and eye-contact
2. Deep breathing exercises
3. Child-like Playfulness
4. Positive affirmations

As research exploring LY is relatively sparse, clarification of the intervention content is essential for consistency within the research and ensures participants are receiving the 'genuine' intervention. A meta-analysis by Zhao et al (2019), which broadly explored the impact of laughter and humour interventions on depression, anxiety and sleep, is an example of this issue. Within this review, laughter yoga is classified as a laughter-based therapy that is assessed with humour therapy. Although there is a key distinction between laughter and humour therapy, clarification between laughter-therapy, which utilises external resources to simulate laughter such as books, movies etc, and laughter yoga is essential.

2.10.15 Psychological Outcomes

Across all nine studies published post review completion, psychological outcome measures, including depression, anxiety and stress, statistically improved when exposed to the laughter yoga intervention in comparison to a control group or active control. Otzer & Tezel (2021), for instance, measured mood with the Brief Symptom Inventory (BSI) before and after the intervention period (TO, T1). The BSI consists of 53-items that assess nine symptom dimensions; Somatization, Obsession-Compulsion, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid ideation and Psychoticism; and three global indices of distress; Global Severity Index, Positive Symptom Distress Index, and Positive Symptom Total. The global indices measure the current or past level of symptomatology, the intensity of symptoms, and number of reported symptoms, respectively (Derogatis, 1973). Within this study, analysis was conducted on the sub-dimension's depression, anxiety, negative self, somatisation and hostility pre-test – post-test (before the sessions and after eight sessions). For all sub-dimensions, those who received the laughter yoga intervention presented a statistically significant ($p < .05$) reduction in all sub-dimensions in comparison to the control group.

Armat et al (2020) and Meier, Wirz, Dickinson & Pruessner (2020) utilised the Beck Depression Inventory (Beck et al, 1961) to measure and assess depressive symptomatology among their

participants. Unlike the Brief Symptom Inventory (BSI), the Beck Depression Inventory (BDI) primarily focuses on evaluating the severity of depressive symptomatology. Armat, Emami Zeydi, Mokarami, Nakhlband & Hojjat (2020) revealed a significant difference in depressive symptomatology as measured by the BDI ($p < .001$) in addition to anxiety as measured by the Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer ,1988). However, Meier, Wirz, Dickinson & Pruessner (2020) revealed no significant changes ($p = 2.10$) between the two groups on BDI scoring. One consideration of this discrepancy between these findings is outcome timepoints - Meier, Wirz, Dickinson & Pruessner (2020) obtained psychological measures immediately after one session of Laughter Yoga whereas Armat et al (2020) obtained psychological measures following 16 weekly sessions lasting 90-minutes each. These findings could suggest that the psychological benefits of LY may manifest after several sessions.

The Warwick-Edinburgh Mental Wellbeing scale (WEMWBS) and Mental health Continuum Short Form (MHC-SF) were also used to measure and assess the impact of LY on mental health (Nia, Mohaker, Ghahramanzadeh & Mazlom, 2019 and Schotanus-Dijkstra et al 2019 respectively). The WEMWBS consists of a 14-item scale using 'positively worded' phrases to assess mental health . Participants are required to score their experiences of each of the statements from 'none of the time', 'rarely', 'some of the time', 'often' and 'all of the time' – each item is scored 1,2,3,4,5 respectively. Unlike other scales and questionnaires for mental health, higher results from the WEMWBS represents positive mental health whereas lower scores indicate the contrary. In Nia, Mohaker, Ghahramanzadeh & Mazlom (2019) participants obtained higher post-test WEMWBS score ($P=0.004$), compared to the control group following four 20-30minute sessions of laughter yoga once a week. Independent t-test of the scores in addition to repeated measures ANOVA found significant differences in sub-categories optimism (.001) positive relationships (.001) and having energy (.003).

Similar to the WEMWBS, the Mental Health Continuum Short Form (MHC-SF) recognises poor mental health through lower self-reported scores associated to 'positively worded' statements. Schotanus-Dijkstra et al (2019) also reported a statistically significant increase in self-reported

mental health, specifically for the emotional well-being subscale ($p < 0.01$), before and after completing four 30-minute laughter yoga sessions.

Finally, Rouhi, Etemadi & Pooraghajan (2020) measured and assessed psychological outcomes, specifically symptoms associated with depression, anxiety and stress, using the Depression, Anxiety and Stress Scale (DASS-21) and Quality of Like Questionnaire (SF-36). DASS-21 (Lovibond & Lovibond, 1995) is a 21-item questionnaire consisting of questions reflecting clinical diagnosis for depression, anxiety and stress within the DSM-V – as a result, the DASS-21 consists of three sub-scales for each disorder. Cut-off values differ between the three sub-scales to account for 'normal levels' one may experience (Depression: 0-9, Anxiety 0-7, Stress 0-14). Findings from Rouhl, Etemadi & Pooraghajan (2020) reveal a statistically significant improvement ($p=<0.001$) improvement in DASS-21 symptoms in those who received the laughter yoga.

2.10.16 Physiological Outcomes

Regarding physiological measures, three of the nine studies included a physiological outcome – predominantly salivary cortisol. Ozlem & Tezel (2021), for instance, obtained salivary cortisol samples immediately before and post-session to assess acute changes in cortisol. Although they found no initial significant changes in the first four laughter yoga (LY) sessions, statistically significant differences were found in sessions 5, 7 and 8 suggesting a physiological response after prolonged exposure to laughter yoga. Despite discrepancies in psychological measures, Meier, Wirz, Dickinson & Pruessner (2020) also found that those who received LY, which were then exposed to a Trier Social Stress Test (Kirschbaum, Pirke, and Hellhammer, 1993) presented a reduced stress response (as measured by salivary cortisol) compared to a control group suggesting a potential instantaneous stress-buffering response.

Ozel & Atez (2021) assessed and measured beta-endorphins concentrations in their participants blood plasma – participants were haemodialysis patients. Beta-endorphins βE are endogenous opioids which bind to the same receptors as opioid drugs, such as morphine, providing a pain

reducing effect (Sprouse-Blum, Smith, Sugai & Parsa, 2010). In addition to reducing pain responses, research indicates that (βE) may also aid regulation of stress responses and interact with the dopamine system to provide rewarding experiences (Bilkei- Gorzo et al, 2008). As a result, the presence of βE in the blood may indicate pain tolerance, mental health. Within their study, Ozel & Atez (2021) found no statistically significant difference in βE across the research period, however, participants showed improved self-reported pain in weeks 1, 4 and 8.

2.10.17 Qualitative Outcomes

Drossaert & Pieterse (2019) conducted two semi-structured interviews within their research which explored motivation to participate in the research and their experiences of laughter yoga - each interview lasting 20 – 30 minutes long. Both participants claim an extrinsic motivation to join the study to help the author with the research. However, intrinsic motivation differed with one participant reporting an 'open' attitude towards LY claiming that 'people should laugh more often' whereas the other participant perceived the research as a chance to challenge themselves and their boundaries suggesting a potential hesitancy surrounding the research. When exploring experiences, interviewee one reported no negatives experiences of the sessions, however, interviewee 2 two stated that they predicted the sessions would be 'awkward' and found the loud laughter of others to be intimidating (pg.18). Paradoxically they also stated that *'the authentic laughter of others'* made they enjoy the LY sessions and concluded that '*it was a nice community feeling and the general acceptance of what you do, how you laugh was very cool (…) 'It was an inspiration to see how others came out of themselves.'*

2.10.18 Discussion

This sub-section aimed to explore research published post-completion of the above systematic review '*Biopsychosocial Impact of Laughter Yoga on Depressive Symptomatology, and salivary cortisol; a systematic review'* which may provide further insight into the psychological and physiological impact of Laughter Yoga. As a result of the COVID-19 pandemic, a potential increase of research exploring interventions to improve mental health were considered. Therefore, a scoping

review was conducted to ensure all research exploring the topic was included. A scoping review of the literature found nine studies which explored the psychological and/or physiological impact of laughter yoga. Target population / sub-groups, laughter yoga intervention / control groups, psychological outcomes, physiological outcome and qualitative data was extracted and discussed.

Overall, the findings support the use of LY as an alternative intervention for the improvement of self-reported psychological symptoms associated with depression, anxiety and stress. However, it is difficult to conclude due to heterogeneity in research design, procedure and psychological outcome measures and tools. Despite further evidence that LY may present physiological benefits such as reducing cortisol, there is an apparent lack of research which explores physiology as an outcome measure adjacent to psychological outcomes. Additionally, limitations arise in the research such as variation between chronic and acute measures of cortisol suggesting that further research is warranted. Although LY is an emerging intervention within the research, there is an evident lack of qualitative research which explore participants thoughts, feelings and experiences. Research including a qualitative element have provided insight of potential perceptual bias of the intervention which may influence self-reported measures – however, this research is limited, and further research is necessary.

3 Research Methodology and Justification

3.1 Introduction

In this chapter, research objectives, methodology and justification will be provided for the research. Due to few published studies of laughter yoga (LY), and no studies assessing online LY for educators, this research has been developed as a feasibility study to determine its acceptance and effectiveness. The development of research objectives for this feasibility study will be explored and justified by reiterating the gap in current literature and research. Recruitment and selection of participants will then be explored followed by an illustration of data collection and analysis. A clear outline of the research procedure, including outcome measures, will then be provided.

3.2 Gap in the Literature

Statistics discussed in sub-chapters 2.3 -2.5 reveal that educators, particularly those in higher education, were at high risk of poor mental prior to the COVID-19 pandemic. When the COVID-19 pandemic occurred in March 2019, those within the higher education sector were at a further increased risk of poor mental health due to drastic changes in work environments and job-related stressors (covered in chapter 3.1). Exploration of research into the aetiology of poor mental health, specifically depression, anxiety, and stress, suggests three aetiological approaches: environmental, psychological, and biological.

Environmental aetiology suggests that the environment an individual is exposed to, including work and home, can influence the development of poor mental health. Due to COVID-19 requirements to work from home, the line between the home and work environment blurred, merging the

home/workspace. Educators were required to transition to online teaching and learning, shifting their pedagogical roles. These changes, lack of clarity between work and home environments appear as risk factors to poor mental health. However, social isolation arising from working from home emerges as the key contributing factor. Although environmental factors cannot be manipulated to improve or prevent poor mental health, interventions that can virtually develop a therapeutic environment within the home/work environment and re-establish social connectedness may provide significantly beneficial.

Online interventions in the workplace appear to be accepted and feasible for providing virtual treatment and support. As found in the Systematic Review Exploring Online Interventions in the Workplace, online interventions are often provided as one-to-one, solitary, impersonal programmes. Group-based interventions encourage social interactions and connectedness which research indicates can prevent and reduce the ill-effects of social isolation (ref; ref). Despite this, little to no research has explored the impact of online group-based interventions for mental health. Laughter Yoga (LY) is a group-based psychosocial intervention with promising research for improving mental health. LY research indicates that interventions, specifically group-based interventions, do not necessarily need to be conventional and structured (such as group-based cognitive behavioural therapy) to have an effect. LY promotes that creating a therapeutic environment can be beneficial and therapeutic. Currently, no research assesses the feasibility and effectiveness of online LY for creating a virtual therapeutic environment at home.

In addition to creating a therapeutic environment, research suggests that LY may also provide psychological benefits by improving psychological mechanisms such as coping mechanisms and stress-buffering (see sub-chapter 6.2.1). Kuru Alici & Arikan Dönmez, (2020) argue that several other benefits of LY scope beyond typical symptomatology associated with depression, anxiety, and stress. Therefore, qualitative data collection is vital to capture and assess the full effect of the LY intervention. However, objective measures of mental health through clinical tools and scales are necessary to quantify and objectively measure the impact of the intervention.

Research exploring the biological aetiology of poor mental health suggests that physiological processes may contribute to poor mental health regardless of environment or psychological processes (sub-chapter 3.2) Salivary cortisol is often used within research to assess physiological responses to stress, as heightened concentrations of cortisol are present in those with depression and those experiencing prolonged stress, and as a biomarker for poor mental health (sub-chapter 3.2.2). Although there is sparse research that explores the physiological impact of LY on biomarkers, such as salivary cortisol, research does suggest a potential acute and chronic impact on reducing cortisol suggesting psychological and physiological changes. As suggested by Shackleton (2021), bio-measures (such as salivary cortisol) are recommended in research that explores occupational stress as they provide further understanding, greater ability to detect, manage and reduce.

Prior to COVID-19, research indicates issues surrounding accessing conventional mental health support and treatment (as discussed in chapter four). Research explored in chapter four suggest a pre-existing group of individuals who do not meet clinical diagnosis (and therefore cannot access treatment), have been incorrectly prescribed pharmacological treatments or suffering the negative implications of treatments such as anti-depressants. For these 'high-risk' individuals, the psychological impact of COVID-19 may exacerbate symptoms and increase the risk of developing a mental health condition. During the COVID-19 pandemic, psychological therapies, which would usually occur face-to-face, transitioned to online and virtual appointments due to restrictions and policies. Although psychological therapies were available, anti-depressant prescriptions within the UK soared and psychological therapy access and treatment reduced (sub chaps). As explored in sub-chapter 4.4 despite the effectiveness of pharmacological treatments for issues such as depression, stress and insomnia, pharmacological treatments are often associated with negative side effects, reliance, relapse, and finical burden. These findings suggest that during COVID-19, more alternative treatments, and interventions, particularly for those within the high-risk group, are necessary and required.

3.3 Research Questions

Educators within the higher education sector are a high-risk group for poor mental health. Issues with accessing support before and during COVID-19 for mental health add further risk. Online group-based interventions which can reduce the psychological impact of changes in work environments and social isolation may provide therapy and support needed during the COVID-19 pandemic. Laughter Yoga (LY) is an effective group-based intervention with psychological and physiological benefits and no negative side effects. Due to the vast benefits of LY, as proposed by previous research, quantitative and qualitative methods appear better suited to capture and assess the effectiveness of the intervention. In addition to subjective measures, objective measures such as salivary cortisol (a biomarker to determine and assess stress) may also provide further assessment of the LY intervention for educators. Currently, no research has explored the biopsychosocial benefits of online group-based LY for educators during the COVID-19 pandemic. Within this feasibility study, we propose to answer the following research questions:

1) Would online group-based Laughter Yoga (LY) be accepted and feasible as an alternative mental health support intervention for higher education staff within the UK?
2) Does online group Laughter Yoga present psychological and physiological benefits for mental health (specifically symptoms of depression, anxiety, stress, and insomnia) in higher education staff compared to a wait-list control?

3.4 Feasibility Research

The research at hand has been designed with consideration to Bowen et al's (2009) and the National Institute for Health Research's (NIHR. 2021) guidelines for developing and employing a feasibility study. Bowen et al (2009) propose that feasibility studies are conducted to determine whether an intervention is relevant, sustainable, and appropriate for further testing. They are performed when there is an evident lack of previous research exploring an intervention when previous studies do not assess the intervention for a specific population, when a population or intervention has been identified to need unique consideration or when assessing changes to an intervention may provide successful. A lack of research exploring LY as an online intervention for

educators, who appear as an at-risk population for poor mental health, meets all the criteria warranted for a feasibility trial.

The NIHR (2021) propose that feasibility studies should assess the acceptability and effectiveness of an intervention through a randomised-control trial (RCT) research procedure with mixed-method data collection. NIHR (2021) states that RCT trials in feasibility studies demonstrate an ability to be upscaled to 'full-size' RCT studies. They also state that mixed methodology (quantitative and qualitative assessment) assesses intervention effectiveness, feasibility and enables issues with the intervention to be highlighted. To enable a full assessment of adherence, acceptability, willingness and effectiveness of an intervention, a mixed-method approach is required as part of the feasibility study.

3.5 Mixed Method Research Approach

Mixed-methods research (MMR) consists of qualitative and quantitative data which can be analysed in conjunction or independently. Within this research, quantitative measures will be utilised to provide data that will allow the effectiveness of the intervention to be assessed objectively. Qualitative data will also be collected within this research to provide insight into the acceptability and feasibility of the intervention alongside analysis of retention rates. Although qualitative and quantitative measures will be collected and analysed independently, findings from these measures will be triangulated and discussed to provide a thorough answer to the research questions at hand.

Acceptability and Feasibility

Acceptance of the LY intervention will be assessed through qualitative data collected through semi-structured focus groups at the end of the research period. Focus groups will allow participants to share their experiences and describe issues with the LY intervention, clarify notions and highlight

any unmet needs. The semi-structured format of the focus groups will allow specific areas of interest to be covered but also provide room for the participants to elaborate on areas of importance to them (further explored in sub-chapter 7.10.4).

Calculation of retention rate throughout the research period (before, during and after) will also provide insight into acceptability. To assess feasibility, the recruitment process, retention, adherence, and fidelity of delivery of the intervention will be monitored and calculated. Success or failure of the intervention execution will be assessed through researcher observation of the LY sessions.

Efficacy

To assess the intended effects of the intervention, quantitative measures of mood will be measured before, during and after the intervention. Quantitative measures will include the depression, anxiety, and stress scales (Lovibond and Lovibond, 1995b. DASS-21), Insomnia Severity Index (Morin, 1993. ISI) and will provide objective, quantifiable measures of mental health . To assess the physiological impact of LY, salivary cortisol will be measured throughout the research period. Salivary cortisol provides numerical measures (nmol/litre) which can be analysed to provide further quantifiable measures of mental health.

Although quantitative and qualitative data will be analysed and reported separately within this report, both methodological approaches will be utilised and reported with equal weighting. Additionally, as each method will approach different research aims (qualitative findings approach acceptability and feasibility, quantitative measures assess efficacy) they will be used conjunctively to understand the intervention further and will not be used to buffer potential ineffectiveness of the intervention (Curry et al, 2019).

3.6 Ethical Considerations

This study was reviewed by Coventry University Ethics and received full ethical approval on 09/10/2018 (see appendices two and three). Amendments were made to the research design, procedure, and data collection between July 2019 – October 2020 requiring further ethical approval (see appendix four). All amendments were approved by 11/11/2020. As participants consisted entirely of University staff at Coventry University, no further or external ethics were required. Gatekeeper and Faculty approval was obtained and required before the virtual research flyer was distributed via e-mail, staff message board and released in the staff newsletter. Participants were asked to contact a Coventry University e-mail address belonging to the principal researcher to show initial interest in the research and were contacted via e-mail thereafter to maintain discretion. All e-mails sent to participants were encrypted to prevent unauthorized users on the network from intercepting and capturing login credentials to access e-mails through this e-mail account. No e-mails were kept longer than necessary. Once necessary data and information were extracted, e-mails were permanently erased.

Valid consent was required from all participants before the continuation of the research (see appendix five). Full valid consent required participant competency (competency was presumed until told or shown otherwise), received and read the information sheet and watched the accompanying video, and to have freely provided consent without coercion. To ensure the wellbeing of the participants, emergency details, including phone numbers and address where required. As suggested by the Information Governance Unity (2021), consent forms were developed using clear and concise language. Consent was clearly provided by crossing all relevant boxes on the consent form (see appendix five). Participants were made aware of their right to withdraw from the study at any time including withdrawal of their data. Once full valid consent was obtained, all participants were provided pseudonyms (e.g. P001, P002) which was used for all further documentation and data. As suggested by the UK General Data Protection Regulations (GDPR. 2016) pseudonyms implement data-protection principles, such as data minimisation which meet GDRP requirements. Furthermore, pseudonyms provided anonymity during the triangulation of data between researchers to ensure no participants could be identified. Separate consent was obtained for the focus group sessions to ensure participants agreed to be recorded and allow transcription of the

interviews (see appendix eleven). Audio files and transcripts were deleted once the analysis was completed. Interviews were transcribed verbatim with identifiable information removed.

Salivette tubes sent to the participant's address were coded with the participant's pseudonym. In the case that salivette's are lost, they could not be traced back to the participant. As the sample provided is unidentifiable to the participant, and no DNA or biometric data will be processed, no legal consent is required (Human Tissue Act 2004). However, full consent is required for the removal, storage, and analysis of the sample. To provide full consent, participants must be made aware of how the sample will be obtained, how it would be used and the risks or implications of its use (Human Tissue Act, 2004). The relevant information is clearly stated in the information sheet provided to the participants accompanied with diagrams to clearly demonstrate how samples are obtained (see appendix nine). A full COSHH assessment was completed and authorised on 18/06/2018 (see appendix two).

Under the UK General Data Protection Regulations (GDPR. 2016), this research falls under 'public task' and 'legitimate interests' as lawful bases for the processing of data. The GDPR states that when personal data is collected under these bases, the individual must be provided with the identity and contact details of the controller (researcher), that the legitimate interests are shared with the individual and the intention of the information that they provide is clear. These details are provided clearly and coherently in the participant information sheet and consent form provided (see appendix six and nine). Participants were also made aware of their right to withdraw, erase their data, and withdraw consent at any time - this was confirmed when obtaining consent and throughout the research period (*Section Three - Rectification and Erasure*. GDPR, 2016.)

Adhering to Coventry University Group Data Protection Policies, and subject to provisions of the UK General Data Protection Regulations (2016) and the Data Protection Act (2018), personal data was processed fairly and transparently, used only for specified and intended purposes, handled in a way that ensured appropriate security, processing, access, loss, and destruction. No third parties had access to the computer, which held personal data of the participants, at any time – passwords

were not shared, and the computer was not left logged in and unattended. All electronic documents were encrypted with a password and stored on OneDrive as agreed with CUEthics.

Previous research indicates no known negative physical or psychological side effects of Laughter Yoga (LY). Participants were informed and advised of certain medical conditions and limitations to be wary of (e.g., advanced (bleeding) piles, hernia, persistent cough, heart disease, undergone surgery in the last 3-months,) due to intra-abdominal pressure because of deep laughter exercises and deep breathing. However, there is no supporting research on the implication of these health issues during LY and therefore were discussed as a precautionary measure with the laughter yoga instructor prior to the session. No known research indicates psychological side effects, or exacerbation of pre-existing symptoms, from LY.

As the research advertised LY as an intervention to improve mental health , measures were taken to ensure consistent mental health support throughout the research. A research support network was developed with key organisations and contact details (see appendix six). Within this document, which was included within the participant information pack, relevant networks were developed for varying levels of mental health including 'General Mental Health', 'Self-Reported Clinical Symptoms and Immediate Concerns' and 'Immediate Intervention with Concern for Wellbeing and Safety.'

Although the intervention sessions took place online, salivette tubes were sent through the post and collected in person. When collected in person, the participant was met on the Coventry University campus at a public place (outdoors) during working hours to adhere to Coventry Universities guidelines for researching in the community setting. There are no other known risks associated with the principal researcher.

3.7 Inclusion Criteria

Participants included higher education staff members who are currently employed for Coventry University and work within one of the below faculties or schools:

- Arts and Humanities

- Engineering, Environment and Computing
- Health and Life Sciences
- Coventry Business School
- Coventry Law School

Participants who meet the following criteria will be eligible to take part in the research:

- An academic staff member at Coventry University.
- Have access to the internet and a computer
- Are not currently receiving any other yoga or exercise-based intervention

· Do not plan to change medication (for mental or physical ailments) in the next 3-months (throughout the research period).

3.8 Recruitment Strategy

The demographic recruitment remained broad to capture a generic sample of higher educators employed at Coventry University including any gender, age, ethnicity, religious beliefs, faculty/schools, and years worked at Coventry University.

Consistent with feasibility studies, no power analyses were conducted to establish a significant sample size. Although the secondary research aim is to assess the effectiveness of the intervention, the primary research aim is to assess the acceptability and feasibility of online LY for educators. Therefore, a power analysis was not required. Justification of sample size was established considering benefits, risks, costs, and recommendations from previous research. Browne (1995), for instance, states a minimum of thirty patients to estimate a parameter is adequate for a feasibility study. Julius (2005) recommends a minimum sample size of 12 participants per group as a rule of thumb and justifies this based on rationale about feasibility and precision about the mean and variance.

Previous feasibility studies assessing LY indicate sample sizes between 18 – 28 participants.

Bennett et al (2015) pre-post intervention feasibility study consisted of eighteen participants receiving LY, Ellis, Ben-Mosh, Teshuva (2017) included twenty-eight participants receiving LY and Bressington et al (2019) compared twenty-three participants receiving LY to twenty-seven patients receiving treatment-as-usual (TAU). On average, these studies suggest twenty-three participants per arm. As recommended by National Institute for Health Research (2019), to account for 20% drop-out and lack of compliance, the recruitment goal was set to twenty-five participants per arm. Due to the RCT procedure (further explored in 7.9), fifty participants were required in total (LY: 25, Wait-list control (WLC): 25).

However, when discussing providing online sessions, the LY instructor felt their personal competency was a maximum of fifteen people per session. They describe their experiences of providing LY online and felt that having a large group of people (over fifteen) was distracting and difficult to ensure everyone is engaging in the session. Therefore, the recruitment goal was lowered to forty participants (twenty receiving the LY sessions and twenty allocated to wait-list control) to ensure the LY felt comfortable and competent to provide the sessions.

An electronic flyer was developed (see appendix eight) and circulated via e-mail accompanied by a descriptive outline of the study - a £10 Amazon voucher was also included on the flyer as an incentive for those who complete the study. The electronic flyer was created using Adobe Spark, an online media creation software, independently by the principal researcher. On competition, the flyer was circulated between the researchers to ensure suitability and that all relevant information was provided. The research was posted online via a staff message board, only accessible by staff members at the University, and advertised on the monthly staff newsletter. The head of the Staff Mental Health Network (SMHN) was also contacted to promote the research within the University. The flyer was sent to the head of the SMHN, following a face-to-face discussion, which was then dispersed to faculty representatives of each faculty/school at Coventry University (see appendix eight). The flyer requested to contact the principal supervisor via e-mail to show initial interest and be provided further information regarding the study. Participants were given time to read the information sheet and ask further questions regarding the study. They were also sent a video

developed by the LY instructor providing the sessions to familiarise themselves with the intervention. If they agreed to take part, they were then sent a consent form to complete and return (see appendix five). On completion, all participants were given a participant's code (e.g. P001, P002) which was provided on all further documents sent between researcher and participant.

3.9 Research Procedure

As proposed by the NIHR (2019), a randomised-control trial (RCT) procedure was chosen to assess the acceptance and feasibility of LY and compare its effectiveness to a wait-list control. RCT's compare interventions to a control group to establish cause and effect (Walker, 2005). Randomisation of participants minimises allocation bias, selection bias and minimizes confounding variables due to unequal distribution of predictive factors (Altman & Bland, 1999; Levin, 2007). Concealment of the allocation also minimises performance and assessment bias (Stang, 2011, Higgin et al, 2011). The application of an RCT procedure within a feasibility study also establishes whether the intervention can be further assessed as a full-scale RCT.

Bressington et al (2020) effectively assess the acceptability, feasibility, and effectiveness of LY by conducting a feasibility study with a mixed-method RCT design. In addition to subjective measures of depression, anxiety, and stress (as measured by the Chinese version of the DASS-21 and Short Form 12 item (version 2) Health Survey. SF12v2), qualitative data was obtained through individual one-to-one interviews with the LY participants. A mixed-method RCT design was deemed appropriate for this study due to similar research objectives with Bressington et al (2020). However, focus groups were chosen to obtain qualitative data from participants.

Following full valid consent, participants were randomly allocated to receive the intervention (online Laughter Yoga) or were assigned to a wait-list control (WLC). All participants pseudonyms/codes (e.g., P001, P002) were input into an online random generator with a 1:1 ratio for equal allocation (LY: WLC). Due to the nature of the intervention (LY), and with a requirement for the researcher to observe the sessions, double blinding was preferable but not achievable. All participants were

required to complete all measures, regardless of intervention allocation, as a condition of taking part in the research s). Participants who took part in the LY sessions were invited to a focus group discussion at follow-up – justification for focus group data collection is explored in sub-chapter 7.10.4.

3.9.1 Laughter Yoga (LY)

Laughter Yoga (LY) sessions were provided by a certified Laughter Yoga instructor who had been providing LY for over 8-years to a variety of organisations and client groups including those with mental health difficulties and those with physical and sensory impairments. The instructor also mentioned experience of providing online LY. The principal researcher contacted the LY instructor prior to the first online session to discuss the participant demographic and activities that would be deemed most suitable for the research (initial face-to-face meeting 27/03/2019, discussion of online sessions and change of LY sessions - via e-mail 13/01/2022). Firstly, it was agreed that providing LY online limited the types of activities within the sessions. However, the structure of the online sessions needed to replicate face-to-face session as closely as possible to provide fidelity to the LY intervention. The key structure and content of 'normal' face-to-face LY sessions were discussed and ways to provide LY online was established. All session outlines were sent 1-week prior to the session to ensure suitability and consistency with a typical LY session. Particularly, each session was required to meet the four components of LY clapping and warm up, deep breathing, childlike playfulness, and laughter exercises (Madan Kataria – What Is Laughter Yoga? https://laughteryoga.org/laughter-yoga/about-laughter-yoga/). Sessions took place over Zoom, an online video-conferencing platform, every Thursday at 12pm for 45-minutes once a week for 4-weeks. A duration of one session a week for four weeks was decided upon reflection of the findings from the systematic reviews. Findings from the systematic review exploring the effectiveness of online interventions for mental health and wellbeing suggest session lengths of 30 min – 1 hour

once a week for between 5 – 8 weeks. However, previous research exploring the effectiveness of LY varied between one session (pre and post-intervention research) and three months. After discussion within the research team and with the LY instructor, 45-min sessions for 4-weeks were agreed. It was suggested that the sessions be kept to less than an hour to avoid Zoom fatigue and technology related ill health (e.g. eye strain). A shorter research period was also decided to maintain good mental health across the participants as the research took place during the COVID-19 pandemic.

For the initial session, the LY instructor introduced themselves to the participants provided background information of LY including the key concepts of LY, reasons why you should engage in LY yoga and potential psychological and physiological benefits. They also highlighted risk factors associated with LY as mentioned within the consent form. The table below presents the initial session outline.

Table 6 *- Outline of the first online Laughter Yoga (LY) session.*

EXERCISE	DESCRIPTION	COMMENTS
5 Points about LY	**Contra-indications** Unique concept Group, eye contact + childlike playfulness Reason – L exercises + deep breathing Concept based on scientific evidence Dr Madan Kataria – 1995, 10K clubs - 105 countries	Complete individual forms and register Introduce + ask perception of what LY is about
3 Reasons	10 – 15 minutes Deep hearty laughter Daily	To feel cumulative benefits
5 Benefits	Elevates mood Stress relief Health – immune system Connector of people – caring – sharing Laughter challenges – coping strategy	Go into more detail for about 1 minute
4 components of session	Clapping and warm up Deep breathing Childlike playfulness Laughter exercise	4 Aspects: Body, Mind, Spirit, emotional energy Love, kindness, compassion, beauty. You are what you feel Laugh in play …. because we can
Alive, Awake, Alert, Enthusiastic – activity	Arms out in front (palms up) – say 'I'm ALIVE. Arms outstretched sideways – say AWAKE Hands to mouth with eyes wide open (as if shouting to someone) – say ALERT Run on the spot whilst turning hands over in a pedalling motion – say ENTHUSIASTIC Repeat	Twice through complete sequence

	Say I'm ALIVE, AWAKE ALERT then Say ALERT, AWAKE, ALIVE Repeat from beginning.	
Comfort Zone Laughter (+ Breathing) (Karen Siugzda #883)	Inhale and draw an imaginary boundary circle around yourself. Exhale and gently step outside the boundary circle. Repeat couple of times. Next time exhale with a gentle chuckle as step out of boundary circle. Allow laughter to increase and get louder.	Participants decide the size and playfulness of their step Good example of pre-supposition to combat anxiety.
Shy laughter	Put hands in front of face, peer over fingers having eye contact with others and laugh in a shy manner. Repeat several times	30 – 40 seconds
Mobile phone laughter	Chatter, giggle and laugh. Share phones too.	No more than 30 seconds
Zipper laughter (Dave Berman)	Pull your fingers from one hand across your lips to zip mouth shut. 'Unzip' lips and laugh out loud. Have eye contact with others and repeat – looking at different people	20 – 30 seconds
Fishing Laughter	Pretend to throw a fishing line, feel a tug at the line and pull out a 'little' fish – throw the fish and line back in the water and feel the line tug again – pull out a huge fish and laugh	2-3 sequences
Swim strokes laughter (Ros Ben-Moshe – 293)	Pretend to do crawl, butterfly and breast stroke swimming whilst laughing. Also do 'doggy paddle' stroke with laughter. Then use towel to dry selves' laughter.	30 seconds
Magic laughter dust (Maya Carrington)	Pretend to throw magic laughter dust and laugh – throw at self and also share with others	20 – 30 seconds
1 Metre laugh	Pretend to measure cloth, put right hand from left hand to left elbow whilst chanting 'Eeee', then to left shoulder + right shoulder – stretch right arm out and laugh	Repeat sequence 3 - 4 times
Free Flow laughter	Participants sit or lie in a circle and allow the laughter to flow like a meditation. If they prefer they can do it with their eyes closed to help them feel in a comfort zone	As long as they wish
Vowel + humming meditation / breathing	Breath in and say 'a' vowel sound as slowly breath out. Then do similarly for rest of vowel sounds – 'e', 'I', 'o', 'u'. Finish with 'hum'	One sequence

For the following sessions, the points, reasons, and benefits of LY are not reiterated. Each session consisted of 10 to 12 LY exercises / activities covering the four-key components of LY; clapping and warm up, deep breathing, childlike playfulness, and laughter exercises. The activities provided were different for each session – no activity was repeated. In addition to promoting engagement, varying activities between sessions prevented participants redoing activities they did not like or did not find useful. See appendices nine - twelve for all session outlines. The LY instructor was paid from Coventry University (Faculty of Health and Life Sciences) when all sessions were provided. Participants additional engagement with LY, such as following YouTube videos, continuing activities outside the sessions and taking part in further online LY sessions were not monitored.

3.9.2 Wait-list Control (WLC)

Wait-list controls (WLC) are often used in clinical research as a preferred control group. In addition to avoiding 'sham interventions' WLC groups allow all participants to access the intervention or treatment considering ethical implications (McCauly et al, 2012; Lawson-Moore & Ledbetter, 2020). A wait-list control (WLC) group provides an un-treated comparison of psychological and physiological measures. Data collected from the wait-list control group provides baseline measures used to analyse statistical differences with those receiving the intervention for all research outcomes. The wait-list control within this research allowed assessment of whether the LY intervention is more effective than no intervention at all. Participants allocated to the WLC group were not given any intervention over the research period. Once the research finalised, WLC participants were given an opportunity to take part in an online LY session with the instructor via Zoom – three participants from the WLC took part in the voluntary LY session.

3.10 Data Collection

Psychological measures of mood, wellbeing and sleep, physiological measures of saliva cortisol and qualitative data was obtained during this research. Within this sub-chapter, the method of which each measure was obtained will be discussed with justification from the literature.

3.10.1 Participant Demographics

To obtain participant demographics, a short interactive Microsoft Word document was developed. Information such as age, nationality, gender, department, and years working at Coventry University were required. These details were obtained once at baseline prior to the psychological questionnaires and sent as one document (see appendix fourteen).

3.10.2 Psychological Measures

To assess participants mood , the depression, anxiety, and stress scale (DASS-21) are utilised. DASS-21 consists of twenty-one closed questions which reflect the clinical diagnostic symptoms of depression, anxiety, and stress as listed in the Diagnostic-Statistical Manual (DSM-V, American Psychiatric Association. (2013). Within the questionnaires, different questions relate to different symptomatology and are scored independently. For instance, questions 3,5,10, 13, 16, 17 and 21 refer to symptoms of depression and will be provide a score for depressive symptomatology. In addition to independent scoring, each sub-scale also presents varying cut-off ranges for symptom severity (see table below).

Table 3 *- Depression, Anxiety and Stress cut-off scores for symptom severity*

Severity	**Depression**	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Although these scores reflect clinical symptomatology, the DASS-21 tool is not often used for diagnosis but to indicate the prevalence of symptoms and assess significance of impact on the individual's life. As the participant demographic for this research are not a clinical population, and the research does not include providing a diagnosis, the DASS-21 tool presents no issues for assessing and measuring potential symptoms.

Regarding validity and reliability of the DASS-21 scoring tool, Henry and Crawford (2005) assessed the construct validity and normative data of DASS-21 in a non-clinical trial of 1,794 adults within the UK. To assess validity, they applied confirmatory factor analysis (CFA) to competing models of the latent structure of the DASS-21. They revealed that the model, with optimal fit (RCFI = 0.94) had a quadripartite structure. In addition to the three facets (depression, anxiety, and stress) the DASS-21 also revealed an ability to detect a general factor of psychological distress.

Previous research has indicated that the DASS-21 tool can be utilised effectively for measuring the impact of LY on mental health . For instance, Bressington, Mui, Yu & Leung (2019) used the DASS-

21 at baseline (T0), post-intervention (T1) and at 3 months follow-up (T2) to assess mental health . Within this research, the DASS-21 subscales were measured and analysed to assess the impact of mental health of LY on mood . However, psychological distress was not calculated and assessed as an additional scale. It could be argued that psychological distress was not calculated as the research aim was to '…*investigate the feasibility and potential efficacy of LY for improving residual mood, anxiety and stress symptoms in adults diagnosed with depression"*. As suggested in previous research, psychological distress may provide more suitable as a tool for screening and assessing poor mental health in non-clinical populations (Henry and Crawford, 2005; Zanon et al, 2020).

In addition to assessing psychological distress and symptoms relating to depression, anxiety and stress, symptoms associated with insomnia will also be measured using the Insomnia Severity Index tool (Morin, Belleville, Belanger & Ivers, 2011. ISI). The Insomnia Severity Index (ISI) is a brief screening tool consisting of seven questions requiring respondents to rate the nature and symptoms of potential sleep problems using a 5-point Likert-type scale (Shahidi et al, 2012). Research assessing the ISI reveals excellent levels of internal consistency (Cronbach α of 0.90 and 0.91) (Morin, Belleville, Belanger & Ivers, 2011). Wong et al (2017) also states that the ISI can achieve high discriminant validity (AUC > 0.85) in detecting insomnia based on both DSM-5 and ICSD-3 criteria.

For the research at hand, both DASS-21 and ISI were developed as interactive Microsoft Word documents providing drop-down menu responses for each question – see image below.

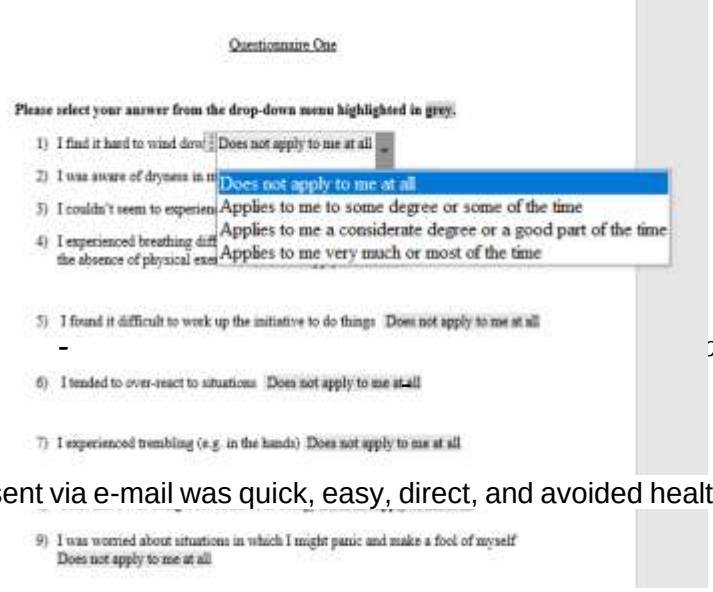


Fig **-** ***ocument used to***

Documentation sent via e-mail was quick, easy, direct, and avoided health and safety complications

associated with COVID-19. Once complete, participants returned the questionnaires which were entered into a pre-developed Microsoft Excel template. Each sub-scale score was calculated in addition an overall psychological distress score. The psychological questionnaires were sent to all participants via e-mail one-week before the intervention (T0), mid-intervention (T1 - after two weeks), post-intervention (T2 - fourth week) and at follow-up (T3 – one month following the last LY session). Participants were given a week to complete and return the questionnaires with mid-week e-mail prompts.

3.10.3 Physiological Measures

Although previous research exploring the physiological efficacy of LY for reducing blood pressure, due to COVID-19 restrictions, we were unable to obtain the blood pressure equipment. Additionally, the blood pressure equipment (provided by the University) was unavailable at the time of the research period. Coded salivette tubes (as supplied by Coventry University) were sent in an insulated padded jiffy envelope to participants chosen address alongside an information sheet (see appendix nine), saliva collection table and return envelope to obtain salvia samples. Envelopes were sent Royal Mail 1st Class tracked to ensure delivery of the tubes. Participants received their envelopes around three to four weeks prior to the first LY session to allow familiarisation of the tubes and process – this also provided time for the participants and ask questions. Salivette tubes were coded with the participants ID (i.e. P001), daily collection timepoints (AW= awakening, 30= 30-minutes after awakening etc) research timepoints (T0,T1,T2,T3), and for those in the LY intervention, before and after tubes for sessions one and four (S1 BEF, S1 AF, S4 BEF, S4 AFT) in permanent marker. Dependant on the intervention allocation, participants were required to gather 16 – 20 saliva samples over the research period. For those allocated to the LY interventions, saliva was collected immediately after waking up, 30-min after waking up, midday and before bed at timepoints T0, T1, T2 and T3. Sample were also collected immediately before and after sessions 1 and 4 (20 samples).

Those allocated to the WLC group also provided samples immediately after waking up, 30-min after

waking up, midday and before bed at timepoints T0, T1, T2 and T3 (16 samples) to provide comparative samples. Once all samples were collected, they were sent back to the researcher via the return envelopes (1st Class, 24 guaranteed next) and stored in a freezer until transportation to the lab for analysis. Salimetrics® (the organisation which provide the tubes and ELISA testing kits) state that once saliva is collected, it should be moved to a refrigerator / freezer as soon as possible – this is explicitly advised on the information sheet and on the cortisol, sheet sent with the salivette tubes. Shipping advice recommends that samples should be sent with a maximum 36-hour delivery slot.

Cortisol samples were collected at certain throughout the day to reflect circadian processes which influence cortisol production (as described in sub-chapter 3.2.3). As indicated by Du et al (2013) and Dedovic & Ngiam (2015) disruption to awakening cortisol responses (ACR) may indicate stress and anxiety. Armer (2020) and Bayes, Tavella and Parker (2021) suggest that sustained cortisol, with slow reduction of cortisol throughout the day, is associated with depression, anxiety and stress justifying mid-day measures. Researchers also indicate that disruption to bedtime cortisol may also be indicative of depression, anxiety, sleep, and insomnia (see sub-chapter 3.2.3). To develop an overall cortisol profile of the participants, and to assess changes at any cortisol indexes associated with poor mental health , measured were taken immediately after wakening (AW), thirty minutes after awakening (30), midday (MID) and before bed (BED). To establish normal diurnal cortisol concentrations prior to the intervention, all participants provided one day's measures of saliva samples (AW, 30, MID, BED) one week before the first LY session. Participants were advised to complete the psychological questionnaires the same day as providing saliva samples.

Baseline comparative samples, within and between groups, were obtained to assess the physiological effectiveness of the intervention and determine potential relationships with self-reported psychological symptoms. As discussed in sub-chapter 7.4, the NIHR state that feasibility studies should assess the acceptability and effectiveness of an intervention through a small-scale RCT. In addition to assessing the ability to conduct a further full-scale RCT, assessing psychological and physiological measures provide insight into the effectiveness and validity of LY.

Due to lack of research exploring the effectiveness of LY for symptoms of poor mental health, this further warrants the need for subjective and objectives measures of the intervention's effectiveness.

3.10.4 Focus Groups

Following completion of the research, participants within the LY group were invited to take part in an online focus group/s to discuss and share their experiences. Focus groups involve a group of individuals discussing a topic set by the researcher. The researcher keeps the group on topic with list of open-ended questions, however, allows the group to approach the topic from many different angles allow thorough exploration of the topic (Gregory et al, 2009; Kamberelis & Dimitriadis, 2013). Focus groups attempt to simulate a group of friends, or people, who have something in common and feel relaxed and talk openly about the topic (Kamberelis & Dimitriadis, 2013). Guest et al (2017) indicates that, in comparison to one-to-one interviews, personal and sensitive information and themes are more likely to be disclosed in a focus group setting. Breen (2007) also argues that focus groups are more appropriate for the generation and exploration of new ideas that are novel to participants.

Focus groups were ran with participants who received the LY intervention to share and compares experiences of the intervention. Semi-structured open-ended questions were used to encourage discussion of LY but steer the topic of conversation. As exploration of the feasibility, acceptance, experiences, and perceptions of the LY intervention was discussed, only participants who took part in the LY sessions were invited to interview. Focus groups were conducted over Zoom online videoing platform. Due to the online format of the focus group, a limit of four participants were allocate per interview to reduce overlap and ensure clarity during transcriptions. All LY participants were invited to online focus groups sessions through e-mail - the focus groups were not a mandatory part of the research. As interviews were recorded and transcribed verbatim, participants who were interested in taking part were requested to complete a separate consent form (see appendix thirteen). A semi-structured interview format was used (see appendix fourteen) to explore participants experiences of the research including motivation to join, how they found the sessions, whether they found the sessions useful and if they would continue to engage in LY sessions after

the research. On average, the interviews ran for 32.4 minutes. Interviews were recorded via a personal voice recorder and transcribed by the primary researcher.

3.11 Data Analysis - Psychological Measures

Recruitment and retention were contextualised with descriptive statistics and presented as a Consolidated Standards of Reporting Trial (CONSORT) flow-diagram (see 8.1). The CONSORT statement is a set of recommendations for reporting randomised-trials including a 25-item checklist (Schulz et al, 2010) and a flow diagram. The CONSORT flow diagram presents all stages of the randomised control trial including enrolment, intervention allocation, follow-up, and data analysis. Participant demographics and characteristics were presented as descriptive statistics.

Due to a small sample size Shapiro-Wilk tests were run to assess for normal distribution of the data at baseline (T0) between the two groups (Mishra, 2019). Non-parametric data was assessed for potential outliers by calculating a threshold of two standard deviations from the mean. Outliers which fall outside this threshold were removed. If data still did not meet parametric assumptions, a Mann-Whitney U test was run on the data. Independent t-tests were run-on baseline scores (T0) to assess for any significant differences between the groups. General Linear model (GLM) analysis was used to assess the impact of the intervention on reported symptoms of depression, anxiety, and insomnia. If the Mauchly Test of Sphericity was violated, results from the Greenhouse-Geisser correction were referred to. Least significant pairwise comparisons were also run to assess any statistically significant difference of reported symptoms of depression, anxiety, stress, and insomnia at timepoints T0, T1, T2 and T3 between the two groups. Pre-post intervention pairwise effect size calculations were deemed most relevant to the research question. All statistical tests were two-sided, and the significance level was set at 5%.

3.12 Data Analysis – Physiological Measures

Shapiro-Wilk tests were run to assess for normal distribution of the data at baseline (T0) between LY and WLC at daily intervals AW, 30, MID and BED. General linear model analysis of daily cortisol

measures (AW, 30, MID) was conducted between the two groups across the four-research time-points (T0, T1, T2, T3). If the Mauchly Test of Sphericity was violated, results from the Greenhouse-Geisser correction were referred to. Further repeated measures analysis was run on any statistically significant time-points. Non-parametric data was assessed for potential outliers by calculating a threshold of two standard deviations from the mean. Outliers which fall outside this threshold were removed. If data still did not meet parametric assumptions, a Friedman test for non-parametric data was run.

To assess for relationships between psychological symptoms and cortisol measures, Pearson's correlation analysis was run between depression, anxiety, stress and insomnia scores and daily cortisol measures (AW, 30, MID and BED) at research time points T0, T1, T2 and T3 for the LY group. Finally, independent t-test were run on cortisol measures obtained immediately before and after LY session one and LY session four to assess the acute impact of the intervention. All statistical tests were two-sided, and the significance level was set at 5%.

3.13 Effect Size

To assess the magnitude of difference between the LY intervention and WLC control, effect size was calculated using Hedges *g* for post-intervention (T2) and follow-up (T3) outcome measures. Hedges *g* was used due to small overall sample size and unequal group distribution (Hedges, 1981; Ellis, 2010). Effect size was interpreted using Cohen's (1977) 'small' (0.2), 'medium' (0.5) and 'large' effect size (0.8). Psychological measures included depression, anxiety, stress and insomnia. Physiological measures including diurnal cortisol measures taken at awakening (AW), after 30-minutes (30), midday (MID) and before bed (BED).

3.14 Data Analysis – Focus Groups

Thematic analysis was used to analyse the qualitative focus group interview data (Braun and Clarke, 2006). Thematic analysis is used to identify themes and patterns within qualitative data which contribute towards the research question/s (Braun and Clarke, 2006). In the research at hand, focus groups were used to explore the acceptability and feasibility of the LY intervention.

Braun and Clarke (2006) argue that although thematic analysis does not answer research questions directly, they are able to capture something important in relation to the overall research question. An inductive semantic approach was taken to thematic analysis (no pre-existing coding frames were developed) allowing the data to create its own themes (Patton, 1990, Braun and Clarke, 2006). Themes within the data were theorised with their significance to the research question - is online LY an effective and feasible intervention. No further analysis beyond what the participants said was required or conducted.

The focus groups were recorded and transcribed verbatim by the principal researcher. As proposed by Braun and Clarke (2006), the principal researcher familiarised themselves with the data through repeated reading in an active manner. Initial codes were then generated to identify 'interesting themes' within the transcripts (Braun and Clarke, 2006). These codes where then analysed to assess their contribution and validity to the research question/s. Codes were then grouped together to develop candidate themes and sub-themes. On review, sub-themes collapsed into candidate themes, with supporting raw data, and named (Braun and Clarke, 2006). These themes were triangulated among the researchers to assess discrepancies.

One triangulation technique to validate themes in qualitative studies is 'member checking' (Jonsen and Jehn, 2009). 'Member checking', or informant feedback, involves circulation of findings among informants (researchers) to ensure the credibility and consistency of the interpretation. Initial findings from the thematic analysis, presented as candidate themes with supporting raw data, was circulated among the researchers within the supervisory team via e-mail. No external members were involved in triangulation of the data due to lack of knowledge of the research and time restrictions (Blumer, 1969). Discrepancies within the data were resolved by referring to the raw data when necessary and reaching an agreement with the supervisory team. No discrepancies were found during triangulation of data and no power dynamic between the researchers influenced research decisions.

4 Presentation of Findings

Within this chapter, findings from the research will be presented. Firstly, recruitment will be discussed followed by participant characteristics and retention rates. Following this, psychological findings including depression, anxiety, stress, psychological distress, and insomnia will illustrated and discussed. Physiological findings will then be illustrated with reflection of the psychological findings followed by findings from the focus groups. The chapter will then conclude by discussing the implications of the findings and potential

relationships between the quantitative and qualitative data. All tools used within the research are listed within the appendices and will be referred to accordingly.

4.1 Recruitment / Retention

Overall, 64 individuals showed initial interest in the research. From this, 24 individuals were excluded due to not meeting the inclusion criteria or declining to participate. A further 7 participants were excluded after baseline measures due to high-work load or lack of contact / inability to reach the participant. In total, 17 participants were allocated (computer generated 1:1) to the LY intervention and 16 to WLC. Due to missing outcome measures, 26 participants data were included in the analysis (LY n=14, WLC n=12). See CONSORT flow diagram below for enrolment, allocation, follow-up, and analysis.

CONSORT Flow Diagram

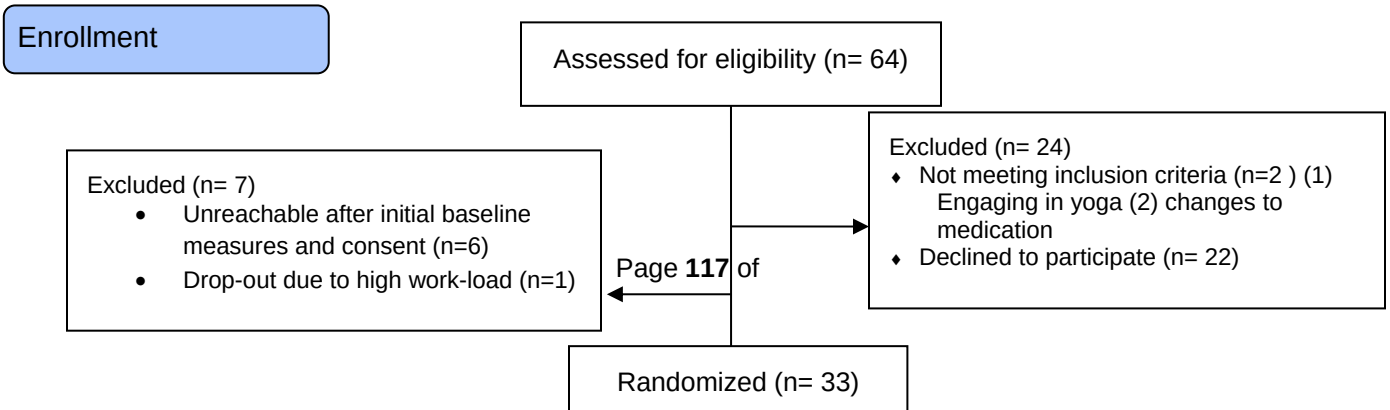


Diagram One - CONSORT flow diagram of recruitment, allocation, follow-up, and analysis courtesy of http://www.consort-statement.org/consort-statement/ flow-diagram

Attendance of the four LY yoga sessions were as follows:

Session One	**Session Two**	**Sessions Three**	**Session Four**
n=16	n=15	n=14	n=14

One participant withdrew prior to the first session due to work commitments. Another participant was unreachable following the first session. For sessions three and four, one participant attended A&E (unrelated incident) and another had work-related commitments. Overall retention rate of intervention attendance was calculated at 87.5%.

4.2 Participant Characteristics

Among the participants, the accumulative mean age was 49.3 years of age with an average of 7.9 years working at Coventry University. A two-tailed independent t-test revealed no statistical differences of age (*p* = .41) and years and Coventry University (p= .21) between the LY and WLC control group. Majority of participants were female (69.3%) and of British ethnicity (88.46%) with some participants stating duel ethnicity (11.5%) and one participant of Italian descent (.04%).

Table 4 - *Table showing participant demographics*

Age	Nationality	Gender	Department	Years at Coventry
54	British	Male	Office of Teaching and Learning	16
58	British	Female	CAW	10
39	British	Female	Library	4
64	British	Male	CUS	4
60	British	Female	Physiotherapy	19
69	British	Female	Health and Life Sciences	13
35	British/Welsh	Male	Health and Life Sciences	3
58	British	Female	School of Health	3
50	British	Female	Health and Life Sciences	3
34	British	Female	Professional Service	10
27	British	Female	EEC	9
54	British	Female	Health and Life Sciences	35
61	British	Male	EEC	8
50	British	Female	School of Health	2
65	British	Female	Health and Life Sciences	13
50	British / Italian	Female	Coventry University Online	3
47	British / Dutch	Female	Coventry University Online	3
54	British	Male	Library	2.5
72	British	Male	SSL	18
58	British	Female	Dietetics	0.5
27	British	Male	MEA	1
48	British	Female	Faculty of Engineering Environment and Computing	20
33	British	Female	MEA	1
43	Italian	Female	Enterprise and Innovation	1
47	British	Female	School of Health	9
28	British	Male	IT	0.5

4.3 Psychological Findings

4.3.1 Depressive Symptomatology

A Shapiro-Wilk normality test showed no significant departure from normality of data at baseline (T0) for depressive symptomatology within the wait-list control (WLC) (W(12) = .918, *p* = .271) and laughter yoga (LY) group (W(14) = .910, *p* = .162) (see appendices fourteen for respective box plot). An independent samples t-test revealed no significant difference of baseline depression scores between participants in the LY group (M = 4.14, SD = 3.16) and WLC group (M = 4.50, SD = 2.9; t(26) = .297, *p* = .769).

General linear model analysis of the depression scores at T0, T1, T2, and T3 between the two groups was conducted. No statistical difference was found for the time*intervention interaction (F(1.53, .47); *p* = .576) and a marginally significant difference for time (F(1.53, 3.22); *p* = .064). Between-subject findings revealed no statistical significance of depression scores between the two groups (F(1.00, 1.47); *p* = .237).

A least significant difference (LSD) pairwise comparison was run on the data to assess for any differences in depressive symptoms between timepoints T0 and T1, T2 (LY M = 1.92, SD = 2.76; WLC M = 2.41, SD = 2.31), and T3. Findings revealed a statistically significant difference between time-points T0 and T2 (MD = 2.15; 95% CI (.335, 3.96), *p* = .022). No other significant differences were found.

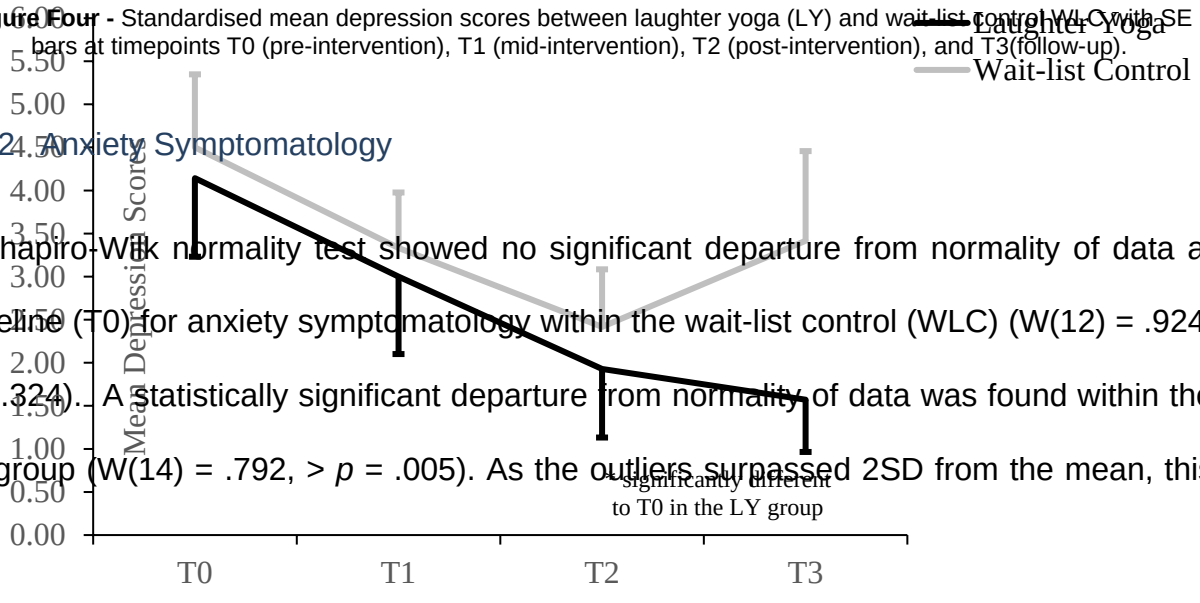


Figure Four - Standardised mean depression scores between laughter yoga (LY) and wait-list control WLC with SE bars at timepoints T0 (pre-intervention), T1 (mid-intervention), T2 (post-intervention), and T3(follow-up).

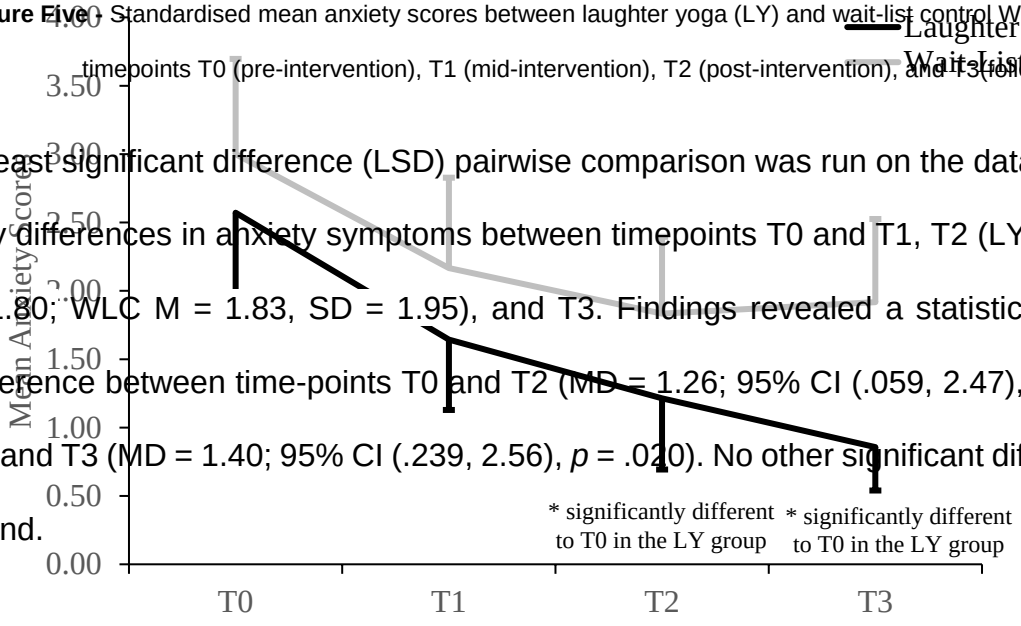
4.3.2 Anxiety Symptomatology

A Shapiro-Wilk normality test showed no significant departure from normality of data at baseline (T0) for anxiety symptomatology within the wait-list control (WLC) (W(12) = .924, *p* = .324). A statistically significant departure from normality of data was found within the LY group (W(14) = .792, > *p* = .005). As the outliers surpassed 2SD from the mean, this

was removed from the data (M = 2.57; SD = 2.31). Once removed, a Shapiro Wilk was repeated and found no statistical significance suggesting normality of distribution (W(12) = .911, *p* = .219) (see appendix fifteen for respective box plot). An independent samples t-test revealed no significant difference of baseline anxiety scores between participants in the LY group (M = 2.57, SD = 2.31) and WLC group (M = 3.00, SD = 2.41; t(26) = .462, *p* = .555).

General linear model analysis of the anxiety scores at T0, T1, T2, and T3 between the two groups was conducted. No statistical difference for the time*intervention interaction (F(1.66, .145); *p* = .827) and a marginal significant difference for time (F(1.66, 2.95); *p* = .073). Between-subject findings revealed no statistical significance of anxiety scores between the two groups (F(1.00, 2.05); *p* = .165).

Figure Five: Standardised mean anxiety scores between laughter yoga (LY) and wait-list control WLC with SE bars at timepoints T0 (pre-intervention), T1 (mid-intervention), T2 (post-intervention), and T3 (follow-up).



A least significant difference (LSD) pairwise comparison was run on the data to assess for any differences in anxiety symptoms between timepoints T0 and T1, T2 (LY M = 1.21, SD = 1.80; WLC M = 1.83, SD = 1.95), and T3. Findings revealed a statistically significant difference between time-points T0 and T2 (MD = 1.26; 95% CI (.059, 2.47), *p* = .041) and T0 and T3 (MD = 1.40; 95% CI (.239, 2.56), *p* = .020). No other significant differences were found.

4.3.3 Stress Symptomatology

A Shapiro-Wilk normality test showed no significant departure from normality of data at baseline (T0) for stress symptomatology within the wait-list control (WLC) (W(12) = .956, *p* = .729) and laughter yoga (LY) group (W(14) = .904, *p* = .129) (see appendices sixteen for respective box plots). An independent samples t-test revealed no significant difference of baseline stress scores between participants in the LY group (M = 6.07, SD = 2.95) and

WLC group (M = 6.25, SD = 3.87; t(26) = *.134, p = .619).*

General linear model analysis of the anxiety scores at T0, T1, T2, and T3 between the two groups was conducted. No statistical difference for the time*intervention interaction (F(1.79, .872); *p* = .415) and no statistically significant difference for time (F(1.79, 1.54); p = .227). Between-subject findings revealed no statistical significance of stress scores between the two groups (F(1.00, 2.51); *p* = .126).

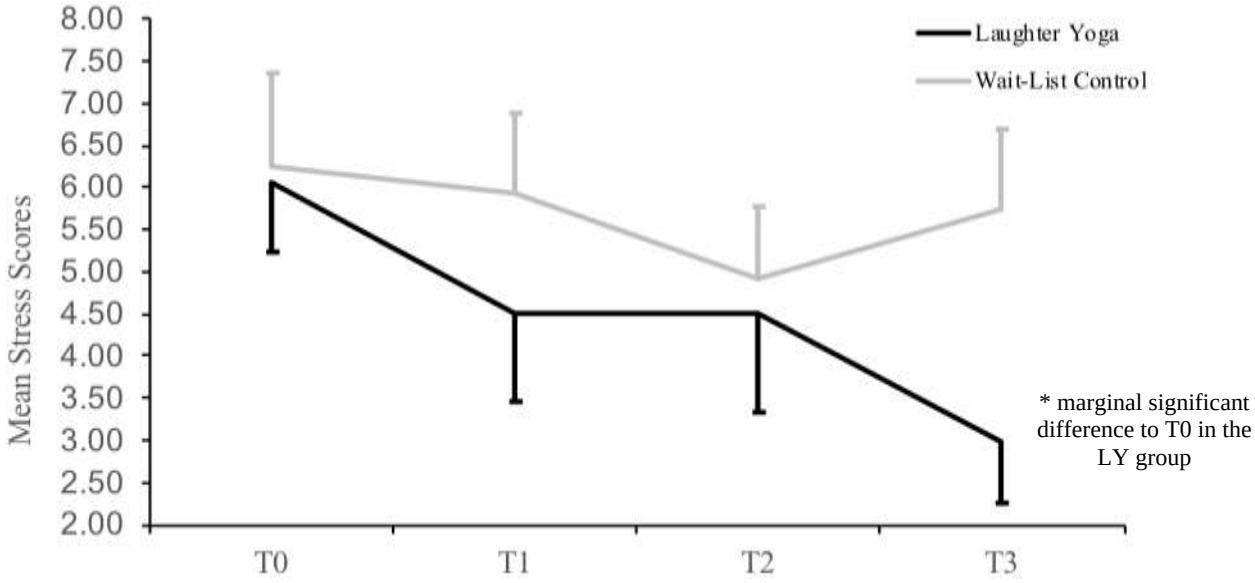


Figure Six - Standardised mean stress scores between laughter yoga (LY) and wait-list control WLC with SE bars at timepoints T0 (pre-intervention), T1 (mid-intervention), T2 (post-intervention), and T3(follow-up).

A least significant difference (LSD) pairwise comparison was run on the data to assess for any differences in stress symptoms between timepoints T0 and T1, T2 (LY M = 4.50, SD = 4.09; WLC M = 5.92, SD = 2.97), and T3. Findings revealed a marginally significant difference between time-points T0 and T3 (MD = 1.79; 95% CI (-.136, 3.71), *p* = .067). No other significant difference was found.

4.3.4 Insomnia Symptomatology

A Shapiro-Wilk normality test showed no significant departure from normality of data at baseline (T0) for insomnia symptomatology within the wait-list control (WLC) (W(12) = .960,

p = .780) and laughter yoga (LY) group (W(14) = .928, *p* = .286) (see appendix seventeen for respective box plots). An independent samples t-test revealed no significant difference of baseline insomnia scores between participants in the LY group (M = 10.57, SD = 1.84) and WLC group (M = 8.58, SD = 1.43; t(26) = -.833, *p* = .325).

General linear model analysis of the insomnia scores at T0, T1, T2, and T3 between the two groups was conducted. No statistical difference for the time*intervention interaction (F(1.66, 1.78); *p* = .168) or time (F(1.66, 1.78); *p* = .186). Between-subject findings revealed no statistical significance of insomnia scores between the two groups (F(1.00, .005); *p* = .943).

A least significant difference (LSD) pairwise comparison was run on the data to assess for any differences in insomnia symptoms between timepoints T0 and T1, T2 (LY M = 7.86, SD = 4.12; WLC M = 4.42, SD = 4.93), and T3. Findings revealed a marginally significant difference between time-points T0 and T2 (MD = 3.80; 95% CI (-.182, 7.79), *p* = .061). No other significant difference was found.

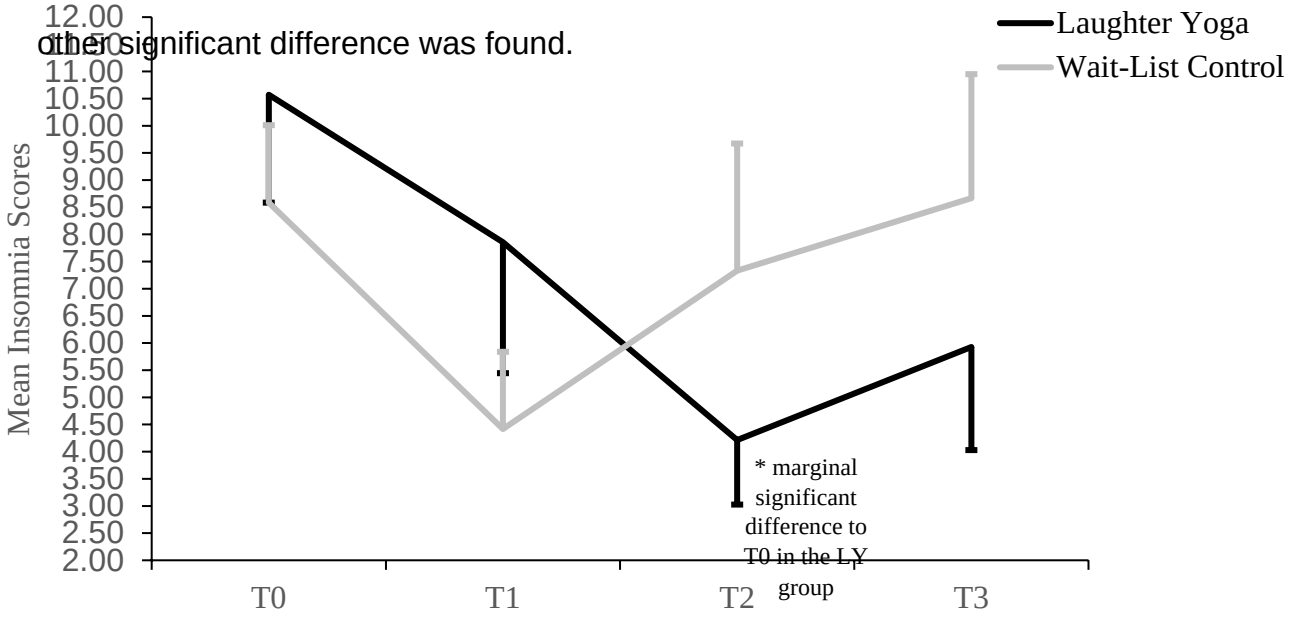


Figure Seven - Standardised mean insomnia scores between laughter yoga (LY) and wait-list control WLC with SE bars at timepoints T0 (pre-intervention), T1 (mid-intervention), T2 (post-intervention), and T3(follow-up).

Effect Sizes

Hedge's *g* effect size was calculated for depression, anxiety, stress, and insomnia scores at post-intervention and follow-up. See table seven below.

***Table 7**- Effect sizes (Hedge g) of depression, anxiety, stress, and insomnia between Wait-list control (WLC) and Laughter Yoga (LY) at post-intervention (T2) and follow-up (T3). *indicating medium effect size, ** indicating large effect size*

Outcome Measure	Post-Intervention (T2)	Follow-Up (T3)
Depression (DASS-21 Subscale)	-0.209	0.066
Anxiety (DASS-21 Subscale)	0.320	0.625*
Stress (DASS-21 Subscale)	0.111	0.917**
Insomnia (Insomnia Severity Index)	0.482	0.367

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Findings indicate a medium effect size for anxiety symptoms at follow-up and a large effect size for symptoms of stress at follow-up.

4.4 Physiological Findings

A Shapiro-Wilk normality test showed no significant departure from normality of data at baseline (T0) for cortisol within the wait-list control (WLC) at daily time point AW (WLC :W(9) = .857, *p* = .07). However, the LY group was significant W(12) = .0.82, *p* = .001). Visual observation of the Q-Q plot identified one outlier (see appendix eighteen and nineteen for Q-Q plots). Once removed, a Shapiro Wilk was repeated and found no statistical significance suggesting normality of distribution (W(11) = .944, *p* = .601). Further Shapiro Wilk tests for normality revealed no significant departure from normality of data for daily time-points 30 (WLC: W(9) = .892, *p* = .180. LY: W(12) = .899, *p* = .155) and MID (WLC: W(10) = .88, *p* = .147) (see appendix twenty, twenty-one, two and three Q-Q plots). A statistical significance was found within the LY group at daily-time point MID W(12) =

.796, *p* = < .001). Visual observation of the Q-Q plot identified one outlier. Once removed, a Shapiro Wilk was repeated and found no statistical significance suggesting normality of distribution (W(11) = .899, *p* = .185). Final Shapiro-Wilk tests at daily time-point BED revealed a statistical significance within the WLC group (W(10) = .623, *p* = < .001). Visual observation of the Q-Q plot identified one outlier (see appendix twenty-four). Once removed, a Shapiro Wilk was repeated and found no statistical significance suggesting normality of distribution (W(9) = .930, *p* = .521). A Shapiro-Wilk normality test for baselined BED cortisol within the LY group also revealed statistical significance (W(12) = .800, *p* = .009). Visual observation of the Q-Q plot identified one outlier (see appendix twenty-five). Once removed, a Shapiro Wilk was repeated and found no statistical significance suggesting normality of distribution (W(11) = .857 *p* = .058).

4.4.1 General Linear Analysis – Cortisol Comparison

General linear model analysis of daily cortisol measures (AW, 30, MID, BED) were conducted between the two groups across the four-research time-points (T0, T1, T2, T3). Mauchly's Test of Sphericity had been violated for time-points 30 ($\chi^2(5) = 17.3$, ***p*** < .005) and MID ($\chi^2(5) = 18.81$, ***p*** < .005). The Greenhouse-Geisser correction was used where appropriate. Overall, no statistical significance was found within-subjects for the time*intervention interaction or for time (***p*** = > .05).

Between-subjects analysis revealed a statistically significant difference between groups at time-point AW (F(1, 5.55); ***p*** = .029). A repeated-measures analysis was conducted for AW measures at time-points T0, T1, T2 and T3. No statistical significance was found within the LY group (F(1, 1.70; p = .22) – further analysis also revealed no significance within the WLC group (***p*** = <.05).

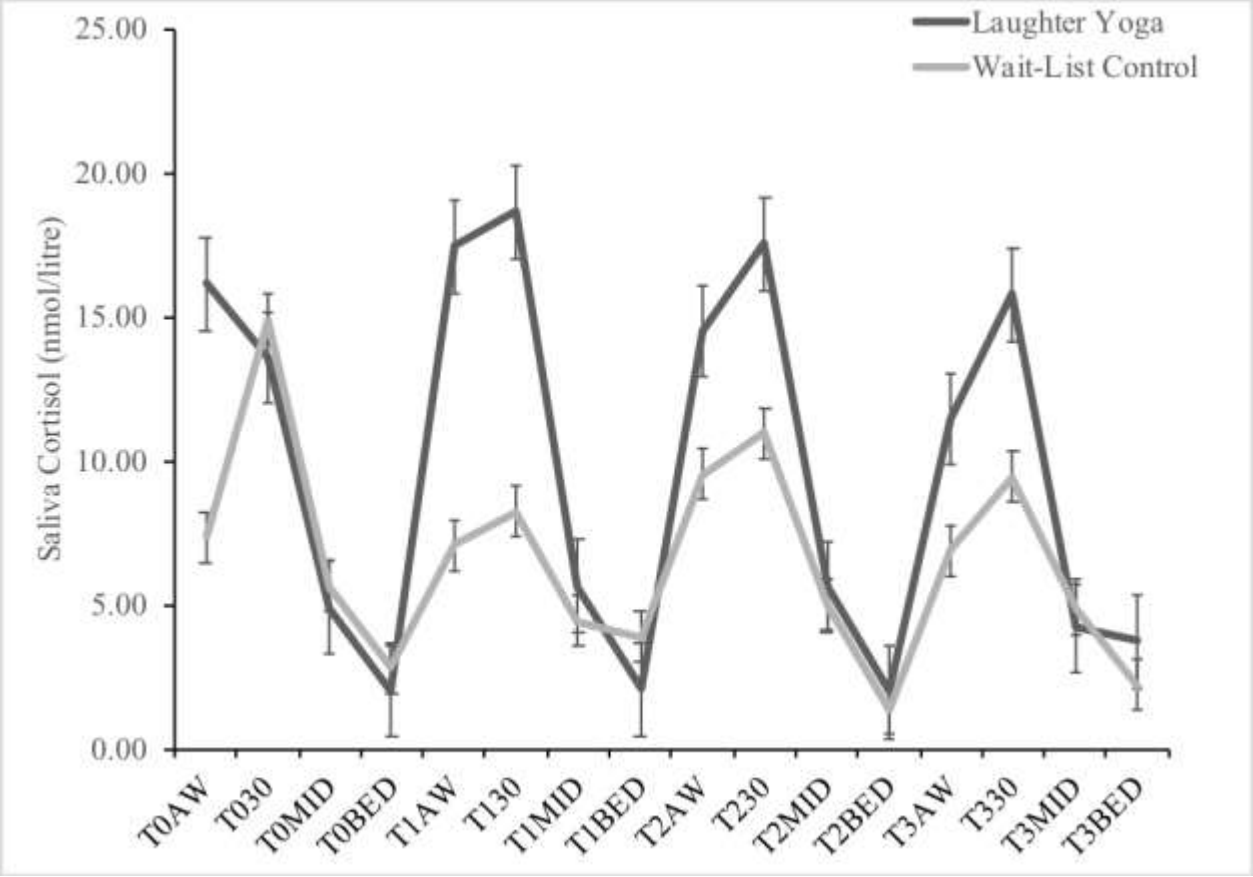

Figure Eight – Standardised mean saliva cortisol measures across all timepoints between the control group and laughter yoga group with standard error bars. Timepoints T0 (pre-intervention), T1 (mid-intervention), T2 (post-intervention), and T3(follow-up). Awakening (AW), 30-minutes after awakening (30), midday (MID) and before bed (BED).

4.4.2 Correlation Analysis

Pearson Correlational tests were conducted between salivary cortisol and self-report psychological measures (depression, anxiety, stress and insomnia) between the two groups at time-points T0, T1, T2 and T3. No statistically significant relationships were found between cortisol and psychological measures within the WLC group (p = > .05).

4.4.3 Cortisol and Depression

Pearson's Correlational analysis was conducted between depression and salivary cortisol (AW, 30, MID, BED) at timepoints T0, T1, T2 and T3. A statistically significant relationship was found between depression and salivary cortisol BED at timepoint T3 (r (11) = .70, p = .017).

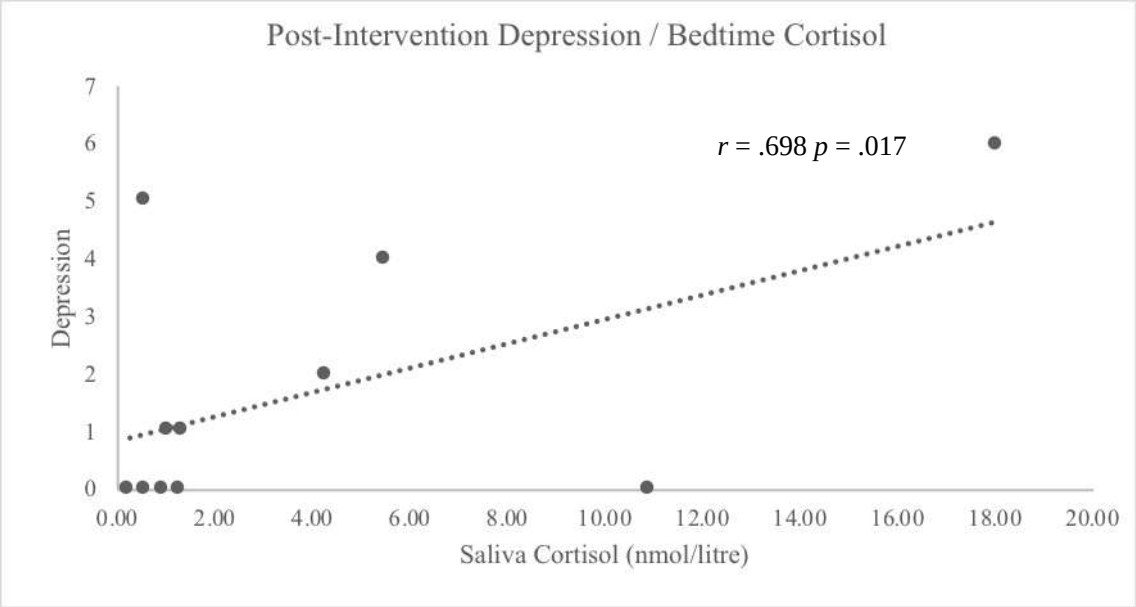

Figure Nine- A chart showing a significant positive correlation between depression and bedtime (BED) salivary cortisol (nmol/litre) for LY participants at post-intervention (T3).

No other statistically significant relationship was found between depression and daily cortisol (AW, 30, MID, BED) at research time points T0, T1, or T2 (p = < .05).

4.4.4 Cortisol and Anxiety

Pearson's Correlational analysis was conducted between anxiety and salivary cortisol (AW, 30, MID, BED) at timepoints T0, T1, T2 and T3. Statistically significant relationships were found between anxiety and salivary cortisol MID at timepoint T0 (r (11) = .833, p = .001), and BED at timepoint T3 (r (11) = .866, p = .001). No other statistically significant relationship was found between depression and daily cortisol (AW, 30, MID, BED) at research time points T0, T1, or T2 (p = < .05).

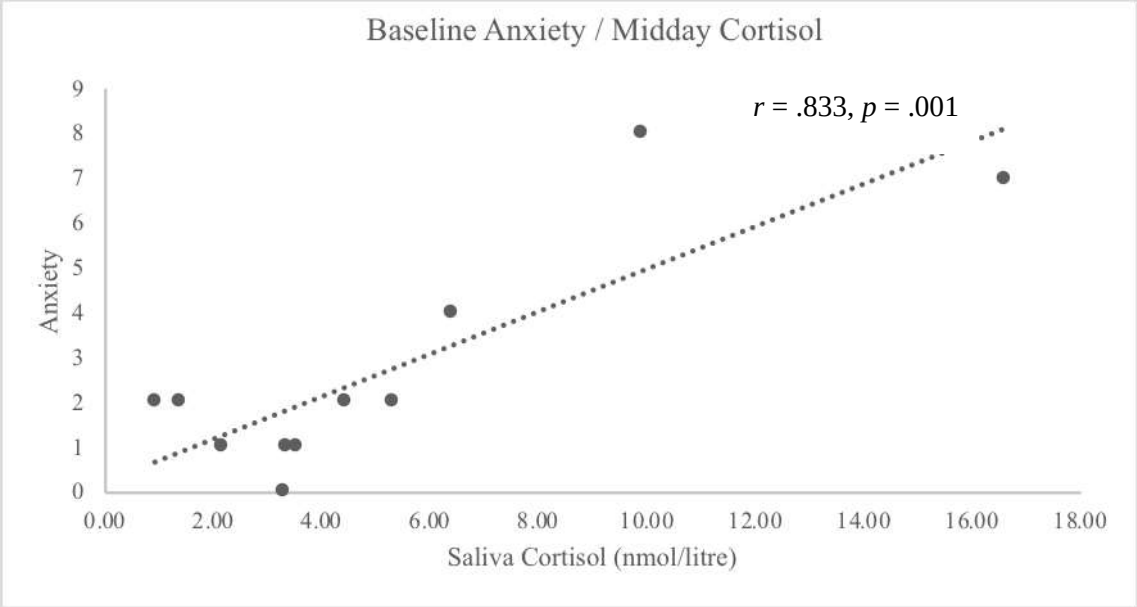

Figure Ten - A chart showing a significant positive correlation between anxiety and midday (MID) salivary cortisol (nmol/litre) fr LY participants at baseline (T0).

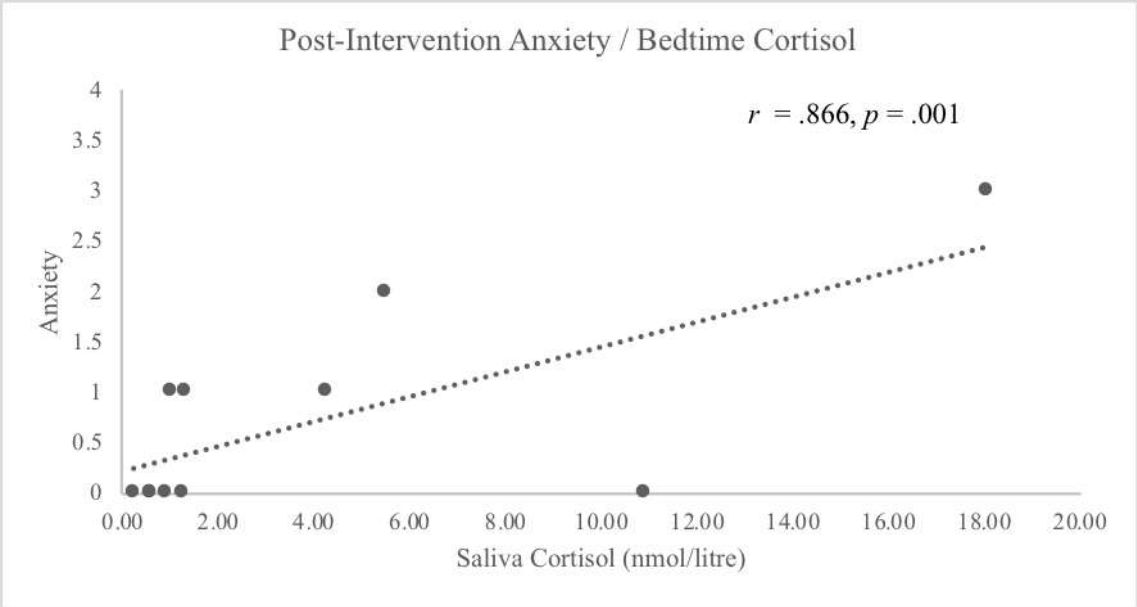

Figure Eleven- A chart showing a significant positive correlation between anxiety and bedtime (BED) salivary cortisol (nmol/litre) for LY participants at post-intervention (T3).

4.4.5 Cortisol and Stress

Pearson's Correlational analysis was conducted between stress and salivary cortisol (AW, 30, MID, BED) at timepoints T0, T1, T2 and T3. A statistically significant relationship was found between stress and salivary cortisol MID at timepoint T1 (r (11) = .790, p = .004),

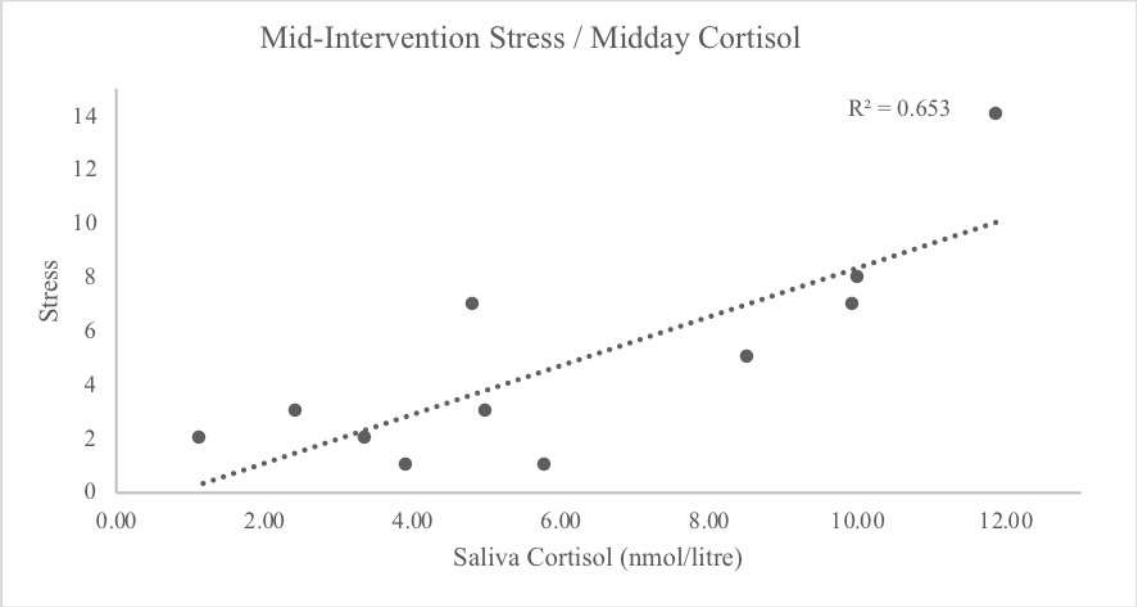

Figure Twelve- A chart showing a significant positive correlation between stress and midday (MID) salivary cortisol (nmol/litre) for LY participants at mid-intervention (T1).

No other statistically significant relationship was found between stress and daily cortisol (AW, 30, MID, BED) at research time points T0, T1, or T2 (p = < .05).

4.4.6 Cortisol and Insomnia

Pearson's Correlational analysis was conducted between insomnia and salivary cortisol (AW, 30, MID, BED) at timepoints T0, T1, T2 and T3. No statistically significant relationships were found (p = >.05).

4.4.7 Acute Cortisol - LY

Independent t-tests were conducted on mean saliva cortisol obtained immediately before and after session one (S1BEF, S1 AFT) and session four (S4BEF, S1 AF). No statistical significance was found immediately before (M= 5.11, SD = 3.89) and after session one (M = 3.59, SD = 3.05; t(11) = 1.065, ***p*** = .149) or immediately before (M = 5.13, SD = 4.60) and after (M = 4.67, SD = 2.98; t(11) = .325, ***p*** = .374) session four.

4.4.8 Effect Sizes

Hedge's g *effect size was calculated for diurnal cortisol measures (AW, 30, MID, BED) between the wait-list control (WLC) and laughter yoga (LY) at post-intervention and follow-up. See table 8 below*.

Table 8 *- Effect sizes (Hedges g) of diurnal cortisol measures (awakening, 30-min after awakening, midday and bed) between wait-list control (WLC) and Laughter Yoga (LY) at post-intervention (T2) and follow-up (T3). *indicating medium effect size, ** indicating large effect size.*

Cortisol Timepoint	Post-Intervention (T2)	Follow-Up (T3)
AW	-0.569*	-0.845**
30	-0.346	-0.875**
MID	0.139	0.143
BED	-0.261	-0.340

4.5 Focus Groups – Thematic Analysis

Within the data, six key themes emerged from the data; Motivation, Understanding Laughter Yoga, Laughter as a Coping Mechanism, Forced Laughter, Online vs Face to Face and Engagement outside the session. These themes are explored below in chronological order of the research rather than in descending in frequency or in the order they emerged from the data. Following exploration of the themes, the implications of these themes to the research are then discussed and concluded with consideration to further research.

4.5.1 Theme One – Motivation

When questioned about motivation to join the research, participants describe experimentation / intrigue as well as an opportunity to connect and regain connectedness with others during the lockdown. One participant stated, '*I was really intrigued to see how this was going to take us… - P035'* and another claimed '*I do like laughing. So, the thought of what could be… what could be more interesting than seeing the impacts of something like this?* – P001'.

Some participants appear to view the research as an opportunity to expand from other interventions and therapeutic exercises such as mindfulness, breathing techniques, yoga and meditation. *"I have been interested… for a long time about sort of the self -care method to sort of to lighten up and to do the mindfulness and taking conscious about your breathing and stuff like that. And so, yeah, I*

just thought there was an extra bit to learn about. – P035*".* One participant describes 'experimenting' with other therapeutic sessions due the stressful environment created by the COVID-19 pandemic and lockdown – "*I've been experimenting with sort of like yoga, meditation, just ways of distressing, you know, in this rather stressful environment that we've been in for the last 12 months* – P006".

Developing and maintaining connections with others during the lockdown period also appeared as an incentive to take part in the research. When asked why participants decided to sign-up for the study one participant stated that "*I've been doing everything I can to just keep connecting with people, keep... Keeping up upbeat.* – P020" they further add that they want to "keep connected, keep positive, during lockdown -P020". Another participant claimed they took part in the research to regain the connectedness they lost during lockdown due to working from home "…*one of the things that really motivated me was to sort of have that connection and mixing with other people, that sort of thing, having gone from a job where you see hundreds of people every day to… to being by myself.* -P014".

4.5.2 Theme Two - Understanding Laughter Yoga

Laughter Yoga (LY) is a concept which may have been new to many of the participants (LY is relatively new to the UK). Despite vast information and videos given to the participants prior to the research, varying concentration of understanding surrounding concepts and underpinnings during the LY sessions emerged from the data. One participant stated "…*to be honest, I didn't really get my head around it. If I'm if I'm honest, it was OK* – P015". They continue to mention that "…*I wasn't really laughing at something you know what I mean? So - it didn't really… it didn't really quite connect for me* - P015*"* Despite the participant claiming that they didn't understand the sessions and that it didn't quite 'connect' for them, they also describe that although they "…*didn't particularly really always understand the sessions. The concept of laughing is there. I followed that really* – P015". Similarly, another participant states that *"…it wasn't really what I was expecting because I expected the laughing yoga to be. You know, let's say 95 percent about laughing in different ways, and actually it's not* – P001". Although they didn't fully understand the LY sessions, they claim to

understand the breathing and relaxation element due to familiarity from other experiences – "*I like that sort of thing. I think that all of those things are useful you know, I've been involved with a bit that in the past as well…* - P001".

One participant stated that "…*I do understand all the sort of the science, the psychology behind laughing and my breathing and stuff like that and so that I was actually understanding all that and what I find myself, especially in the first session, maybe the second thinking is this is absolutely ridiculous* – P031'. They claim that although they understand the psychological underpinnings and benefits of LY, they describe the content of the sessions to be '*absolutely ridiculous'* which questions the participants overall experience of the session. Another participant shows some understanding of the childlike playfulness element of LY by describing that "…*some of the exercise we're doing about like fishing, for example, the stuff in that they… all things that the children do. And they find it very, very hilarious. And I was sort of trying to think, OK, so these are things I haven't done in 30, 40 years* – P035".

4.5.3 Theme Three - Laughter as a Coping Mechanism

Within the data, some participants describe how laughter yoga has enabled them to access laughter 'easier' to cope with stressful situations. "*I do think this like something about it making the laughter more accessible outside of that…. So, I feel like I'm getting to the point of finding the funny side or laughing more easily because it's almost like it's cleared the pathway. Laughter is more of a natural response now* – P020". They also continue to state that "*I think so that's a useful skill because sometimes you have to laugh, or you would cry. So that's what I took from that*- P020".
They also describe their experience of using laughter during a stressful situation which helped them to cope:

"…*the other week my plastering started coming off, it had to be plastered. I painted it. It was all looking good. And then I heard these atrocious noises and it was basically the ceiling splitting…and it's going to come down. And it was stressful on my own, like single home-owner I haven't got a lot*

of money And I thought, oh my God, I've got a builder around. And he was like, yes, it's all got to come off like it or it's going to come off or you've got to get it off the whole room. And my heart did think quite quickly, did manage to laugh because I remember Maggie's thing about getting a phone bill and being like, I can't believe it all these numbers. It did help us. Something funny did happen because he also fell through the loft hatch on his way, having to look if there was anything causing it from the loft. So, we both ended up laughing. But I think I wouldn't have probably got to that point as quickly. I probably would have got to the oh, my God, it's going to cost me so much money. How am I going to sort it out? I got to the laughter sooner – P020".

Another participant also agrees "…*like you say, it's a bit freer, it's a bit easier to…to laugh and there's not been a lot to laugh about recently* – P015".

4.5.4 Theme Four – Forced Laughter

For some participants, the element of forced laughter within the sessions to trigger natural laughter was described as difficult and embarrassing.

"I'm struggling to laugh along with her the exercises that we're looking to do. They don't make me laugh, and so you're always forcing yourself, and I completely understand, (LY instructor) explained very well that forcing yourself to laugh doesn't seem to make any difference in regards of if you're laughing, then your body reacts in a certain way whether its forced or real, you know, so…so I understand the concept behind those things, but I found it really quite embarrassing to do that by forcing myself to laugh – P001."Another participant states that forcing laughter is a confusing consciousness process – '…*you're conscious of the fact that you're forcing this laughter really and you're doing it, but you're not quite sure whether it's real or not* – P020".

Regardless of understanding the mechanisms behind forced laughter, they describe feeling embarrassed to force themselves to laugh and found it difficult to laugh because "…*I don't particularly find (LY instructor) very funny* – P001". They also continue to state that it "…*is strange for me, because I normally I'm absolutely fine with stuff like that* – P001".

Some participants claim that they found the forced laughter difficult due to being 'with' people that they don't know. "*I think it's difficult when you're with people you don't know if you… you know… people have inhibitions don't they…unless you're one of these types of people who doesn't care what anybody else thinks about them* – P006". They also claim that people without inhibition may find it easier to laugh within the sessions as they might not care what anybody else thinks about them. On the contrary, one participant states that they found it difficult and embarrassing to force laughter because they knew people in the session – "…*but I know those people… actually worked with them quite a lot. So, I found it quite embarrassing to force myself to try and laugh in that way in front of people* – P001".

4.5.5 Theme Five – Online vs Face to Face

The context of the LY sessions emerged as a key topic of discussion within the focus groups with some participants describing the benefits of online LY sessions but also showing consideration how the sessions would differ and present different benefits face-to-face.

"*I would definitely be willing to do it, especially if it's online, because it's a very subtle short sessions to do, you know, once a week or every day or something. Because sometimes if you actually do face to face, I mean, we are talking about before what do you say that before, but something that if it is something face to face, you have to have the time to go. And it's a problem. It is just five minutes in the morning online, you can sort of try to sort the rest of the day around it. So, I didn't have to go in physically* – P035."

The participant above describes the convenience of online sessions as they are short and subtle which are easy to fit into the day. They also state that if they are elsewhere, they would have to physically attend the location which may require more times. Similarly, another participant claims "*And is this also easy to…to do it, you know, because you just switch on your machine and it's there, whereas if I had to put my coat on and get on in the car and go somewhere to do it, I'd probably be less inclined to do that* – P015".

The freedom and anonymity of online sessions was described as ‘effective’ for one participant “*You know, this is just a video and you can just do what you like and, you know, that sort of idea. Dancing around in your own kitchen or living room and nobody can see you, you know. Is a good thing I think...I think to be online, it's quite effective because you could be as daft as you want to be and nobody else sees you doing it* – P006”.

Despite some participants perceiving the online format of sessions as beneficial, others state that they would have found face-to-face sessions more effective. One participant claims that they may have engaged more in laughter within a room surrounded by people laughing - “…*I mean, like physically in a room and the laughing … I think I find laughing very contagious for me, it's like it's like yawning*. -P035’. Another states that others may have engaged more and be more willing to be outgoing in a room context as relationships and links can be formed.

“*I would imagine that those relationships and therefore those links and therefore the laughter I think would permeate far better in a face-to-face situation. I think that… I think people would be more willing to and more willing to be outgoing*…. – P001”. Although the participant believes the session would be more effective in a face-to-face context, they also claim that the online environment may be more suitable for those who can’t travel, who prefer more anonymity and recognise that the online sessions limit them on a personal basis.

“I think it's far better than nothing. If people can't get to places and they want a bit more anonymity, and I think the idea of sort of doing stuff online can help, but you just miss so much, so much in regards of communication that I think I think that that hugely, hugely limiting for me on a personal basis – P001”. When discussing online to face-to-face interventions and therapies in general, issues with technology which could also create further barriers emerges. “… *you've got connection problems and then you've got… you've got all of these different things that, you know, create noise* – P001”.

4.5.6 Theme Six – Engagement outside the Sessions

Engagement of LY outside the sessions emerged as a key topic of discussion across the two groups. Although no daily LY activities between the sessions were arranged as part of the research, the LY instructor encouraged participants to try and engage with some exercises at least a few minutes every day. The levels of engagement outside the sessions to 'make the most' out of LY appear to vary. Some participants actively took part in LY sessions available on YouTube, outside of the set 1-hour a week session, with their family "…*looking on the YouTube after our sessions, like the Asian guy that does the Yoga Laughter and have actually been doing it here and come to my husband and he says, we just I just laugh* – P023". Another participant also states "*And actually, I love it. I do it every day. And, you know, we've been YouTubing, my wives been doing it with me we've been YouTubing and all different people to do it. And I now start every day in the shower with it.* – P006".

One participant stated that although they hadn't searched for or engaged in any LY activities outside the sessions, they used some elements from the sessions in their day-to-day life. *"I haven't looked up formal exercises and what have you. Well, in my day to day life, I do find myself doing that yay business, you know, laughing with the dog and actually just, just laughing. No real reason. And that can only be because of the laughter yoga* – P015". Another participant admitted that they had planned to practise but then didn't "*Just got very busy and I didn't do it. But my intention was to practice, but I didn't.* – P035"

Interestingly, some participants claim that they would of have done activities outside of the sessions if it had been a requirement of the research. "*I think what would have been better, I think, for me would have been to have something specific to do on every day in between the sessions, I think if maybe she had recorded some 10-minute videos or something, which, you know, to give us something to do because I couldn't... you know we are kind of left to our own devices* – P006". Another participant also states that '…*just a little bit each day, which is just, you know, one or two very, very simple things that you could do. I think… I think…I would be willing to do it. So, I've done*

nothing outside of the sessions - P001".

4.5.7 Discussion

The first chronological theme which emerged from the data is motivation to join the research. Currently, Coventry University has approximately 1800 academic staff employed across all faculties and departments. However, only sixty-five participants expressed an interest in the research with twenty-six participants taking part and competing the study. Therefore, motivation to the join the research was a key area of interest. Three key reasons for joining the research became apparent during analysis of the interviews: intrigue, expanding on other similar and a need for connectedness during lockdown. As Laughter Yoga is an emerging intervention originally founded and developed in India, it may be new and intriguing to those seeking something different and alternative. For some, Laughter Yoga is perceived as an extension to other forms of alternative therapies such as yoga, meditation, and mindfulness. Through this perception, Laughter Yoga provides an extra novel element of laughter to breathing and relaxation techniques often found in these types of therapies. These perceptions suggest that individuals who have knowledge and experience in these alternative therapies may have been more willing to join the research as they only required to incorporate the element of laughter.

Another motivational element is the need for connection and social interaction during lockdown. Participants express a need for connectedness and viewed the research as an opportunity to regain this connectedness. As stated by one participant, changes in working environment, for instance transitioning from being surrounded by employees to working at home alone, may be an influential factor for seeking reconnection and taking part in the research. Although virtual, video-based interventions may provide some element of social connectedness, and although not explicitly mentioned, may potentially prevent subsequent poor mental health because of social isolation.

Another emerging theme from the data is conflict between understanding the mechanisms of LY and understanding activities involved within the sessions. Despite some participants describing their understanding of forced and fake laughter to elicit psychological and physiological responses,

they appear confused with the activities involved. Prior to the research, a YouTube video - including examples of activities and deep breathing exercises, was provided to ensure familiarity of the sessions and to ensure transparency. However, participant still appear confused after all four LY sessions questioning whether the link between the benefits of LY and the types of activities included require further clarification. Furthermore, if participants perceive LY as an extension of other types of alternative therapies, such as those mentioned above, it might be suggested that the new concept of laughter through childlike playfulness and activities is difficult to grasp.

The ability to utilize concepts learned during LY as a mechanism to cope with difficult life events and stresses outside of the sessions is an interesting concept brought forward within the interviews. Regarding the overarching research question of whether LY can be used to improve or prevent poor mental health, these findings suggest that LY could potentially be beneficial in preventing poor mental health. As described within the data, participants claim that laughter seems more accessible and can be used to deal with stressful life events (e.g. one participant describes their story of expensive house repairs and laughing as a way to cope) which may otherwise be dealt with differently. These experiences and perceptions further questions LY's ability as an intervention to provide techniques to help cope with stressful life events and its ability to prevent the development of symptoms associated with poor mental health.

Despite participants reporting the benefits of the intervention, some participants describe that the concept of forced laughter was difficult and embarrassing. Although they state to understand that the body cannot differentiate between forced and natural laughter, several barriers such as not finding the instructor funny, being in the presence of people they don't know and, conversely, being in the presence of people they work closely with. These findings highlight the importance of the relationship between the LY instructor and participant for the participant to reap full effectiveness of the intervention. Additionally, issues surrounding the presence of individuals that they don't know or work closely with could potentially be influenced by the online context of the sessions.

The context of the sessions (online vs face-to-face) also appeared as a key topic within the data.

As LY is usually provided face-to-face, the intervention was altered for an online environment (due to COVID-19 restrictions) resulting in loss of activities which usually include eye contact and physical contact. Within the interviews, some participants express a preference for the online sessions as they were deemed as more accessible, less time consuming and gave some participants the confidence to engage more with the sessions. However, others argue that connections and relationships between other participants and with the LY instructor may have been easier to develop in a face-to-face context and that laughter would permeate more within the group. The issue of technical difficulties is also mentioned as another barrier for accessing and emerging into the sessions. Overall, online context of the sessions presents both benefits and limitations that vary on the preference of the individual. These preferences may influence the overall effectiveness of the intervention which should be considered in further research.

Finally, the last emergent theme discussed is the varying engagement of LY outside the sessions. One perceived procedural limitation of the research, as mentioned by a few participants, is lack of structured activities provided outside of the sessions. Although a structured protocol outside the sessions was avoided to reduce participant responsibility, improve recruitment, and ensure retention, some participants state that they may have benefited from this and believe they would have gained more from the research. Others, however, appear more proactive outside of the sessions and have engaged with LY available through other channels such as YouTube. The engagement outside of the LY sessions was varied and was not controlled as an external variable. As it was not controlled or measured, it cannot be determined whether individuals who engaged more with LY outside the sessions benefited more from the intervention that those who didn't – this requires further research.

Overall, there is conflict between experiences and perceptions of LY. For some, LY is perceived as an extension to other forms other alternative therapies such as yoga, meditation, and mindfulness, that adds an extra element of laughter. Although there is mutual understanding to the concept of laughter and its benefits, the structure of the LY sessions and activities, such as childlike activities and forced laughter, is confusing and difficult for some. As a result, some participants found it

difficult to emerge themselves and fully engage in the sessions questioning intervention efficacy. However, difficulties surrounding engagement with the session may arise from the sessions being provided online rather than face-to-face. Additionally, engagement outside of the sessions may also be an influential factor to intervention efficacy. Although additional research is required, it could be suggested that engagement outside the sessions, including using techniques from the sessions or engaging in other LY activities, may provide further clarification of LY which, may increase efficacy of the intervention.

5 Recommendations for Further Research

Laughter Yoga is a promising intervention which may provide potential relief for psychological symptoms associated with poor mental health . As this research is feasibility study, it is tangible to conclude that the intervention is accepted and feasible as an online intervention for higher education staff members at Coventry University. However, the significance of the efficacy of the intervention and further assessment of the psychological underpinnings of the intervention warrant further research. It is recommended that a larger sample size be recruited to truly assess the statistical significance. Psychological, physiological, and qualitative outputs are recommended to allow triangulation of data although it may provide beneficial to also assess specific work-place stressors which may contribute to poor mental health . To assess the psychological underpinnings of LY, it is also recommended that three-arm randomised control trial be conducted in which there is one-active control group of laughter-based treatment or yoga-based treatment, alongside laughter yoga and a comparative control group. Although LY provided as an online intervention appeared to be quick, time-effective, and cost-effective, further research comparing the effectiveness of online versus face-to-face may also provide insight into the psychosocial elements of LY.

As LY exposure and engagement outside of the sessions was not monitored (as discussed in **) it is difficult to truly assess the efficacy of four one-hour weekly sessions. It is recommended that engagement outside the sessions are monitored and controlled by personal diaries to establish a relationship between engagement and efficacy. Personal diaries would also provide insight into the participants willingness and enjoyment of the intervention i.e. more frequent engagement would suggest higher enjoyability. However, it is further recommended that participants are provided with activities or requested to practice activities used within the sessions. There is an abundance of activities and videos available online which claim to be LY. To ensure rigor of the intervention, it is

suggested that participants are advised not to engage with activities beyond those provided by the research.

Focus on demographics may also provide beneficial when exploring the efficacy of LY for poor mental health and wellbeing. Within this research, participants were recruited on a voluntary basis from a broad sample size of higher-educational staff. Despite this, the majority of participants appear to be female which questions whether the intervention may appeal more to the female demographic and why. Another consideration is the appeal of the intervention for different ethnicities. Although white/ British participants emerged as the major ethnicity for this research, it could be questioned whether those with as Asian or Indian descent may find the intervention more appealing due to its original development and roots in India.

Biological measures (saliva cortisol) and psychological measures also appear to be effective for assessing the efficacy of the intervention for poor mental health and wellbeing. In addition to subjective measures, biological measures provided an objective measure providing further insight and an interesting comparison. It is recommended that biological measures and psychological measures be applied conjunctively and other biological measures e.g., heart rate and blood pressure be considered in further research.

6 Discussion

6.1 Introduction

In this chapter, the context of the problem and how the problem was approached will be reiterated restating the research aims and objectives. The research aims will then be discussed referring to findings from the data and triangulating results from all outcomes.

These results are then compared to current literature with debate of potential discrepancies. Finally, the chapter will conclude by highlighting strengths and limitations of the research and a researcher log illustrating pitfalls and successors faced during the research journey.

6.2 Summary and Context of Problem

Poor mental health is a growing issue across the general population within the UK (explored in chapter two). However, statistics suggests that those who work in certain workplace sectors, such as professionals within the higher education sector, are more at risk of developing symptoms associated with poor mental health due to work-related stressors (subchapter 2.4 and 2.5). In March 2020, the COVID-19 pandemic reached the UK. Subsequently, laws and policies were introduced to govern and prevent the spread of the virus. Such policies included closure of all private and public sector businesses including schools, colleges and universities and social isolation. For those in higher education, this meant working from home and transition of face-to-face teaching and learning too online. Although some individuals may have benefited or were unaffected by these changes, it is tangible to assume that for others these changes may have exacerbated or triggered the development, or further exacerbated, symptoms associated with poor mental health. As those within the higher education sector were already an at-risk population prior to the pandemic, exploration into ways of providing support and treatment to this demographic is essential.

Before COVID-19 treatment pathways for mental health presented an array of limitations leaving groups of individuals without support or treatment. Some potential issues include subsyndromal symptoms (not meeting the criteria for a diagnoseable condition) and overdiagnosis of pharmacological treatment. Despite research indicating the effectiveness and benefits of pharmacological treatments, this treatment pathway may not be suitable for some (those who do not want to take medication) ineffective for others (those experiencing treatment resistance) and

presents an array of negative side effects. Improving Access to Psychological Therapies (IAPT) aims to improve access to psychological therapies not associated with pharmacological treatments. Although IAPT provides a step forward in providing alternative forms of therapy, the impact of COVID-19 had a detrimental influence on this service. Face-to-face therapies ceased due to social isolation restrictions and many services were provided over the phone. Statistics indicate that over COVID-19 anti-depressant prescriptions soared whilst psychological therapy reduced.

To overcome barriers associated with accessing mental health support, including referrals, time-management, and altruistic avoidance (see sub-chapter 4.6), interventions providing online during working hours was explored. A systematic review assessed current online interventions used within the workplace (see sub-chapter 5.2). Findings reveal primarily cognitive-behavioral based interventions which mimic therapy provided by therapists. Although providing several benefits, the limitations of these interventions include a rigid structure of therapy and lack of human interaction. Additionally, the review indicated no group-based psychosocial interventions that where assessed. Considering that social isolation and social connectedness are key risk factors during COVID-19, the use of psychosocial virtual group-based intervention can provide additional benefits that can't be provided through conventional cognitive-behavioral based individual therapy.

Laughter yoga (LY) is a psychosocial based intervention which provides some evidence in improving psychological and physiological symptoms associated with poor mental health. Despite LY usually being provided in a face-to-face context, LY instructors have continued their sessions online throughout the pandemic. As a group-based psychosocial intervention, online LY may hold potential in providing a form of therapy to higher education academics that might be at risk of developing poor mental health. The aim of this research was to assess the feasibility and effectiveness of online LY sessions for higher-education academics for reducing symptoms associated with poor mental health.

6.3 Summary of Approach and methods

To assess the feasibility and effectiveness of online LY sessions for higher-education academics for reducing symptoms associated with poor mental health a mixed method randomized control procedure was developed to compare those receiving the LY intervention to those in a wait-list control. Psychological measures of mental health were obtained through the DASS-21 questionnaire which assesses depression, anxiety, and stress as three separate subscales. Additionally, due to the impact of mental health on sleep, the ISI was used to assess symptoms of insomnia across the participants. Further to psychological measures, saliva was also measured to explore the physiological impact of LY. As the secretion of cortisol is linked stress, saliva cortisol measures provided an insight into objective stress that participants could not actively manipulate (ref). In addition to psychological and physiological measures, focus groups were conducted providing a qualitative element and deep insight into the feasibility and acceptance of the intervention. As the research is a feasibility study, providing participants an opportunity to talk about their experiences of the intervention and the research was deemed vital. Although the quantitative and qualitative measures were analyzed and presented separately, the interactions between the two measures provide a deeper insight into the participants experience.

6.4 Answering the Research Questions

The two key research questions for this research were as follows:

1) Would online group-based Laughter Yoga (LY) be accepted and feasible as an alternative mental health support intervention for higher education staff within the UK?
2) Does online group Laughter Yoga present psychological and physiological benefits for mental health (specifically symptoms of depression, anxiety, stress, and insomnia) in higher education staff compared to a wait-list control?

In this subchapter, the first research question will be approached by discussing the psychological, physiological, and qualitative findings. Firstly, psychological, physiological, and qualitative findings

will be discussed independently then triangulation of the findings will be discussed and the implications of potential relationships between the measures will be explored. The sub-chapter will then finalize with recruitment and retention, considering qualitative findings in addition to study characteristics, which will determine the acceptance and feasibility of the intervention among higher education staff – this will approach the second research question.

6.4.1 Psychological Results

To assess mental health among the participants, the depression, anxiety, and stress scale (DASS-21) was utilized. Despite often being used as a diagnostic tool, the DASS-21 scale appeared useful in detecting symptoms at subsyndromal level. For instance, across all 26 participants, only two participants did not report any symptoms associated with depression, one did not report any symptoms of anxiety and two did not report any symptoms of stress at baseline. That is, almost all participants reporting experience at one least symptom associated with depression, anxiety, and stress. To assess insomnia, the Insomnia Severity Index (ISI) was used. At baseline, insomnia symptoms appeared to be a key issue for participants with ten participants meeting diagnosis criteria for subthreshold insomnia (score of 8 -14), four meeting requirements for moderate insomnia (score of 15 -21) and one participant meeting the threshold for severe insomnia (score of 27). Overall, the DASS-21 and ISI tools appeared to be effective tools for capturing the varying severity of depression, anxiety, stress and insomnia symptoms.

Findings revealed no statistically significant interaction of the intervention for depression, anxiety or stress across the research time points. However, a statistical significance for depression and anxiety was found for time suggesting that symptoms may have improved over the research period regardless of intervention allocation. These findings could be attributed to a regression toward the mean in which extremely high scores may have become moderate over time due to the recovery process. External variables, such as adapting to new working environments may also have contributed to improvement of depression and anxiety symptoms over time. As the research ran through February 2021, it could be argued that ‘settling’ into the new academic year may have influenced improvement of symptoms – however, this cannot be assumed from the research.

When exploring change in symptoms at varying time-points between the groups, it was found that symptoms of depression, anxiety and insomnia appeared to statistically improve in the LY group compared to WLC between baseline and post-intervention (T0 – T2). These findings suggest that those in the LY may have benefited from improvement in depression, anxiety and insomnia symptoms as a result of taking part in LY sessions. For stress, a statistically significant difference was found at baseline and follow-up (4-weeks) between the two groups which suggests a potential long-term impact on LY for symptoms of stress. Overall, the psychological results suggest that those in the LY group may have benefited from short-term improvements in depression, anxiety and insomnia and long-term improvement of stress. However, due to an overall improvement of symptoms across the participants, these findings should be taken with caution.

Effect size calculations of psychological measures revealed a medium effect size (0.625) at follow-up (T3) for symptoms of anxiety between the WLC and LY group. These findings suggest that the LY intervention may reduce anxiety in the long-term. A statistically significant difference was also found between anxiety scores at baseline, post-intervention and follow-up supporting these findings. Previous research by Yazdani et al (2014) found significant decreases at follow-up and 1 month in anxiety symptoms when assessing the LY intervention. They found medium and large effect sizes of -.78 and -.57 further supporting the notion that LY provides effective for reducing anxiety. A large effect size was also found at follow-up (T3) for self-reported symptoms of stress suggesting substantial magnitude of the intervention for reducing stress. However, marginal statistical significance of stress between the two-groups discredits these findings. Farifteh et al (2014) found a medium effect size of self-reported stress post-intervention (-.53), when assessing the LY intervention, but also found statistical significance. Overall, when considering effect sizes between WLC and LY, LY is promising for reducing long-term anxiety however no further psychological benefits are apparent.

6.4.2 Physiological Findings

Findings from the cortisol measures across the participants indicated several outliers above two standard deviations of the mean. These findings suggest that some participants could be experiencing high levels of stress which their body is responding to through secretion of cortisol. However, further analysis reveals that for those who received the LY intervention, there were no statistically significant differences at any time points for cortisol in comparison to the wait-list control. These findings suggest that LY may not be effective for reducing or having any impact on cortisol secretion. Likewise, acute cortisol analysis also suggests that LY does not appear to have any immediate impact on cortisol – this was apparent for the first and last session of LY.

The aim of measuring saliva cortisol alongside psychological measures was to provide an insight into physiological responses to poor mental health. As illustrated in background research, individuals who are experiencing poor mental health (primarily depression and stress) present higher concentrations of saliva cortisol. In addition to providing a physiological insight, saliva cortisol also provided an objective measure that which not be actively manipulated by the participant. To assess potential correlations between subjective self-report psychological measures and objective biological measures, correlational analyses were run between depression, anxiety, stress, and insomnia scores and all cortisol measures for those who received the LY intervention.

Correlation analysis revealed positive correlations between psychological symptoms and physiological symptoms at mid-day and bed-time - specifically, midday cortisol and anxiety/stress and bedtime cortisol and depression/ anxiety. When considering the research design, it could be suggested that baseline midday cortisol and anxiety could be correlated due to timing. As the LY sessions run at midday (11 – 11:45), it could be tangible to suggest that participants may have felt elevated levels of anxiety, with subsequent increased secretion of cortisol, due to potential nerves / anxiety of starting a new intervention with a group of people they may or may not have met before. As for correlations between midday cortisol and stress at session two, this could be attributed to participants who may have found that the intervention was not what they expected and may have perceived them as stressful (these assumptions and findings are explored further in 9.4.3 *Focus Group Findings* and *9.4.4 Triangulation of Data*).

Further findings revealed correlation between post-intervention anxiety/depression and bedtime cortisol measures. Although most participants presented low measures of cortisol (as expected) some participants appear to present high concentrations of cortisol which are positively correlated with self-report anxiety and depression. Despite the influence of psychological symptoms on cortisol, across the research period, there is no other timepoints in which psychological measures and cortisol are correlated at bedtime. Post-intervention measures provide an insight into the longevity of the intervention. As these findings suggest a positive correlation between psychological symptoms and cortisol at post-intervention, it could suggest that LY may only have a short-term impact or that more sessions are required for a long-term influence.

A medium effect size (.569) was found for awakening measures (AW) at post-intervention (T2) between groups. Between-subjects analysis also revealed a statistically significant difference between groups at time-point AW ($F(1, 5.55)$; $p = .029$). However, across the research timepoints there were no statistically significant differences suggesting no significant changes over the research period. These findings suggest that a significant decrease in awakening cortisol at post-intervention (T2) could be attributed to the LY intervention, however, due to no within group significance, further research is warranted. A large effect size (.845) was also found at follow-up. However, there were no statistically significant differences at this time point. Currently, there is no previous research which explores the long-term (chronic) impact of LY on cortisol and diurnal patterns. Therefore, these findings should be taken with causation – further research is required.

6.4.3 Focus Group Findings

Overall, the focus group data provided further insight into the perceptions of experiences of the LY sessions and research. Motivation to join the research appeared to be fuelled by the need to stay socially connected and viewed as a new way to improve and maintain good mental health during the pandemic. Participant's report trying varying types of group-based therapies, sessions and interventions which highlights the need for psychosocial interventions.

Findings from the focus groups appear to present a distinctive split between participants who didn't understand the intervention, therefore did not engage, or immerse themselves into LY, and those who understood LY, fully engaged themselves into the sessions and emersed themselves into LY by continuing activities outside the sessions. For those who claim to not understand LY, they report feeling uncomfortable with be asked to force laughter especially in the 'presence' of others that they don't know. It is also reported, however, that some felt uncomfortable forcing laughter in the 'presence' of individuals that they do know and work alongside with. It could be suggested that the element of forced laughter might not be suitable for everyone regardless of group context although some participants claim that the online format of the sessions 'dampen' the effect of laughter. That is, in a room with participants, laughter would be more natural and infectious and therefore easier to engage with.

Despite this, other participants describe an extremely positive experience of LY in which they fully engaged and emersed themselves into the sessions and found no difficulty in forced laughter. These participants also report continuing LY outside of the sessions through videos available online and claim to utilise aspects of LY as a coping mechanism to deal with stressful life events.

The challenges and benefits of an online intervention is also a key finding within the qualitative data. Some participants view online sessions as easy and more accessible which may, , reduce any potential stressors associated with time management or travelling to a certain location for the session. It was also reported that some element of embarrassment was removed as participants were in their own home in an environment, they feel comfortable. Particularly for individuals who engaged in LY outside the sessions,

who reported feeling an element of freedom as they were able to behave and act in a way without judgement. Although online sessions do present several benefits which may prevent unnecessary stress and provide an aspect of comfort, it is also argued that the effectiveness and 'potency' of LY would be more beneficial in a face-to-face context. Due to the nature of the intervention, and restrictions surrounding COVID-19, participants did appear to understand why the intervention was provided online. However, it was argued that the sessions would have been more beneficial for them in a face-to-face setting. In conclusion, the focus group findings highlight that some participants did appear to enjoy, actively engage, and benefit from the LY sessions. However, for some, they were unable to grasp the underpinnings of LY and felt the context of the sessions were unsuitable.

6.5 Triangulation of the Data

In this subchapter, the psychological, physiological, and qualitative findings will be triangulated to provide detailed answers to the research questions. To explore the data, each psychological measure (depression, anxiety, stress, and insomnia) will be explored independently with reflection and consideration to the physiological and qualitative data. Finally, all outputs will be accumulated and discussed leading to the conclusive chapter.

6.5.1 Depression

Depression scores measured before, mid-intervention, post-intervention and at follow-up revealed no statistical differences between those who received LY and those in a wait-list control. However, when exploring differences in specific timepoints, it was found that there was a statistically significant difference in self-reported depressive symptoms between baseline (T0) and post-intervention (T2). These findings suggest that participants within the LY group reported less symptoms associated with depression after receiving the LY than those who did not. However, when observing saliva cortisol, there is no statistically significant difference of saliva cortisol across the research periods between the two groups suggesting a discrepancy. As research suggests that

depressive symptomatology is often associated with high concentrations of saliva cortisol throughout the day, it would be feasible to assume that a decrease in depressive symptoms would indicate a decrease in saliva cortisol. One potential causation of this discrepancy could be inaccurate self-reports of depressive symptoms. As the questionnaires used to assess depression were sent and completed electronically, this may have restricted opportunity for participants to ask or clarify questions which may have led to inaccurate scoring. Demand characteristics may also have influenced participants responses. The qualitative findings do not contribute towards explaining this discrepancy as depression, and symptoms and behaviours associated with depression, were not mentioned, or discussed among the participants.

6.5.2 Anxiety

Between the two groups, there were no statistically significant differences in self-reported symptoms of anxiety across the research period. However, when comparing timepoints, a significant difference was found at baseline and post-intervention (T0- T2) suggesting that LY may have improved symptoms associated with anxiety. When exploring correlations of anxiety symptoms and salvia cortisol measures, significance was found between pre-intervention (T0) midday cortisol and anxiety within the LY group. These findings suggest that those in the LY group may have experienced simultaneous psychological and physiological anxiety prior them to the LY intervention. No other correlations of saliva cortisol and anxiety were found at any other time point within the research which may suggest a potential discrepancy between self-report and psychological measures.

6.5.3 Stress

Unlike other psychological measures, although no statistical difference was found when assessing all timepoints, a statistically significant difference was found between baseline and post-intervention (T0 – T3). These findings may suggest that those in the LY group experienced improvements in stress as a long-term outcome rather than immediately post-intervention as found by depression, anxiety and insomnia. Regarding stress and saliva cortisol, a significant correlation was found mid-intervention (T1) at midday. One potential explanation for this significant correlation could be

explained through participant descriptions of their experience during the focus groups. When discussing motivation to join the study, some participants describe wanting to try something ‘new’ and ‘different’ to improve and maintain their mental health while others state an eagerness to contribute and support a PhD study. Most participants claim being uncertain of what LY is which continues throughout the study gaining no further clarification when taking part in the sessions. During the sessions, participants report feeling embarrassed, especially due to the concept of forced laughter, and felt that they were unable to truly engage and immerse themselves. As the LY sessions took place at midday (11 – 11:45am), it could be feasible to suggest that this uncertainty, embarrassment, and confusion surrounding LY may have contributed to correlations between saliva cortisol and stress. However, motivation and moral obligations associated with joining the study may have potentially influenced participant lack of withdrawal from the study.

6.5.4 Insomnia

Results from the Insomnia-Severity Index (ISI) revealed no statistical significance between the LY group and WLC across the research period. However, analysis of specific timepoints revealed statistical significance between timepoints T0- T2 suggesting that those who took part in LY sessions may have experienced an improvement in symptoms Across the psychological measures, insomnia appeared to be the highest reported at baseline across all participants with ten participants meeting criteria for subthreshold insomnia, seven meeting criteria for moderate clinical insomnia and two meeting criteria for severe clinical insomnia.

Despite high levels of self-reported insomnia, there is no significant correlation with saliva cortisol. However, as cortisol measures two standard deviations above the mean were subsequently removed as outliers, it could be feasible to argue that those with severe insomnia, with corresponding abnormal concentrations of cortisol (in comparison to the rest of the participants), may have not been truly represented during the analysis. Therefore, it is impossible to conclude whether LY had an impact on the relationship between saliva cortisol and insomnia for those who meet clinical diagnosis. Nevertheless, within the qualitative data, one participant in the focus group claimed to suffer from insomnia and stated that they felt the intervention had no influence or benefit.

9.4.4.1 Saliva Cortisol

Despite participants reporting changes in self-reported psychological symptoms, there is no statistically significant difference in cortisol outputs at any point during the research between those in the LY group and WLC suggesting that LY may not have any influence on cortisol secretion. However, although there is no statistically significant difference between cortisol measures immediately before and after sessions one and four, average cortisol measures do decrease by 29.75% and 8.97% respectively. These findings may indicate that LY may have the potential to reduce cortisol immediately before and after a session especially during the first session.

6.6 Psychological and Physiological Discrepancies

When comparing psychological and physiological findings, there is some discrepancies - some of which can be explained through findings within the qualitative data, some require further research. One discrepancy is the lack of correlation between self-reported psychological measures and salvia cortisol. As covered in chapter *3.2 Biological Aetiology,* mental health and perceived stress elicits the secretion of hormones such as cortisol. Therefore, it would be tangible to assume that reported psychological symptoms, especially depression and insomnia, would have a positive correlation with cortisol. However, it is apparent that correlations only appear at certain timepoints within the research which could be associated with emotions and experiences described in the qualitative data. For instance, individuals who report ‘embarrassment’ during the sessions may present a positive correlation between stress and cortisol. In addition, there could also be an influencing factor of demand characteristics. For instance, in the qualitative data, some participants describe their eagerness to support a PhD study. It could be argued that this motivation, along with a desire to provide the researcher with what they perceive to want and need, may have potentially influenced the psychological measures. Alternatively, it could be suggested that this discrepancy could also be due to issues surrounding self-reporting symptoms associated with mental health including individual capability of reporting own symptoms, being aware of symptoms, and understanding the question / answers.

6.7 Retention and Recruitment

To approach the research question of whether online LY would be accepted and feasible as an alternative mental health support intervention for higher education staff, the retention and recruitment rates were calculated. Recruitment via e-mail appeared to beneficial in reaching a large sample of higher education staff across all faculties within Coventry University. Many individuals showed an interest in the study, however, the majority did not follow-up and lost contact. Despite this, over half of the participants that showed an interest continued to complete baseline questionnaires and consent forms with a further 26 participants completing the research. Most participants appeared to be working age (average age 49.3 years) British women suggesting that this form of intervention may appeal more to females. Overall attendance of the intervention was high (87.5%) with no reported drop-outs due to negative side effects of the intervention. No negative side effects were reported throughout the study.

6.8 Comparison to the literature

In this subchapter, findings, and results from the research at hand will be compared and discussed with previous literature. Focus will be given to comparing results with literature exploring online interventions in higher education, laughter yoga and the impact of laughter yoga, laughter-based therapies, and yoga-based therapies on saliva cortisol. Due to findings suggesting a discrepancy between psychological measures and saliva cortisol, research assessing psychological measures and saliva cortisol as outcome measures are compared and discussed to the research at hand to provide potential causational factors.

6.8.1 Online Interventions in Higher Education

As found from the systematic review of online interventions covered in chapter 5.2, cognitive-behavioural based online interventions appear to be the main type of intervention utilised for improving mental health in employees. Findings also indicate that recruitment

through e-mail is a quick and effective method for reaching all employees within a company or organisation with previous research yielding large sample sizes. Like the research at hand, predominately women appear to show an interest and be recruited in such studies. When looking specifically at research exploring online interventions in the educational sector, Ebert et al (2014) and Thiart et al (2015) present a high percentage of female participants to male (83.3% and 67.2% respectively). They also found high retention rates of 92 and 95.3% with moderate – large effect sizes suggesting high levels of acceptability and effectiveness. In the research at hand, the retention rate was calculated at 87.5% which could be due to the smaller sample size in comparison to its counterparts.

When exploring the impact of online interventions for symptoms of depression, Ebert et al (2012) revealed a long-term impact of the internet-based problem-solving training (iPST) finding statistical differences, compared to a wait-list control group, at 7-weeks ($p = <.01$), and 6-months ($p = <.01$). A secondary outcome of this study included stress which was measured by the Perceived Stress Questionnaire (PSQ) at baseline, 7-weeks, 3-months and 6-months. It was also revealed that those who received the online intervention presented improvements in symptoms associated with stress between baseline and 7-weeks ($p = <.05$), 3-months ($p = <0.10$) and 6-months ($p = >.05$) suggesting a long-term impact on stress due to exposure of the intervention. Within the research at hand, findings indicate that LY may hold some potential for improving symptoms of depression at post-intervention but presents no evidence of long-term improvement. Regarding stress, however, LY may hold some long-term benefits in reducing symptoms. The discrepancy of findings between the iPST and LY interventions could be explained by accessibility, context and external variables. For instance, the iPST intervention is an internet-based intervention that can be accessed by the participants at any time. Unlike the LY sessions, participants can access and engage with the intervention throughout the research period including

follow-up increasing the intensity of treatment. Additionally, the iPST intervention is a one-to-one individualistic intervention which some individuals may find more beneficial than group based. Finally, a consideration that the research was conducted prior to COVID-19 must be given as symptoms associated with poor mental health are more in the absence of a pandemic.

Thiart et al (2016) assessed the impact of an online cognitive-behavioural based intervention known as GET.ON for individuals in the educational sector suffering from insomnia. In comparison with the wait-list control, those who received the intervention presented a statistically significant decrease ($p = .001$), as measured by the insomnia severity index (ISI), at post-intervention and six-month follow-up. In the research at hand, there is a marginal statistically significant difference between the intervention and WLC control ($p = .061$) between baseline and post-intervention. However, there is no evidence of long-term improvement of symptoms. Similar to Ebert et al (2014) discrepancy of these findings could be attributed to the accessibility and context of the intervention. It could also be argued that participants average baseline insomnia symptoms are considerably higher in Thiart et al (2016) in comparison to the research at hand leaving more room for improvement ($M = 18$, $M = 10.57$ respectively).

As laughter yoga (LY) sessions were provided during the COVID-19 lockdown, a scoping review was conducted to explore online interventions potentially used and assessed during this time. A search was conducted of research published between 2019 – 2021 during the lockdown period. From the search, five studies were found to have assessed the impact of online interventions for mental health within the workplace. However, no studies appear to assess online interventions within the higher education sector. Despite this, findings support the effectiveness and feasibility of utilising online interventions to improve mental

health . Overall, these studies indicate that online interventions can recruit large numbers of participants due to ease of accessibility with high levels of engagement and retention. Wasil et al (2021), for instance, developed an online intervention known as COMET (Common Elements Toolbox) for higher education student's experiencing poor mental health due to the COVID-19 pandemic. Through this intervention, they were able to track individuals who engaged and completed the session. They found that around 72% of students fully completed the online sessions with participants reporting that the intervention modules were acceptable (93% endorsing), helpful (88%), engaging (86%), applicable to their lives (87%), and could help them manage COVID-related challenges (88%). Although not a working population, per se, these findings indicate the acceptance of online interventions for mental health during this unprecedented period.

Regarding symptomatology, stress is a key outcome among studies assessing online interventions. Nadler, Carswell & Minda (2020), Barrett & Stewart (2020) and Shaygan, Yazdani & Valibeygi (2021) all assessed the impact of an online intervention on stress measured by the Perceived Stress Scale (PSS). All studies revealed a statistically significant improvement in self-reported symptoms of stress pre-intervention to post-intervention (p = < 0.001, p = .01, p = .001, respectively). Intervention lengths varied from 2-weeks to 8-weeks with measures obtained at baseline and immediately post-intervention. Barrret & Steward (2020) provided 2-weeks of online acceptance and commitment therapy and cognitive behavioural therapy for 42 individuals working in the healthcare sector. Nadler, Carswell & Minda (2020) conducted a large scale randomised-control trial of an online mindfulness-based intervention with 138 participants receiving the intervention and 137 participants in a wait-list control. Participants within the intervention group received 1-hour weekly online sessions over 8 weeks. Despite the procedural and intervention differences between these two studies, they both reveal that the online interventions

provided are effective in reducing self-reported symptoms of stress. These findings support the research at hand which also indicates that online LY is effective at improving symptoms of stress.

Findings from Behrendt, Ebert, Spiegelhalder, Lehr (2020), who assessed the impact of an internet-delivered cognitive behavioural intervention for insomnia (iCBT-I), also highlight that online interventions may also present long-term benefits. From this research, participants were given 6 1-week modules and were assessed for symptoms of insomnia at baseline, 8-weeks and 6-months with the Insomnia Severity Index tool (ISI). They found at 6-months, there was a statistically significant difference in insomnia symptoms compared to those who did not receive any intervention (p = .001). These findings suggest that online interventions have the capability of providing long-term relief for an issue. However, it is plausible to mention that participants within this research presented high levels of insomnia at baseline with 69.5% (123/177) presented clinically relevant insomnia symptoms (ISI score 15 – 28). Additionally, the intervention assessed within this research (iCBT-I) is developed to specifically target symptoms of insomnia rather than mental health in general. Therefore, it could be argued that the intervention provides more intense treatment for a specific problem providing effective long-term results.

6.8.2 Laughter Yoga Research – Pre-COVID-19

When comparing findings from the research at hand to LY research conducted prior to COVID-19, it is first evident that there is a discrepancy between participant average age. The average age calculated from the systematic review conducted in chapter 6.3 (Biopsychosocial Impact of Laughter Yoga on Mental Health, and salivary cortisol) was between 55 – 80 years, however, the mean age for the research at hand is considerably lower at 49.3 years. It is feasible to argue, that this discrepancy could be due to the general

demographic of research exploring LY. Previous research looks at individuals with co-morbid physical ailments which primarily affect older generations. Additionally, the research at hand recruited those of working age in the educational sector and therefore unlikely to recruit participants beyond retirement age (65 years+) lowering the overall average.

Previous research exploring the impact of LY on mental health suggests a potential for improving symptoms of anxiety (Memarian, Sanatkaran & Bahari, 2017) and depression (Shahidi et al, 2010; Bressington, 2018) between baseline and post-intervention. However, findings from Fukoka et al (2016) found that LY had no statistically significant influence on depression and anxiety in comparison to a wait-list control. Furthermore, Bressington et al (2018) found no statistically significant differences between baseline and any follow-up period suggesting the short-term impact of LY. These findings rival results from the present research in which statistical significance in symptoms were found between baseline and post-intervention within the LY group. However, no statistical significance was found when comparing LY to the wait-list control or between baseline and post-intervention. These findings, supported by findings from this research, could implicate that LY may provide mild brief alleviation for some symptoms over a short period of time.

Similar to online interventions, a scoping review was conducted for research exploring the impact of LY during the COVID-19 lockdown. Although no research was found which specifically explored the impact of LY, several studies were published which highlight the effectiveness and importance of online yoga. A systematic review conducted by Sharma, Anand & Kumar (2020), for instance, explored the role of Yoga in working from home during the lockdown. They summarise that yoga can help to '…*relieve mental stress maintains a balance in the autonomic nervous system through enhancing the parasympathetic activity and lowering the sympathetic activity else it can result in a state of depression and stress*'

(Sharma, Anand & Kumar, 2020- pg 733). They also claim that cortisol can be balanced through yoga due to slow breathing practices, improving lung capacity, and improving respiratory health (Bernadi et al 1998; Mahajan, 2014).

A recent study by Wadhen & Cartwright (2021) also assessed the feasibility and effectiveness of online yoga for improving stress . A 6-week pilot randomised-control trial was conducted assessing mental health through the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) Coping Self-Efficacy Scale (CSES-26) and Depression, Anxiety & Stress scale (DASS-21). Overall, they found that those who took part in yoga reported significant improvements in perceived stress, mental wellbeing, depression and coping self-efficacy, but reported no improvements in stress and anxiety. They also found that online yoga had high acceptability with participants reporting enjoyment of the sessions suggesting good feasibility.

Finally, Kulkarni, Kakodkar, Nesari & Dubewar (2021) conducted a systematic review on yoga to assess how it could be implemented to combat the psychological impact of COVID-19. It was concluded that yoga presents a moderate to positive effects on the mental health parameters including depression, anxiety, and stress. They also clarify the psychological underpinnings and benefits of each type of yoga stating that pranayama can be used regularly to focus the mind, slow down the cardiac rate, reduce blood pressure and improve cortisol concentrations. It can also create a sense also creates sense of well-being, improved self-confidence, efficiency, attentiveness, and positive outlook (Oken et al 2006).

Although Laughter Yoga (LY) and yoga are independent forms of therapy, LY includes pranayama and deep breathing techniques to help calm and ‘ground’ the individual. Therefore, research which suggests that yoga, especially yoga which incorporates deep

breathing techniques, can be beneficial for improving mood and balancing cortisol may support the use of pranayama techniques in LY which may, , have contributed to the improvement of psychological symptoms within this study. It is imperative, however, to consider that the laughter element of LY is also supported by research which explores the effectiveness of laughter (aka laughter therapy or laughter inducing therapy) for improving depression, anxiety and perceived stress (van der Wal & Kok, 2019). Yim (2016) also summarises that laughter-based therapies present physiological benefits including decreasing stress hormones such as cortisol. Despite research suggesting that the two underpinning elements of laughter yoga (yoga and laughter) present psychological and physiological benefits, there is some limitations when combining the two elements. Findings from the research at hand suggests that psychological symptoms of depression, anxiety, stress and insomnia did appear to improve within the LY group, however, when compared to a control group there is no statistically significant difference questioning the overall impact of the interventions. Likewise, there is no statistically significant difference of saliva cortisol between the two groups at any time point suggesting no physiological benefits of the intervention regarding the decrease of stress hormone. Few correlations between salvia cortisol and psychological measures further support the notion that LY may not have an influence on saliva cortisol.

6.9 Saliva Cortisol

Research assessing the impact of laughter yoga on saliva cortisol is sparse. Within this subchapter, research which assesses LY with saliva cortisol as an outcome measure will be discussed and compared to findings from the research at hand. Following this, research assessing the impact of laughter-based therapy and yoga interventions will be explored and compared. Due to the discrepancy between psychological measures and saliva cortisol, research which may explain lack of correlations will also be discussed.

6.9.1 Laughter Yoga Research

Previous research assessing the impact of LY on saliva cortisol indicates a potential immediate response from the intervention. Fujisawa et al (2018) found a statistically significant decrease immediately after and 30-minutes post intervention (p = .002). However, within this research, considerably more participants took part (LY= 40, active control= 40, control = 40) which may have influenced the statistical significance. Within the research at hand, a cortisol concentration did appear to decrease immediately before and after the intervention, however not with statistical significance. It could be argued that a larger sample size may have provided a statistically significant difference. Ozlem & Tezel (2021) also found a statistically significant decrease in cortisol immediately pre and post intervention at sessions 5, 7, 8. These findings may indicate that more sessions may have been required for the LY to impact saliva cortisol as only four sessions were provided.

6.9.2 Laughter-Based Therapy

Research which assesses the impact of laughter-based interventions on cortisol (saliva and blood) is contradictory. Early research by Youn & Hae-Sook (2013) found that individuals who took part in yoga five times a week for two weeks presented a reduction in saliva cortisol but not statistically significant (p = .158). Heo, Kim, Park & Kil (2016) also found that after four sessions (once a week) of yoga, participants did not present any statistically significant differences in blood cortisol between pre- and post-intervention. However, Lee & Lee (2020) revealed that participants who took part in four sessions (once a week) of yoga presented a statistically significant decrease of saliva compared to a control group (p = .001). Additionally, the control group reported a significant increase in saliva cortisol. Research is conflicting to whether laughter-based therapies can decrease

saliva cortisol immediately pre – post intervention, however, further research into the physiological impact of laughter-based therapies is warranted.

6.9.3 Yoga Interventions

A systematic review was conducted by Meister & Juckel (2017) to assess the physiological impact of yoga on the body for individual with major depressive disorder. Overall, only two studies were found which assessed the impact of yoga-based intervention on saliva cortisol. One study within the review revealed that there was no evidence of pronounced downregulation of HPA axis activity when participants were exposed to 5x60 minutes sessions of yoga over 5 weeks meaning no significant reduction of saliva cortisol (Sarubin, Nothdurfter & Schule, 2014). However, the other study examined the association between serum brain-derived neurotrophic factor (BDNF), cortisol concentrations, and depressive symptoms in 54 outpatients treated with anti-depressants, yoga therapy, or both (Naveen et al, 2016). They found a significant negative correlation between change in serum BDNF and cortisol concentrations only in those within the yoga group. That is, when BDNF rose, cortisol decreased, and depression scores also decreased. As BDNF is a marker for neuroplasticity, the authors claim that these findings suggest that yoga may present similar effects to anti-depressants in which cortisol secretion can be reduced and neuroplasticity can be facilitated through stress reduction. As both studies assessed yoga for individuals with major depressive disorder, these findings present conflicting results to whether yoga-based interventions can impact saliva cortisol. Like Meier, Wirz, Dickinson & Pruessner (2020), who assessed the impact of laughter yoga on stress-buffering response, Robinson, Hopke and Massey-Abernathy (2021) also found that those who took part in yoga sessions also present decreased concentrations of cortisol when exposed to the Trier Social Stress Test compared to a control group.

Overall, it is unclear whether yoga-based interventions can impact or decrease saliva cortisol. Although some evidence suggests that yoga-based interventions may reduce saliva cortisol and reduce associated depressive symptoms, other researchers argue that yoga, specifically short-term yoga interventions, may not provide enough intensity to change endocrinological functioning. A lack of ability to change endocrinological functioning in individuals could potentially explain why participants who received LY within this research did not present any changes in saliva cortisol at acute or chronic level.

6.10 Psychological Measures and Saliva Cortisol

As explored in subchapter 3.2.1 – 3.2.4, individuals experiencing high levels of depression, anxiety, and stress present elevated concentrations of cortisol in their blood, urine, and saliva (Nemeroff & Vale 2005; Pariante & Lightman, 2008; Pariante & Lightman, 2008). When comparing saliva cortisol concentrations and self-reported psychological symptoms within a clinical population (diagnosed with depression and / or anxiety), research indicates a statistically significant correlation, especially after awakening, suggesting that cortisol can be an effective biomarker for detecting poor mental health (Vreeburg et al, 2009; Owens et al., 2014; Nandam, Brazel, Zhou & Jhaveri, 2019). However, when exploring correlations between saliva cortisol and self-reported measures within a non-clinical population, findings appear unclear.

For instance, studies such as Pruessner et al (2002) indicate that 'healthy' young males with no psychological or physical diagnosis presented statistically significant correlations between awakening cortisol and self-reported depression symptoms, as measured by the Hamilton Depression Inventory (r = 0.34, p = .05) as well as stress, as measured by the Trier Inventory for the Assessment of Chronic Stress (TICS) (r = 0.46, p = <.004). However, similar studies which explore correlations between self-reported anxiety, stress and saliva cortisol in non-clinical samples

appear to suggest little evidence. Carlson et al (2006) and Leininger & Skeel (2012) compared awakening cortisol measures with self-reported stress (Carlson et al 2006 -12 item stress inventory) and anxiety (Leininger & Skeel 2012 -State-Trait Anxiety Inventory) and found no statistically significant correlations (p = >.05). These findings may suggest that saliva cortisol, especially cortisol obtained immediately after awakening, presents more effective for detecting symptoms of depression in non-clinical populations. Despite this, findings from the research at hand did not present any statistically significant correlations between self-reported depression and awakening cortisol. Although some research suggests that individuals with depression present a slower basal cortisol decreases throughout the day in comparison to healthy individuals, the causation of these findings is unknown as no other correlations were found.

One potential explanation towards lack of correlation between psychological measures and saliva cortisol could be the tool used to assess and measure psychological symptoms. Although the Depression, Anxiety and Stress tool (DASS-21) is renowned for accurately assessing symptoms and providing a clinical diagnosis, research which explores correlation between self-report and cortisol in healthy working-age participants appear to utilise tools which assess potential causations. For instance, in Garcia, Wilborn & Mangold (2017) utilise the Hispanic Stress Inventory (HSS) which includes subscales of occupational/Economic Stress, Parental Stress, Marital Stress, and Family/Culture Stress to consider and measures the different areas of life which may elicit stress. When measured independently, they found statistically significant correlations between family/cultural stress (r = −.41, p < .001) and occupational/economic stress (r = −.27, p = .009) to awakening cortisol measures. These findings suggest that tools which specifically measure stresses associated with poor mental health may provide a more accurate judgement of mental health and could have potentially provided more significant correlations within this research. This is further supported by research that specifically explores correlations between self-report and cortisol among educators.

Katz, Greenberg, Jennings & Klein (2016) assessed whether educators perceived stress, emotion regulation and burnout presented correlations with awakening cortisol and awakening cortisol response (30-min after awakening). They utilised the Maslach Burnout Inventory, Perceived Stress

Scale, Emotion Regulation Questionnaire and found statistically significant correlations between awakening cortisol and emotional exhaustion (p = >.05) and awakening cortisol response with depersonalisation (p = >.05*).* Furthermore, Karlsen, Eek, Hansen & Ørbæk (2011) collected saliva samples awakening, after 45 min and at 21:00 from 383 working men and women and found correlations between high awakening cortisol response and lower perceived job control, low mastery and poor wellbeing (as measured by the Symptom-Checklist-35). A low cortisol daily decrease was also associated with higher job demands. Overall, it could be argued that any potential correlations between psychological measure and cortisol may have been detected by implementing tools which consider work related stressors. However, further research is warranted. In this subchapter, the strengths and limitations of the research procedure, Laughter Yoga session, data collection and data analysis will be discussed. Strengths and were considered when concluding the overall research and used to aid recommendations for further research.

6.11 Research Recruitment and Procedure

Recruitment via e-mail appeared to be a quick and easy method of recruiting and provided access to all higher education staff members across every faculty at Coventry University. However, although the advertisement e-mail was sent to all faculties across the University, it is not apparent which faculties received the e-mail as faculty gatekeepers did not respond. Communication via e-mail regarding the research also presented downfalls such as losing contact with participants. Despite this, e-mail was a quick, efficient, and environmentally friendly option as no paper waster was generated.

Overall, a generally large number of participants showed an interest in the study. However, these numbers began to dwindle through the research process which is to be expected. Although only a small sample size was collected in total, the sample size was adequate to assess the acceptability and feasibility of the intervention. Furthermore, the sample size appears to be like previous Laughter Yoga research. The two-armed research procedure,

consisting of the laughter yoga group and wait-list control, appeared effective for assessing the psychological and physiological impact of the intervention. Although suitable for a feasibility study, a three-armed research procedure with an active control group, such as yoga sessions or laughter sessions, would truly assess which element of laughter yoga is beneficial (laughter element or yoga element) or highlight the benefits of the combination.

6.11.1 Online Laughter Yoga

Providing online laughter yoga sessions presented several key benefits with few limitations. Overall, the online sessions were easy to arrange and create with no requirements of room bookings, re-arrangement of furniture that would be associated with providing the sessions in person. Participant's report enjoying the online sessions due to ease of access which allowed them to fit the sessions into their schedule. The 45-minute session length appeared to be adequate for engaging the participants into LY whilst also avoiding any discomfort from the computer – no negative side effects were reported from providing the sessions online.

For each LY session, the activities changed and varied which was beneficial as participants reported enjoying some activities more than others. Circulation of activities also avoided the LY sessions becoming reparative and stagnant. However, it may have been beneficial to incorporate an element of participant contribution to the LY session structure. That is – allowing participants to report at the end of the session which activities they enjoyed and would like to do again in the following sessions. Rather than a set and structured outline, flexibility within the sessions may be beneficial for encouraging participants to engage and provide more benefits.

During the research procedure development, it was proposed that participants should develop a log or diary of their experiences of the research and the sessions. In addition to reporting any LY activities, they use outside of the sessions, a diary to report why they decided to engage with activities outside of the sessions (potentially due to an external stressor or life event) may have provided further insight into the self-reported psychological symptoms. Additionally, as suggested by the participants, set activities between the LY sessions may have provided useful for engaging the participants more in LY and creating more confidence for the set sessions. However, both ideas were dismissed due to ensuring that participants were not overwhelmed with the research. As the research took part during the COVID-19 lockdown, we wanted to ensure that the participants were not overwhelmed with the research which may have elicited or exacerbated poor mental health. Lack of monitoring of additional engagement outside of LY sessions may have influenced the efficacy of the intervention and subsequent psychological and physiological outcome measures.

6.12 Data Collection

Regarding data collection, there is no key area of limitations. Online forms developed as interactive Word documents were a quick and easy way to obtain information from the participants. However, it is unknown whether participants had any issues with the questionnaires such as understanding the questions and corresponding answers. Despite the ability to ask questions via e-mail, the communication between participants and researcher was minimal. The issue of receiving the questionnaires back was also an issue as sometimes participants claim the questionnaires were ‘buried’ or ‘lost’ within other e-mails. Although participants were given a week to complete and send back their questionnaires, some had no access to e-mail during the research due to annual leave, sabbatical etc. These issues may have been eradicated if the questionnaires were obtained

through paper questionnaires in a face-to-face format. However, data collection through this method would not have been possible due to COVID-19 restrictions. Additionally, paper questionnaires sent through the post would have been a financial, environmental, and time-consuming burden.

Regarding the tools themselves, the depression, anxiety and stress (DASS-21) subscale appear to provide a good general insight into mental health . However, as mentioned in the discussion, there are elements to poor mental health that may have contributed to which are not measured or assessed. Although the research itself is not focused primarily on occupational mental health , the impact of work-related stressors may have been beneficial to assessing how working from home during the lockdown influenced the self-reported psychological outcomes. Furthermore, the insomnia severity index tool (ISI), although beneficial for assessing general sleep disruption, provides no clarification of whether the participants are sleeping too little or too much. Although the scores provided would not influence the data analysis regarding sleep disruption, consideration should be taken to whether the participants are experiencing too much sleep or too little sleep.

Obtaining cortisol through saliva samples appeared to be a quick, easy and non-intrusive procedure with participants understanding how and when to take samples- although some participants describe a slight discomfort providing samples due to the dryness of the tampon. During testing, it was apparent that some participants did not provide enough samples to be analysed. It could be recommended that participants stimulate saliva flow through chewing and sucking sugar-free candy or gum before obtaining a sample. As Salivettes were sent through the post to the participants, one limitation is the standardization of the times that the samples were provided. Participants were given a guideline that samples should be taken immediately after awakening, 30-minutes after

awakening, midday and before bed. Granted that morning samples would not change; midday samples and midnight samples could have been standardized to a certain time as used in previous research e.g. midday samples provided at 11 am and bedtime samples provided at 9 pm. Another issue with samples sent through the post was storage. Despite participants keeping their samples in the fridge, and samples being sent through 1st class post, it is unknown how long the samples were not kept in optimal condition – this was evident when mould was present in some samples, however, this did not appear to affect cortisol analysis. Finally, it is important to consider that postage envelope size (both posting and return) is large enough to contain all salivette tubes. Initially, the envelope return size for the Salivettes was not large enough resulting in tubes missing from one participant – ultimately, they had to be removed from the study. Overall, due to restrictions associated with COVID-19 and with the volume of Salivettes samples required, postage directly to the participants enclosed with a return envelope was effective.

Focus groups were a voluntary part of the research for those who took part in the LY sessions. Retrospectively, focus groups as a mandatory part of the research may have provided more data and insight into the research and sessions. However, as previously mentioned, we wanted to keep the workload low in addition to ensuring a high level of recruitment and retention. As the focus groups were conducted online via Zoom, there was a slight issue of overlap due to a lack of synchronicity between speaking and receiving. The questions which were developed for the semi-instructed interviews appear leading on retrospection. For instance, positive terminology was used within the questions which may have influenced the participants to provide a positive response. Other questions, such as '*Did you find the Laughter Yoga session beneficial? How?'* may have also influenced participants to respond in a particular way. Transcription of the focus groups was made easy as the Zoom platform provided a free transcription service. Transcripts were checked and amended accordingly to the raw audio data; however, this transcription tool saved a considerable amount of time. Considering the implications of workplace stressors, it may have also been beneficial to include questions regarding working from home during the

interviews. The topic of isolation and keeping in contact with colleagues was mentioned but discussing related workplace stressors may have provided more insight to the triangulation of data between qualitative, psychological measures and physiological results.

6.13 Data Analysis

Overall, there appeared to be no major issue with data analysis. Software such as SPSS, MyAssays, and NVivo appeared extremely effective and useful for quantitative and qualitative analysis. One limitation of MyAssays was the conversion of saliva cortisol units to nmol/litre. However, this was easily rectified in an Excel chart. Concerning the comparison between psychological measures and saliva cortisol, more questionnaires were returned than saliva cortisol making it difficult to obtain a true comparison. For any participants that missed an outcome, their entire data set was removed, additionally, for those who missed a saliva sample or did not provide enough samples, their entire data set was also removed. Although this did not appear to affect the overall data analysis, the sample size for the research was relatively small and therefore removal of any data could have influenced any potential significant findings. Intention-to-treat (ITT) analysis could be a potential solution to this problem, however, Gupta (2011) argues that the ITT analysis dilutes the estimate treatment effect due to non-compliance and that better application of the ITT approach is possible if complete outcome data are available for all randomized subjects. Although participants were contacted immediately if outcomes were missing, due to the nature of the study (e.g. cortisol samples which were sent altogether) it was difficult to minimize missing responses or recollect saliva samples for a specific time-point.

It is important to consider, however, that this study is a feasibility study to determine whether the intervention is acceptable and feasible. To assess the physiological and psychological effects of LY, a larger sample size is recommended to account for potential loss of data.

6.14 Reflective Log

As a feasibility study, I felt it would be important and insightful to provide my experiences and reflections on the entire research process. Unlike the rest of the PhD, this section will be written as an informal reflective log. In addition to being useful for myself, for future potential research in this field, I hope that this reflective log provides beneficial for any researcher/s who wish to expand on this research. The reflective log will be written in chronological order.

6.14.1 Background Reading

After reading about mental health within the UK, I was shocked by statistics of the prevalence and severity of poor mental health. Specifically, I was unaware that mental health between workplace sectors presented such a large varying degree of risk. When researching into the area, I had an interest in the general causational factors of poor mental health, specifically depression, anxiety, and stress, with a focus to the higher education sector. Therefore, when exploring the potential causations, I covered general risk factors such as biological and psychological as well as environmental risk factors associated with working in higher education. In my experience, there is a vast amount of research that attempts to explain what causes issues such as depression, anxiety, and stress. As advised by a close Professor in Psychology, I attempted to keep a ‘golden thread’ throughout my work and include research and literature relevant to the research at hand and tried not to stray too far afield.

When researching and exploring the different potential causational factors for poor mental health, I began to wonder how findings from literature transferred to actual clinical treatment and therapy. With there being so many proposed causational triggers to poor mental health, how could there possibly be a treatment which encompasses biology, psychology, and

environmental issues? From my reading and research, apparently, there is not. Unfortunately, yet, there does not appear to be any form of therapy or treatment which encompasses all aetiological models of poor mental health . Instead, treatment pathways appear to focus on one specific aetiology or approach. It was also apparent that conventional treatment pathways, offered through NHS, approach the biological and medical model in which pharmacological treatment is provided with the sole purpose of eradicating and / alleviating symptoms. Through my reading of alternative approaches to therapy, such as the recovery model perspective, and through my personal experiences of conventional treatment, I sought to describe the limitations of conventional treatment and explore alternative therapies. By highlighting issues with conventional therapy, a group of individuals emerge that may benefit from non-conventional alternative therapy. For instance, those who do not meet diagnostic criteria, those who are unaware that their symptoms are due to poor mental health , those who have been prescribed medication but do not wish to continue, those who want to avoid pharmacological treatment and those who may wish to try alternative treatment to avoid the development of symptoms. Non-invasive, alternative therapies and treatments that can alleviate or prevent symptoms associated with poor mental health may appeal to an array of demographics as they face no repercussions such as side effects (commonplace when taking medication). Laughter yoga is an example of one of these alternative therapies.

When reading around Laughter yoga (LY) I was surprised to come across little research. Although much research has been conducted on laughter therapy and yoga, there appeared to be few studies on LY, which combines the two, which sparked my interest further. The few studies that had been done on LY appeared promising however presented some research and procedural limitations. Despite this, I was extremely excited and

intrigued to develop research that assessed the psychological and biological impact of this novel, alternative and interesting intervention.

6.14.2 Laughter Yoga Instructor Training

I was very lucky to be given the opportunity to fully train as a Laughter Yoga (LY) instructor in London through the official LY academy. The training took place over 3-days and provided me with all the training I needed to become an independent LY instructor. Although this allowed me to be able to provide sessions for my own research, my key interest in training as an LY instructor was to gain a deep insight into the session structure, how they worked, what they included and the psychological underpinning of the intervention. I had knowledge from the research of how LY could be used to improve mental health and its suggested psychological underpinnings, however, I really wanted to feel the intervention for myself and whether I could personally feel the benefits. I must admit, I thoroughly enjoyed the sessions and felt very enlightened about being surrounded by happy, upbeat individuals. The act of laughing for a full day was extremely tiring but I felt it was very rewarding. The sessions themselves were a bit odd to me to start with, though once I emerged in the sessions and fe3lt comfortable with those around me, I truly could feel the benefits of a good laugh. The sessions furthered my intrigue, and I was very excited to research and assess the intervention for others.

When seeking an LY instructor, I was very keen to find someone with a positive and upbeat attitude that could really emerge you into the sessions. I was very lucky to find Maggie Thompson who was extremely passionate about LY and eager to help with the research. After discussing the research, she was happy to take part. She provided me with some draft session outlines which followed the session structures as mentioned in the training. Maggie also described her experiences working with an array of different individuals

including those with depression, personality disorders etc. I feel very lucky to have had Maggie on board throughout the research journey. I certainly advise that before you recruit an instructor, you emerge yourself in the intervention first and learn what makes a good instructor. For me, I found that a positive and upbeat individual who enjoys what they do and are passionate about LY provides an extremely engaging and positive experience.

6.14.3 *Recruitment Drive*

Recruitment of higher education staff members was a key area of concern within the research. The issue with recruiting higher education staff appeared to be timing. For instance, we didn't want to recruit during a busy period of the academic year such as the end or start of a new semester. Additionally, we didn't want to recruit just before the holidays. Ultimately, it was decided that the best method of recruitment was to advertise the research just before the Christmas holidays with a reminder in the New Year. Therefore, potential participants have time to think about whether they would be interested or not. We also agreed that the incentive of 'new year, new you' would be useful for recruitment as people may wish to try something new in the new year. As agreed, the research was posted just before the Christmas holidays with the intention to re-advertise in the New year and with the research running through February. Over 60 individuals contacted me showing an interest in the study which was a lot more than expected. Therefore, a reminder e-mail was not sent out in the New Year. Participants continued to show an interest in the research past the deadline date (end of January). However, some participants did decide to drop out just before the session or completely lost contact. I felt like the timing at which we decided to advertise and recruit participants was good, although I feel like a longer recruitment period may have yielded larger sample size – due to time limitations associated with the PhD, this wasn't possible.

6.14.4 Online Data Collection

Online data collection certainly took me by surprise. I assumed that as the data was collected online and electronically, everything would be quicker and easier. Although certain tasks were easier, such as scoring the questionnaires (which was done through a tool I developed myself on Excel), I felt like a different level of effective communication was needed to make sure the participants were clear on the research and what was expected of them. Everything needed to be explained in a meticulous, thorough, and clear way to ensure all questionnaires and cortisol measures were obtained and measured correctly and at the correct time. Although there didn't appear to be many issues, I felt like clear written communication through e-mail and through the saliva information pack was essential for ensuring collection of data. The intensity and frequency of e-mails is also something I wasn't expecting. During recruitment, participants were at different stages and therefore requiring different information and documentation (e.g., Participant information sheets, consent forms etc.). It felt slightly overwhelming at first and I was worried that I would miss participants e-mails. However, I decided to develop and keep a 'participant tracker' on Excel which allowed me to keep track and establish each stage of the research that every participant was at. I also removed participants who lost interest or lost contact. Once everyone was at a certain stage, I was confident and comfortable in sending group e-mails (through BCC to ensure anonymity) which allowed me to contact everyone all at once. I feel that by doing my research solely online, I have certainly developed a different level of communication and come to appreciate that effective communication and clear explanations go a long way. I was aware, however, that communicating with people purely through e-mail prevented me building a repertoire with my participants. Therefore, I tried to keep my e-mail informal but ensuring a level of professionalism. I also ensured that I attended all the LY sessions. Although I didn't take part in the sessions themselves, I felt it was important to introduce myself and personally thank the participants for taking part in the research. I also let them know that I was very happy for them to contact me at any point during the research. Personally, I felt that this communication and introduction was appreciated by my participants and provided a sense of pride for taking part in the research.

6.14.5 Practical Application

Overall, this research suggests that online LY could provide useful in reducing symptoms of poor mental health in higher-education staff. Although further research is required to assess the overall effectiveness of the intervention when provided online, and some amendments are required for the research procedure, findings from this research indicates that online group-based psychosocial interventions, such as LY, could be beneficial for those seeking an alternative treatment pathway. As LY does not require a clinical diagnosis or referral, the intervention can be accessed at any time by anyone. Due to the easy accessibility, LY may also appeal to those who are seeking adjunctive interventions or therapy or to those wishing to prevent the development of poor mental health and wellbeing. Findings from this research provides promising insight into the efficacy of online group-based LY.

6.14.6 Dissemination of Research

To disseminate findings from this research, the key researcher plans to publish findings from the two systematic reviews included and overall findings from the research. The findings will also be shared with the LY community via the LY instructor used for the research and via contact details found on the LY website. However, the aim of the research is to provide a scientific and rationale approach to the assessment of the efficacy of the intervention and therefore publication in peer reviewed journal articles will be prioritised.

7 Conclusion

In this final chapter, an overall conclusion for the research will be provided by addressing the two

key research questions.

7.1.1 Does online group Laughter Yoga present psychological and physiological benefits for mental health (specifically depression, anxiety, stress and insomnia) in higher education staff?

Overall, the research indicates that online Laughter Yoga for improving mental health in higher education staff may present some short-term benefits associated with depression, anxiety, stress, and insomnia. However, due to small sample size and no direct statistically significant differences between those who received the intervention and those in the wait-list control, further research is required. There is to be no evidence that laughter yoga is beneficial for reducing acute or chronic saliva cortisol measures.

7.1.2 Would online group Laughter Yoga be accepted and feasible as an alternative mental health support intervention for higher education staff?

Through qualitative analysis and calculated retention rate, it is apparent that online group Laughter Yoga would be an accepted and feasible alternative mental health support intervention for higher education staff. However, further research assessing face-to-face sessions compared to online sessions could also be beneficial to exploring the psycho-social element of the intervention.

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Appendices

Appendix One – Data Extraction Template and Study Characteristics

Study (Author ; Year)	Study Desgin	Country	Sample	Interventions	Outcomes and time points	Comparison Group	Main Results	Effect Size
Bennett et al 2015	Pre-post single study design	Austraila	Patients with end stage kidney diseases; receiving hemodialysis treatment for more than 3 months. Age range from 20–89 years (mean = 68.06, SD = 17.23)	LY group (n=17) -11 sessions and three times/week (30-45min) -By 2 LY therapists - Contents: Breathing and stretching exercises, laughing exercises, laughing meditation	DASS (T0, T2) HP Mood (T0, T2)	N/A	No significant difference on depression, anxiety and stress scores and HP mood was observed, p>.05.	DASS(Depression): 0.11 [-0.87, 1.10] DASS(Anxiety): -0.38 [-0.62, 1.37] DASS(Stress): -0.19[-1.18, 0.79] HP mood: 0.11 [-0.87, 1.09]
Dolgoff-Kaspar et al 2012	Repeated measures	America	Awaiting orga transplants. 2W 4M. 51-69yo	LY group (n=6) control 1 week, intervention 3 weeks (20-min sessions, once a week) 1 week control	Profile of Mood States, questionnaire, BP, HRV, HR (C1, C2,C3,I1, I2), Beck	Control intervention (n=6)	Baseline > Post-intervention (Beck Anxiety): p = .16 Baseline > Post-intervention (Beck depression): p = 1	N/A
Ellis et al 2017	Pre-post single study design	Austraila	Residents of three residential aged care homes, Age range from 61-96 years	LY group (n =28) -6 weekly session (30 min) -By a trained laughter	GHS (T0, T1, T2) PANAS (T0, T1, T2)	N/A	Significant improvement on GHS (T0: M=5.2, SD=0.973; T2:M=5.9, SD=0.744, p=0.001) , positive affect (T0: M=27.36, SD=7.597; T2: M=31.39, SD:7.908,p=0.001) and negative affect (T0: M=14.54, SD=4.686, T2: M=12.93,	N/A

			(mean age= 84 years).	therapist - Contents: Breathing and stretching exercises, LY exercises, body relaxation and deep breathing			SD=3.126, p=0.032) when compared T0 and T2	
Farifteh, et al 2014	Quasi-experimental study (2 groups study design)	Iran	Cancer Patients in hospital awaiting chemotherapy	LY group (n=23). A one-off session (20-30 min) -by LY trainer	QSCR-23 (T0, T2)	Wait-list Control group (n=14)	LY group showed significant improvement on psych-physical complaints (T0: M=1.7, SD=1.3; T2: M=1.5, SD=0.9, p=.05) and total stress score (T0: M=8.9, SD=4.4; T2: M=6.1, SD=4.2, p=.03), compared with the control group.	Total Stress score: -0.53 [-1.20, 0.15] ; Psych-physical complaints: -0.36 [-1.03, 0.31] ; Fear: -0.58 [-1.26, 0.10]
Fujisawa et al 2018	RCT	Japan	Healthy uni students (n=120)	LY group (n=40) Comedy movide (n=40) Reading group (n=40)	Salivia T0 T2 T2. Immediately after intervention, 30-min after intervention	Active control (n=40) control (n=40)	LY cortisol T0 T1 T2 : p= 0.016 Salivary cortisol concentrations and C/D ratios significantly decreased by time in the LY group	N/A
Fukuoka et al 2016	RCT	Japan	Outpatients; COPD. 7M 1W. 64- 84 yo	LY group (n=4) 10 min LY sesssion before training control group (n=4)	SDS, STAI T0, T2	Control intervention (n=4) exercise programme without LY	There were no significant changes in SDS and ST AI outcomes from baseline to post-	LY SDS Pre: 40.0±4.8 LY SDS Post: 38.8± 9.9 35.0±
Memarian, Sanatkaran & Bahari 2017	RCT	Iran	Parkinsons patients 55-75 yo	LY group (n=12) control group TAU (n=12)	Beck (T0, T2	TAU (n=12)	The average change in anxiety of patients suffering from Parkinson's disease in the laughter yoga practice (experimental) group (M=-2.83) versus the control group (M=0.50) (U=136, Z=3.76, P=0.000).	Anxiety difference LY: -2.8 ± 3.1 Anxiety difference TAU: 0.50.79±
Shahidi et al 2010	RCT	Iran	Depressed old women; Aged 60-80 (mean age = 66.56).	LY group (n=20). 10 sessions with LY facilitator.	GDS (T0, T2)	Exercise group (n=20) control group (n=20)	LY group showed significant improvement in GDS (T0: M=16, SD=5.3; T2: M=10, SD=6.9) compared to the control group, p<.001. No significant difference	Depression: -0.78 [-1.43, -.014]

							was found in GDS between LY & exercise group, P>.05.	
Yazdani et al 2014	Quasi-experimental study (2 groups study design)	Iran	Male nursing university students No age details provided.	LY group (n=19) -8 sessions and 2 times/week (1hour) -by the researcher -Contents: Warm up exercises & relaxation techniques & breathing exercises; LY techniques, LY meditation	GHQ (T0, T2, T3)	Control group (n=19)	No significant reduction on depression, p>.05. LY group showed significant improvement in GHQ at three-time intervals (p<.01). Post hoc revealed a significant difference of GHQ at T0 (M=24.5, SD=15.1) and T2 (M=13.9, SD=9.2, p=.004) and T3 (M=12.8, SD=10.6, p=.003). *The author did not perform any inferential statistical analyses for the sub scores of GHQ	N/A

A

Appendix Two – COSSH Assessment

COSHH Assessment Form

Health and Safety Commission

This assessment ***only addresses the risk of harm to health*** from the substances listed. Additional risk assessments may be required to control the risk from other hazards associated with this work/the procedures used.			
Assessor: Sheriden Morley	**Employer/Supervisor: Martin Bollard**		
Assessment Date: 16/05/2018	**Dates reviewed**(4)		

HAZARDS IDENTIFIED
*If the substance has a R45 or R49 risk phrase or a H350 or H350i hazard statement, it must also be registered on your personal carcinogen return (at Occupational Health) *where exposure is not adequately controlled*.

Substance(5) *(Name of Chemical, etc. as appropriate); **NB.***	**Hazardous Properties**(6) *(Provide details of how the substance could cause harm, e.g. harmful by inhalation, skin contact, flammable, carcinogen, allergen, etc)*	**Quantity**(7) *(Indicate how much of the substance will be used)*
Salivia	N/A	

Additional information(8)
- Workplace Exposure Limits:
- R-phrases:
- S-phrases:
- H and P statements:

Emergency Procedures(9)
- Eye contact:
- Inhalation:
- Skin contact
- Ingestion:
- Spill procedure:

What will the chemical be used for? *(insert title of experiment or experimental procedure)* **Who may be exposed?** (10)
Saliva will be analysed for cortisol measures through the ELIZA sampling kit. Only lab technicians will be exposed.

METHODS OF PREVENTION OR CONTROL OF EXPOSURE
(select all that apply by circling/ticking/highlighting the appropriate statement)

1. Engineering controls required(11)	**2. Access control**(12)
• total containment • fume cupboard • local exhaust ventilation • blast screen	• restricted to competent personnel • special containment facility (give specific area):
3. Special procedures(13) • Standard Operating Procedure (SOP) required ☐ • Code of practice, local rules, etc ☐	**4. Approved PPE**(14) *(Note: PPE is to be used as the 'last resort' when controlling exposure)* • gloves etc (specify type)

	• eye protection (specify type) • laboratory coat/overalls (specify type) • other PPE (specify)

Disposal Procedures[15] *(Give details of waste disposal procedure to be used)*

- Are chemicals with risk phrases R50-R59 or hazard statements H400 – H413 (environmental hazards) involved? ~~Yes /~~ No

TRAINING REQUIREMENTS[16]

- Full and complete lab training

HANDLING AND STORAGE REQUIREMENTS[17]

(Note any special requirements e.g. ventilation, chemical incompatibility, flash point, etc)

ASSESSMENT OF RISK USING CONTROLS DETAILED ABOVE[18]

Yes.

Authorisation by Employer/Supervisor[19]

I confirm that I have considered and understand the chemical to be used and the associated hazards. I am satisfied that all of the hazards have been identified and that the control measures to be followed will reduce the risks to as low a level as reasonably practicable.

Print name: Martin Bollard **Signed:**

[redacted]

Date: 18.06.18

Declaration by Employer/Supervisor [20]

I confirm that I have read this COSHH Assessment and that I understand the hazards and risks involved and will follow all of the safety procedures stated.

Declaration by employee[201]

I confirm that the employee who has signed below is competent to undertake the work. My counter-signature indicates that I am happy for the work to proceed.

Name (please print)	Signed	PI countersignature	date
Sheriden Morley	Sheriden Morley		18.06.2018

Guidance notes for COSHH assessment form

This form must be completed for every hazardous chemical used within the company. The form must be signed by the employee and their employer/supervisor before the work starts.

(1) **Assessor:** Insert the name of the person doing this assessment

(2) **Employer/Supervisor** Insert the name of **the Employer/Supervisor.**

(3) **Assessment Date:** Insert the date that the assessment form is completed. The assessment is valid for a maximum of 1 year. It must be reviewed after 1 year, or if a significant change occurs (change of lab, pregnancy, etc).

(4) **Dates reviewed:** all COSHH assessments must be reviewed annually (as a minimum). The review date should be entered here, and signed by the assessor to confirm that the assessment is still valid.

(5) **Substance:** insert name of the chemical to be used. NB. Biological hazards must not be assessed on this COSHH form.

(6) **Hazardous properties**: insert details of all of the hazardous properties of the chemical – egg. Flammable, explosive, carcinogen, harmful by inhalation, etc).

(7) **Quantity**: insert quantity to be used (mg, g, ml, etc)

(8) **Additional information**: Include details of any additional information, including any workplace exposure limits. Detail fully all R/S phrases and H and P statements (it is not sufficient to simply stat R45, full details are needed).

(9) **Emergency procedures**: provide full details of emergency procedures to be employed following contact with the chemical (skin contact, eye contact, inhalation and ingestion) – such as use of diphoterine, administration of emergency oxygen, etc. Also include details of emergency spill procedures.

(10) **What will the chemical be used for? Who may be exposed? :** Insert title of experiment or experimental procedure that the chemical is to be used in, and detail who may be exposed (individual worker? People in close proximity? Cleaners? Engineers?).

Methods of prevention or control of exposure

Sections 11-14 detail the methods for preventing or controlling exposure to the chemical. The COSHH hierarchy of control measures should be used when determining the methods to be used to prevent/control exposure, with engineering and group control measures being employed in preference to individual measures (such as individual PPE).

(11) **Engineering controls** required: identify the control measures necessary to prevent/control exposure, such as use of a fume cupboard, LEV or blast screen, by circling/ticking/highlighting the appropriate statement(s).

(12) **Access control**: In order to prevent/control exposure, is it necessary to restrict access to competent personnel? Are special containment facilities required? Please circle/tick/highlight the appropriate statement(s).

(13) **Special procedures**: please identify any special procedures necessary to prevent/control exposure. This might include the need for an SOP to be developed, or for local rules to be drawn up. Please circle/tick/highlight the appropriate statement(s).

(14) **Approved PPE**: PPE is to be used as the 'last resort' when preventing/ controlling exposure. Please detail the PPE to be used when handling the chemical. Please circle/tick/highlight the appropriate statement(s) and include details of the type of gloves, etc to be used.

(15) **Disposal procedures**: Identify whether the chemical is an environmental hazard; Detail fully how the chemical waste is to be disposed of (down sink, by specialist contractor, etc)

(16) **Training requirements**: detail any specialised training requirements that must be met before the work can begin – eg. Attendance on a gas safety course, etc).

(17) **Handling and storage requirements**: Note any special requirements e.g. ventilation, chemical incompatibility, flash point, etc.

(18) **Assessment of risk using controls detailed above**: Are the hazards/risks suitably controlled, using the control measures detailed above? Provide details; If not controlled, state the further actions required, eg. Requirement for a standard operating procedure (SOP), etc.

(19) **Authorisation by Employer/Supervisor:** the employer/supervisor must sign and date the assessment, to confirm that they have considered and understand the chemical to be used and the associated hazards, and that they are satisfied that all of the hazards have been identified and that the control measures to be followed will reduce the risks to as low a level as reasonably practicable.

(20) **Declaration by employee:** the employee must sign and date the assessment to confirm that they have read the COSHH Assessment, understand the hazards and risks involved and will follow all of the safety procedures stated.

(21) **Declaration by Employer/Supervisor**: the employer/supervisor must sign and date the assessment, to confirm that the researcher is competent to undertake the work.

Medium to High Risk Research Ethics Approval

Project Title

The biopsychosocial Impact of Laughter Yoga for Depression; a randomised controlled feasibility study

Record of Approval

7.2 Principal Investigator

I **request an ethics peer review** and confirm that I have answered all relevant questions in this checklist honestly.	X
I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.	X
I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.	X

Name: Sheriden Morley .....

Date: 24/01/2018 .....

7.3 Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Martin Bollard .....

Date: 10/08/2018 .....

7.4 Reviewer (if applicable)

Date of approval by anonymous reviewer: 08/10/2018

Medium to High Risk Research Ethics Approval Checklist

Project Information

Project Ref	P66672
Full name	Sheriden Morley
Faculty	Faculty of Health and Life Sciences
Department	FRC CSELS (Sports, Exercise and Life Science)
Supervisor	Martin Bollard
Module Code	PHD-SELS
EFAAF Number	
Project title	The biopsychosocial Impact of Laughter Yoga for Depression; a randomised controlled feasibility study
Date(s)	22/01/2018 - 12/07/2021
Created	24/01/2018 13:54

Project Summary

Within this study, a mixed method parallel randomised feasibility trial is proposed to compare and assess the psychophysiological effects of laughter yoga in comparison to breathing techniques. Psychological measures (including DASS-21 and Quality of Life scale (QLS) alongside physiological measures (Salivary cortisol) will be obtained before, during and after the intervention. The intervention period will last for 8-weeks. A follow-up will occur 3-months post-intervention.

Names of Co-Investigators and their organisational affiliation (place of study/employer)	
Is the project self-funded?	YES
Who is funding the project?	Coventry University
Has the funding been confirmed?	YES
Are you required to use a Professional Code of Ethical Practice appropriate to your discipline?	NO
Have you read the Code?	NO

Appendix Four – Ethical Certificate

Certificate of Ethical Approval

Applicant:

Sheriden Morley

Project Title:

The biopsychosocial Impact of Laughter Yoga for Depression; a randomisedcontrolled feasibility study

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

Date of approval:

09 October 2018

Project Reference Number:

P66672

Appendix Four – Ethical Amendments

Date of Amendment	Amendment/s	Amendment Approval Date
02/07/2019	• Change in project title to 'Biopsychosocial Impact of Laughter Yoga; a randomised control feasibility study • As service providers for the general population are unable to recruit participants, we are looking to recruit staff members at Coventry University which present a score of 10 – 20 on the DASS-21 questionnaire which indicates mild – moderate symptoms of depression (not necessarily a clinical diagnosis) • Removal of clinical diagnosis of depression from the 'inclusion criteria'. All other criteria will remain the same. • Participants will be recruited through e-mail and will be sent an information sheet, consent form and a DASS-21 questionnaire in the format of an editable form. They will be asked to complete the consent form and information sheet and return back to a private CU e-mail address only accessible to the Principal Investigator • All contact will be made directly to the participants through private e-mail. • Three arm research design including Laughter Yoga, (change from breathing techniques) Relaxation techniques and no intervention.	Rejected
06/07/2019	• Recruitment of participant through staff message board, newsletter, faculty leaders • Electronic recruitment flyer	09/09/2020
	• Participant information sheet has been updated with the following: - An introductory video which introduces the Laughter Yoga instructor, what Laughter Yoga is, what the benefits are and some examples of what may be included in the sessions.	06/11/2020 Approval for data collection

	• The section 'How will my mental health be supported throughout the research?' has been added to ensure participants are supported throughout the research. – • Support details are provided at the end of the information sheet that the participants may use if they require further support. Consent form has now been altered to the CU approved consent template. • Location of participant and emergency contact details have been added. No physical flyers will be used for recruitment due to COVID-19 restrictions. • All recruitment will be done electronically through faculty leaders and the staff message board. An E-Flyer has been developed that will be attached to e-mails to initiate interest.	
02/03/2020	• Clarification would like to be added to the storage and deletion of data from the interview. - Interviews will be conducted through Zoom with audio only recording being saved to Cloud storage. • Transcripts will also be developed alongside audio recordings and saved on Cloud storage - Once audio has been transcribed, it will be permanently deleted from Cloud storage. Any files downloaded for transcription will also be deleted. • Zoom recording policy allows 30-days access to recorded video and transcription before automatic deletion • Zoom requires consent to be required prior to the meeting (consent to be recorded is also a requirement in the consent form)	05/03/2020

Appendix Five – Informed Consent Form

INFORMED CONSENT FORM:

Biopsychosocial Impact of Online Laughter Yoga; a randomised controlled feasibility study

Please provide your location (place you will take part in the session) and emergency contact details. **These details will only be used in case of an emergency.**
Location:
Emergency Contact Details:

You are invited to take part in this research study for the purpose of collecting data to assess the acceptability and effectiveness of an online support programmeme, offered through the workplace, for improving mental health . Before you decide to take part, you must **read the accompanying Participant Information Sheet.**

Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether you wish to take part.

If you are happy to participate, please confirm your consent by circling YES against each of the below statements and then signing and dating the form as participant.

1	**I confirm that I have read and understood the Participant Information Sheet for the above study and have had the opportunity to ask questions**	**YES**	**NO**
2	**I understand my participation is voluntary and that I am free to withdraw my data, without giving a reason, by contacting the lead researcher and the Research Support Office at any time until the date specified in the Participant Information Sheet**	**YES**	**NO**
3	**I have noted down my participant number (top left of this Consent Form) which may be required by the lead researcher if I wish to withdraw from the study**	**YES**	**NO**
4	**I understand that all the information I provide will be held securely and treated confidentially**	**YES**	**NO**
5	**I am happy for the information I provide to be used (anonymously) in academic papers and other formal research outputs**	**YES**	**NO**
6	**I have provided my location (where you will access the online session) and emergency contact details and agree that these details will be used in case of an emergency.**	**YES**	**NO**
7	**I am happy to leave my video ON during the Laughter Yoga session.**	**YES**	**NO**
8	**I agree to take part in the above study**	**YES**	**NO**

Participant's Name	Date	Signature
Researcher	**Date**	**Signature**

Thank you for taking part in this research. Your conrtibution is highly valued.
Sheriden Morley
morleys5@coventry.ac.uk

Appendix Five – Mental Health Support Procedure

Mental Health Support Procedure – Biospsychosocial Impact of Online Laughter Yoga; a randomised feasibility study

To ensure the mental health of participants that take part in the research *'Biopsychosocial Impact of Online Laughter Yoga; a randomised feasibility study'* a support procedure and relevant networks have been developed for varying levels of mental health . If you have a current clinical mental health diagnosis, you will still able to take part in this research as this is not a clinical intervention. However, please seek advice from your GP if you are unsure and continue with any ongoing treatment.

General Mental Health

Mental Health Zone: https://coventry.onlinesurveys.ac.uk/mhwbzone

An online booking system for Coventry University Post-Graduate and staff members which allows you to book appointments confidentially with a Mental Health Coordinator.

Connect 2: Online booking system:

https://healthandwellbeingbookings.coventry.ac.uk/

An online resource booking system for Coventry University students and staff.

Together All: https://togetherall.com/en-gb/

An online support network providing services for anxiety, stress, depression and other mental health problems.

Employee Wellbeing Resource Centre

An online service available to all Coventry University staff members. This resource offers advice and information on the 16 most popular health topics with a personal training plan for each topic.

Self-Reported Clinical Symptoms and Immediate Concerns

Samaritans:: 116 123, jo@samaritans.org , https://selfhelp.samaritans.org/
24-hours, 365 days a week helpline for those having a difficult time or to support those who are worried about someone else.

IAPT Services and Self-Referral: https://www.covwarkpt.nhs.uk/IAPT, 024 7667 1090

The IAPT services and online self-referral form allows you to self-refer for psychological therapies. However, due to COVID-19 face-to-face policies, only telephone E-consultations are available.

Mental Health Matters: 0800 616 171
24-hour helpline free from a mobile.

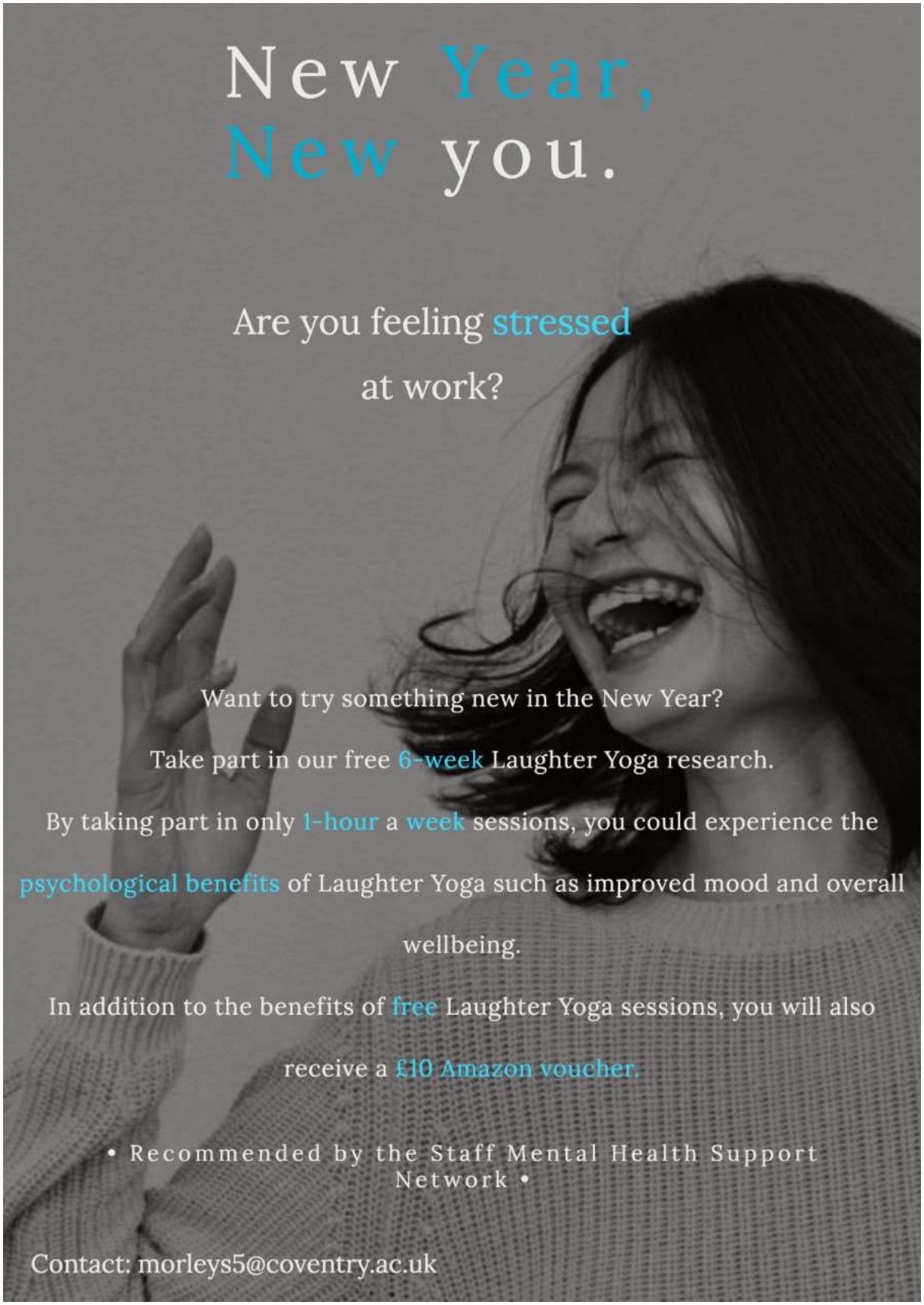
Immediate Intervention with Concern for Wellbeing and Safety

Samaritans: 116 123, jo@samaritans.org , https://selfhelp.samaritans.org/
24-hours, 365 days a week helpline for those having a difficult time or to support those who are worried about someone else.

999 – If you are feeling suicidal or have suicidal thoughts.

Emergency Contact: We will contact the emergency details you provided.

Appendix Six – Laughter Yoga Flyer



Appendix Seven – Participant Information Sheet

BIOPSYCHOSOCIAL IMPACT OF ONLINE LAUGHTER YOGA; A RANDOMISED CONTROL FEASBILITY STUDY

PARTICIPANT INFORMATION SHEET

You are being invited to take part in research on the *'Biopsychosocial Impact of Online Laughter Yoga; a randomised controlled feasibility study'*. Sheriden Morley, PhD Student at Coventry University is leading this research. Before you decide to take part, it is important you understand why the research is being conducted and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

The aim of this study is to assess the acceptability and effectiveness of an online support programmeme, offered through the workplace, for improving mental health . The online support programmeme we are assessing is called 'Laughter Yoga' which combines laughter, playfulness and elements of yoga. The online support programmeme will last for 4-weeks, 1-hour a week over the video-call programmeme 'Zoom'.

Why have I been chosen to take part?

You are invited to participate in this study because:

- You are a current staff member at Coventry University.
- Have access to the internet and a computer
- Are not currently receiving any other yoga or exercise-based intervention
- Do not plan to change medication (for mental or physical ailments) in the next 3-months (throughout the research span).

What are the benefits of taking part?

By sharing your experiences with us, you will be helping Sheriden Morley and Coventry University to better understand the feasibility and effectiveness of providing Laughter Yoga as an online support programmeme. Previous research also indicates that Laughter Yoga can improve overall mood .

Are there any risks associated with taking part?

This study has been reviewed and approved through Coventry University's formal research ethics procedure. There are no significant risks associated with participation. As this online

support programmeme aims to improve mental health , some participants may find the programmeme triggering. If you feel you require more mental health support, please find contacts details at the end of this information sheet and inform the principal investigator.

Do I have to take part?

No – it is entirely up to you. If you do decide to take part, please keep this Information Sheet and complete the Informed Consent Form to show that you understand your rights in relation to the research, and that you are happy to participate. Please note down your participant number (which is on the Consent Form) and provide this to the lead researcher if you seek to withdraw from the study at a later date. You are free to withdraw your information from the project data set at any time until the data are fully anonymised in our records on April, 2021. You should note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, theses and reports) prior to this date and so you are advised to contact the university at the earliest opportunity should you wish to withdraw from the study. To withdraw, please contact the lead researcher (contact details are provided below). Please also contact the Research Support Office ethics.hls@coventry.ac.uk, so that your request can be dealt with promptly in the event of the lead researcher's absence. You do not need to give a reason. A decision to withdraw, or not to take part, will not affect you in any way.

What will happen if I decide to take part?

You will be asked a number of questions regarding your experiences of depression, anxiety and stress. To measure this, we will use the depression, anxiety and stress scale (DASS-21) which will take around 10 minutes in total to complete. We would also like to assess your sleep quality. This will be measured by the Insomnia Severity Index which also takes a few minutes to complete. The questionnaires are electronic to ensure convenience and ensure adherence to COVID-19 policies.

Physical Measures

For this study, we are measuring a stress hormone called cortisol which is released by the brain when we experience stress. To measure cortisol, we require samples of saliva at different time intervals as cortisol measurements fluctuate throughout the day. Collecting saliva is a simple process which involves placing a cotton swab in the mouth for 60-seconds and then placing the swab inside of a plastic tube (see below).

Within this research, participants will be given saliva kits (salivettes) and will be responsible for providing saliva samples at home. A demonstration of how to use the devices and full instructions will be included as detailed by the manufacturer (Sarstedt, Germany). You will be provided with pre-paid and pre-labelled envelopes to return your saliva samples back to the University for analysis; this will be of no cost to you. Please refer to the table below for the saliva measurements we require.

Baseline Measure / screening - 1-week prior to programmeme	Immediately after waking up	30-min after waking up	Midday	Before Bed
Mid-Programmeme (after 2-weeks)	Immediately after waking up	30-min after waking up	Midday	Before Bed
Post-Programmeme (after 4-weeks)	Immediately after waking up	30-min after waking up	Midday	Before Bed
Follow-up (after 12-weeks)	Immediately after waking up	30-min after waking up	Midday	Before Bed
Acute Cortisol Measures	Immediately before programmeme	Immediately after programmeme		

Focus Group

Following completion of the research, you will be invited to attend an online focus group feedback session. This will give you the opportunity to provide verbal feedback with your opinions and experiences of the online support programmeme and entire research process. If you would like to take part in the focus group, please inform the researcher after the last session as this requires competition of another consent form.

Data Protection and Confidentiality

Your data will be processed in accordance with the General Data Protection Regulation 2016 (GDPR) and the Data Protection Act 2018. All information collected about you will be kept strictly confidential. Unless they are fully anonymised in our records, your data will be referred to by a unique participant number rather than by name. If you consent to being audio recorded, all recordings will be destroyed once they have been transcribed. Your data will only be viewed by the researcher/research team. All electronic data will be stored on a password-protected computer file stored on a password-protected external hard-drive, kept in a safe at the lead researchers home address. No paper copies will be used in this research. The lead researcher will take responsibility for data destruction and all collected data will be destroyed on or before January 2027.

Data Protection Rights

Coventry University is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance with the General Data Protection Regulation and the Data Protection Act 2018. You also have other rights including rights of correction, erasure, objection, and data portability. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - enquiry.igu@coventry.ac.uk

What will happen with the results of this study?

The results of this study may be summarised in published articles, reports and presentations. Quotes or key findings will always be made anonymous in any formal outputs unless we have your prior and explicit written permission to attribute them to you by name.

Making a Complaint

If you are unhappy with any aspect of this research, please first contact the lead researcher, Sheriden Morley, morleys5@coventry.ac.uk. If you still have concerns and wish to make a formal complaint, please write to:

Martin Bollard
Associate Professor
Faculty of Health and Life Sciences
Coventry University
Coventry CV1 5FB
Email: aa1895@coventry.ac.uk

In your letter please provide information about the research project, specify the name of the researcher and detail the nature of your complaint.

Appendix Eight – Laughter Yoga Cortisol Sheet

Laughter Yoga Research – Salivary Cortisol Kits

Hi there!

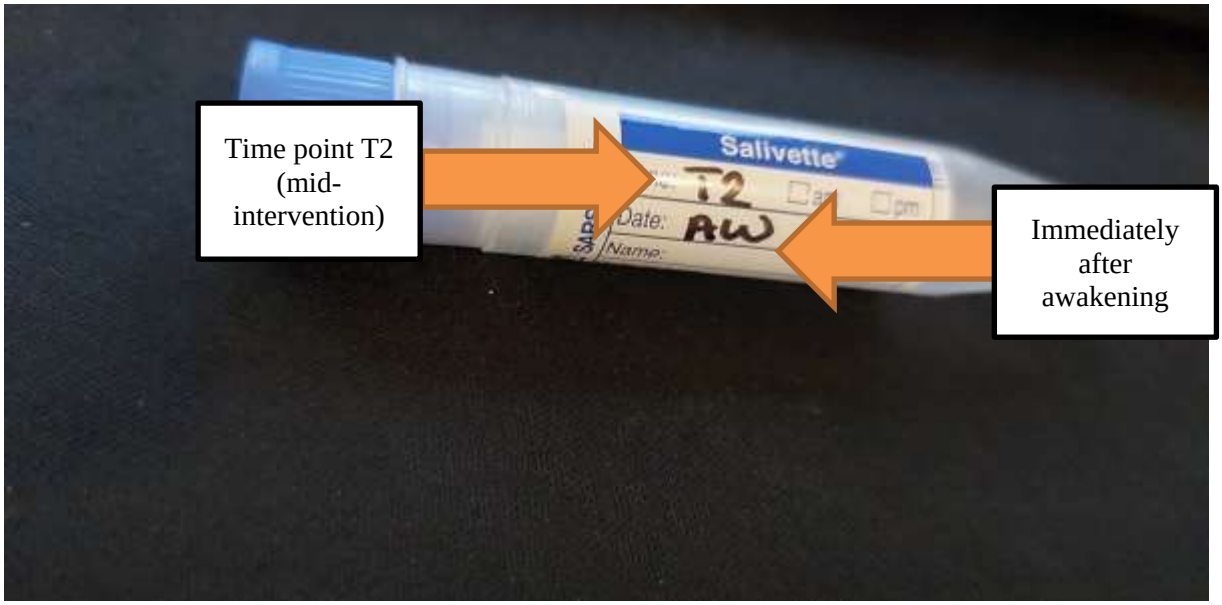
I hope you are keeping safe and well during this time. Firstly, I'd just like to say thank you for taking part in this research. As you know, mental health is extremely important, especially during the past year or so. We hope that this research will help contribute towards improving mental health for staff members at Coventry University. Without you, this research would not be possible.

In this pack, you will find **20 salivary cortisol tubes** for you to use as part of the research. As shown in the information sheet sent to you, we would like for you to obtain your own salivary cortisol measures at certain time points. In the table below, you will see that you can provide the samples within a certain time scale. However, **please take all measures in one day (e.g immediately after waking up, 30-min after waking up, midday and before bed).** If it helps, set alarms and reminders on your phone to remind you

Here is a reminder of how to take a sample:

Due to COVID-19, we are unable to store any tubes. **PLEASE STORE YOUR TUBES IN THE FRIDGE ONCE YOU HAVE PROVIDED A SAMPLE.**

The tubes have been coded to ensure we analyse samples that correspond to the right time point. The tubes should appear like this:



You will find a salivary cortisol table within this pack to help you keep track of which samples you have taken. We will not need this back, but you may find it useful to 'mark off' which samples you have done. Once you have completed the table, and all cortisol measures, please send back with the free return label within this pack

Once again, thank you so much for taking part in this research. If you have any questions at all, please feel free to contact me at: morleys5@coventry.ac.uk

Keep safe!

Sheriden Morley
PhD Student
Faculty of Health and Life Sciences

Participant No.

Salivary Cortisol Table

Date

T0: **Any time before the first session**	Immediately after awakening (T0 - AW) ☐	30-min after awakening (T0 -30) ☐	Midday (T0- MID) ☐	Before bed (T0- BED) ☐
T1: **Feb 8th – Feb 14th**	Immediately after awakening (T1- AW) ☐	30-min after awakening (T1 – 30) ☐	Midday (T1 – MID) ☐	Before bed (T1 – BED) ☐
T2: **March 1st – 7th**	Immediately after awakening (T2- AW) ☐	30-min after awakening (T2- 30) ☐	Midday (T2- MID) ☐	Before bed (T2- BED) ☐
T3: **March 22nd – March 28th**	Immediately after awakening (T3- AW) ☐	30-min after awakening (T3- 30) ☐	Midday (T3- MID) ☐	Before bed (T3- BED) ☐
Session One:	Immediately before session (S1 -BE) ☐	Immediately after session (S1-AF) ☐		
Session Four:	Immediately before session (S2 -BE) ☐	Immediately after session (S2-AF) ☐		

PLEASE KEEP TUBES REFRIDGERATED ONCE SAMPLE HAS BEEN PROVIDED

ONCE ALL MEASURES ARE COMPLETE, PLEASE RETURN VIA FREE RETURN JIFFY BAG

Appendix Nine – Wait-list Control Cortisol Sheets

Laughter Yoga Research – Salivary Cortisol Kits

Hi there!

I hope you are keeping safe and well during this time. Firstly, I'd just like to say thank you for taking part in this research. As you know, mental health is extremely important, especially during the past year or so. We hope that this research will help contribute towards improving mental health for staff members at Coventry University. Without you, this research would not be possible.

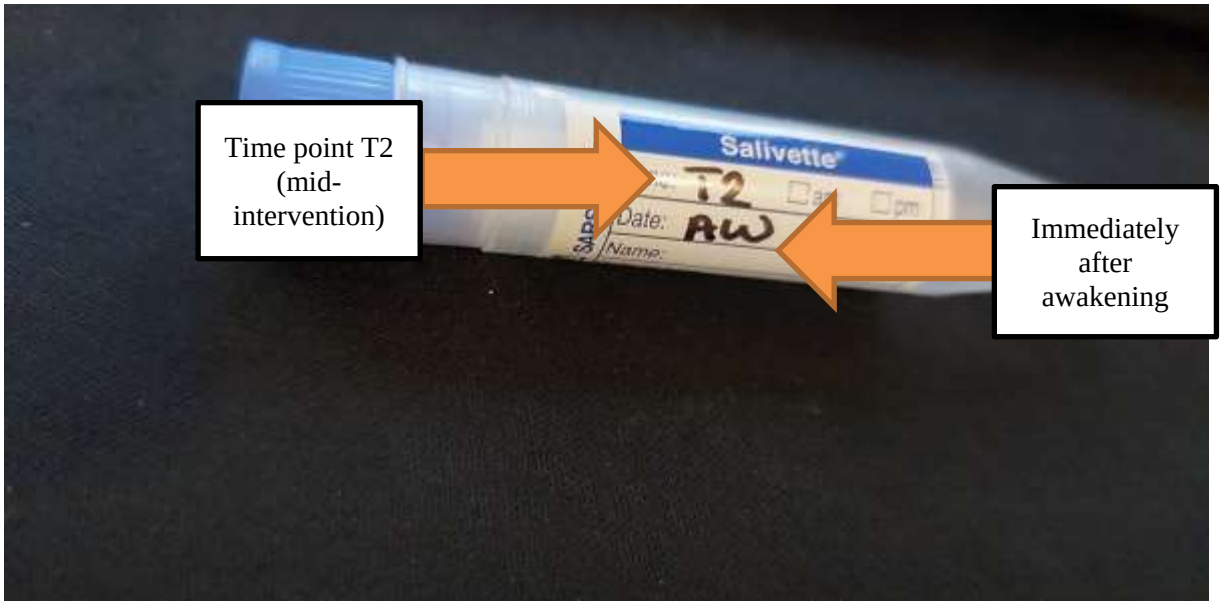
In this pack, you will find **16 salivary cortisol tubes** for you to use as part of the research. As shown in the information sheet sent to you, we would like for you to obtain your own salivary cortisol measures at certain time points. In the table below, you will see that you can provide the samples within a certain time scale. However, **please take all measures in one day (e.g immediately after waking up, 30-min after waking up, midday and before bed).** If it helps, set alarms and reminders on your phone to remind you

Here is a reminder of how to take a sample:

Due to COVID-19, we are unable to store any tubes. **PLEASE STORE YOUR TUBES IN THE FRIDGE ONCE YOU HAVE PROVIDED A SAMPLE.**

The tubes have been coded to ensure we analyse samples that correspond to the right time

point. The tubes should appear like this:



You will find a salivary cortisol table within this pack to help you keep track of which samples you have taken. We will not need this back, but you may find it useful to 'mark off' which samples you have done. Once you have completed the table, and all cortisol measures, please send back with the free return label within this pack

Once again, thank you so much for taking part in this research. If you have any questions at all, please feel free to contact me at: morleys5@coventry.ac.uk

Keep safe!

Sheriden Morley
PhD Student
Faculty of Health and Life Sciences

Participant No.

Salivary Cortisol Table

Date

T0: **Any time before the first session**	Immediately after awakening (T0 - AW) ☐	30-min after awakening (T0 -30) ☐	Midday (T0- MID) ☐	Before bed (T0- BED) ☐
T1: **Feb 8th – Feb 14th**	Immediately after awakening (T1- AW) ☐	30-min after awakening (T1 – 30) ☐	Midday (T1 – MID) ☐	Before bed (T1 – BED) ☐
T2: **March 1st – 7th**	Immediately after awakening (T2- AW) ☐	30-min after awakening (T2- 30) ☐	Midday (T2- MID) ☐	Before bed (T2- BED) ☐
T3: **March 22nd – March 28th**	Immediately after awakening (T3- AW) ☐	30-min after awakening (T3- 30) ☐	Midday (T3- MID) ☐	Before bed (T3- BED) ☐

PLEASE KEEP TUBES REFRIDGERATED ONCE SAMPLE HAS BEEN PROVIDED

ONCE ALL MEASURES ARE COMPLETE, PLEASE RETURN VIA FREE RETURN JIFFY BAG

Appendix Ten – Laughter Yoga Sessions 1 - 4

21 Coventry University Session 1 Plan – breakdown of exercise descriptions:

EXERCISE	DESCRIPTION	COMMENTS
5 Points about LY	**Contra-indications** Unique concept Group, eye contact + childlike playfulness Reason – L exercises + deep breathing Concept based on scientific evidence Dr Madan Kataria – 1995, 10K clubs - 105 countries	Complete individual forms and register Introduce + ask perception of what LY is about
3 Reasons	10 – 15 minutes Deep hearty laughter Daily	To feel cumulative benefits
5 Benefits	Elevates mood Stress relief Health – immune system Connector of people – caring – sharing Laughter challenges – coping strategy	Go into more detail for about 1 minute
4 components of session	Clapping and warm up Deep breathing Childlike playfulness Laughter exercise	4 Aspects: Body, Mind, Spirit, emotional energy Love, kindness, compassion, beaurty You are what you feel Laugh in play ….. because we can
Alive, Awake, Alert, Enthusiastic – activity	Arms out in front (palms up) – say 'I'm ALIVE. Arms outstretched sideways – say AWAKE Hands to mouth with eyes wide open (as if shouting to someone) – say ALERT Run on the spot whilst turning hands over in a pedalling motion – say ENTHUSIASTIC Repeat Say I'm ALIVE, AWAKE ALERT then Say ALERT, AWAKE, ALIVE Repeat from beginning.	Twice through complete sequence

EXERCISE	DESCRIPTION	COMMENTS
Comfort Zone Laughter (+ Breathing) **7.5** (Karen Siugzda #883)	Inhale and draw an imaginary boundary circle around yourself. Exhale and gently step outside the boundary circle. Repeat couple of times. Next time exhale with a gentle chuckle as step out of boundary circle. Allow laughter to increase and get louder.	Participants decide the size and playfulness of their step Good example of pre-supposition to combat anxiety.
7.6 Shy laughter	Put hands in front of face, peer over fingers having eye contact with others and laugh in a shy manner. Repeat several times	30 – 40 seconds
7.7 Mobile phone laughter	Chatter, giggle and laugh. Share phones too.	No more than 30 seconds then clap-chant, followed by breathing
Zipper laughter (Dave Berman)	Pull your fingers from one hand across your lips to zip mouth shut. 'Unzip' lips and laugh out loud. Have eye contact with others and repeat – looking at different people	20 – 30 seconds
Fishing Laughter	Pretend to throw a fishing line, feel a tug at the line and pull out a 'little' fish – throw the fish and line back in the water and feel the line tug again – pull out a huge fish and laugh	2-3 sequences
Swim strokes laughter (Ros Ben-Moshe – 293)	Pretend to do crawl, butterfly and breast stroke swimming whilst laughing. Also do 'doggy paddle' stroke with laughter. Then use towel to dry selves laughter.	30 seconds
Magic laughter dust (Maya Carrington)	Pretend to throw magic laughter dust and laugh – throw at self and also share with others	20 – 30 seconds
1 Metre laugh	Pretend to measure cloth, put right hand from left hand to left elbow whilst chanting 'Eeee', then to left shoulder + right shoulder – stretch right arm out and laugh	Repeat sequence 3 - 4 times
Free Flow	Participants sit or lie in a circle and allow the laughter to	As long as they wish

EXERCISE	DESCRIPTION	COMMENTS
laughter	flow like a meditation. If they prefer they can do it with their eyes closed to help them feel in a comfort zone	
Vowel + humming meditation / breathing	Breath in and say ‘a’ vowel sound as slowly breath out. Then do similarly for rest of vowel sounds – ‘e’, ‘I’, ‘o’, ‘u’. Finish with ‘hum’	One sequence

EXERCISE	DESCRIPTION	COMMENTS
Welcome + Introductions		
A Tootsie Ta activity	https://www.youtube.com/watch?v=rcxttfld4BY Hands outstretched in front of you – palms down sing: A Tootsie Ta, A Tootsie Ta, A Tootsie Ta – Ta Girate hips whilst singing and repeat Right hand forward, left hand forward then repeat above with	Once through complete sequence

EXERCISE	DESCRIPTION	COMMENTS
	actions. RH, LH – then elbows back …. A Tootsie Ta ….. RH, LH, Elbows – then bum backwards…. A Tootsie Ta …. RH, LH, Elbows, Bums – then knees together …….. RH, LH, Elbows, Bums, knees – then tongue out …. Bend forward, arms down,reach up high ooooooooaaaah	
Milkshake laughter	Ask the group for ingredients for the milkshake, add them one at a time then shake the milkshake to one side, then the other chanting 'Eeee' then drink - laugh	Care with people leaning backwards with neck problems - No more than 3 times.
Visa Bill Laughter	Opening a bill, looking down the list of items, shrug and laugh at the total expenditure	2 – 3 repetitions
1 Metre laugh	Pretend to measure cloth, put right hand from left hand to left elbow whilst chanting 'Eeee', then to left shoulder + right shoulder – stretch right arm out and laugh	Repeat sequence 3 - 4 times
Bike Ride Laughter	Walk around the room doing pedalling action with arms; pretend to struggle up a hill – at the top of the 'hill' pretend to swoop down the descent, saying 'Wheeeeee' and laughing	2-3 sequences
Balloon Laughter	Blow up balloons then let them go letting them blow 'raspberries'	1-2 sequences.
Pass the Laugh	Each person introduces their own kind of laugh and everyone copies it – then passes to the next person	Once around everyone
Fishing Laughter	Pretend to throw a fishing line, feel a tug at the line and pull out a 'little' fish – throw the fish and line back in the water and feel the line tug again – pull out a huge fish and laugh	2-3 sequences
Squash the Problem	Think of an overwhelming problem in your life. With your arms out to show how huge the problem is compress by bringing arms closer and closer saying 'ha' each time. When hands together wipe them to get rid of the problem …. Where's the problem?! It's now so small we can deal with it.	One sequence.

EXERCISE	DESCRIPTION	COMMENTS
7.8 Gibberish	Imagine you are Tinkerbell the fairy in Peter Pan and you speak in nonsense language. Using body language, show emotions of excitement, sadness, delight, jealousy, Love, anger and a feeling of peace.	Explain this can be spoken in an excited tone and movement or and exasperated tone and movement, displaying what is being felt but using non-recognisable words to ensure no-one is offended.
7.9 Traffic Lights	Green – pretend to drive (walk around room); red – stop and laugh – amber stop laughter	Colours to be shouted out by leader – 2-3 sequences.
Finger kisses laughter **7.10** (Bron Roberts (#255)	Hold up finger and draw smiley face on tip. Look at smiley finger and laugh. Show finger to others and laugh. Kiss finger and laugh 'kiss' other fingers and laugh.	30 seconds
Free Flow laughter	Participants sit or lie in a circle and allow the laughter to flow like a meditation. If they prefer they can do it with their eyes closed to help them feel in a comfort zone	As long as they wish
Grounding Relaxation	Guided Relaxation	Once

Subject:	Laughter Yoga session	**Date:**	18 February 2021	**Time:**	12:00 – 12:45	**Duration:**	45 min
Tutor:	Maggie Thompson	**Where:**	Via Zoom	**Group Detail:**	Mixed Adults	**Group size:**	16
Aims:	A practical opportunity to experience Laughter Yoga						
Objectives:	- Ensure all participants feel comfortable with the concept - Gently and empathically introduce movement, breathing and smiles - Introduce basic laughter exercises - Encourage connectivity						
Preparation:	- Explain 'Laughter Yoga Information and Liability Release' form (all participants will have completed this form) - Graduated session plan ensuring participants feel within their comfort zones. - Advise participants to have a glass of water handy so they don't feel dehydrated						

Time	Timing	Point/Activity	Instructor	Learner	Resources	Assessment
12:00	5 min	Welcome – Introductions High 5 Greeting	Introduce session	Listen		Observation
12:05	3 min	Ice Breaker Counting Brain Gym	Lead exercise	Sing/ Move		Observation
12:08	3 min	Hand Gel laughter	Lead exercise	Participate		Observation
12:11	3 min	Argument / Appreciation laughter	Lead exercise	Participate		Observation
12:14	3 min	Laughter Boxes	Lead exercise	Participate		Observation
12:17	3 min	Ho ho, ha ha, he he laughter song	Lead exercise	Participate		Observation
12:20	3 min	Pancake laughter	Lead exercise	Participate		Observation
12:23	3 min	Food fight laughter	Lead exercise	Participate		Observation
12:26	3 min	Silent laughter	Lead exercise	Participate		Observation
12:29	3 min	Windscreen wipers	Lead exercise	Participate		Observation
12:32	5 min	Gibberish – descriptions and directions	Introduce concept to aid expression of feelings using nonsense words (Tinkerbell emotions) Lead exercise	Participate		Observation
12:37	3 min	Three-part lung	Lead exercise	Participate		Observation
12:40	3.min	Open your Heart	Lead exercise	Participate		Observation
12:43	3 min	Free flow laughter	Invite all participants to just laugh in free flow for as long as they wish	Participate		Observation
12:46 - 12:50	4 min	Grounding Dance	Lead exercise	Participate		Observation

Session 1 - Self Evaluation

Strengths	Areas for development	Action and improvements required

Subject:	Laughter Yoga session	**Date:**	25 February 2021	**Time:**	12:00 – 12:45	**Duration:**	45 min
Tutor:	Maggie Thompson	**Where:**	Via Zoom	**Group Detail:**	Mixed Adults	**Group size:**	16

Aims:	A practical opportunity to experience Laughter Yoga
Objectives:	- Ensure all participants feel comfortable with the concept - Gently and empathically introduce movement, breathing and smiles - Introduce basic laughter exercises - Encourage connectivity
Preparation:	- Explain 'Laughter Yoga Information and Liability Release' form (all participants will have completed this form) - Graduated session plan ensuring participants feel within their comfort zones. - Advise participants to have a glass of water handy so they don't feel dehydrated

Time	Timing	Point/Activity	Instructor	Learner	Resources	Assessment
12:00	5 min	Welcome – Introductions Handshake - mistake	Introduce session	Listen		Observation
12:05	3 min	In the Pond Activity	Lead exercise	Sing/ Move		Observation
12:08	3 min	Jacket Zipper Laugh	Lead exercise	Participate		Observation

Time	Timing	Point/Activity	Instructor	Learner	Resources	Assessment
12:11	3 min	Identify Pain in body	Lead exercise	Participate		Observation
12:14	3 min	Laughter Pills	Lead exercise	Participate		Observation
12:17	3 min	Mental Floss	Lead exercise	Participate		Observation
12:20	3 min	Laughter boxes	Lead exercise	Participate		Observation
12:23	3 min	Drunk waiter / Mrs Overall	Lead exercise	Participate		Observation
12:26	3 min	EGBOK	Lead exercise	Participate		Observation
12:29	3 min	Hot soup / freezing ice cream	Lead exercise	Participate		Observation
12:32	5 min	Roller Coaster	Lead exercise	Participate		Observation
12:37	3 min	Gather your troubles	Lead exercise	Participate		Observation
12:40	3.min	Laughter Selfie	Lead exercise	Participate		Observation
12:43	3 min	Free flow laughter	Invite all participants to just laugh in free flow for as long as they wish	Participate		Observation
12:46 - 12:50	5 min	Bollywood Dance – Fruit Salad	Lead exercise	Participate		Observation

Session 1 - Self Evaluation

Strengths	Areas for development	Action and improvements required

Appendix Eleven– Focus Group Consent Form

Participant No.

INFORMED CONSENT FORM:
Biopsychosocial Impact of Online Laughter Yoga; Focus Group

Please provide your location (place you will take part in the session) and emergency contact details. **These details will only be used in case of an emergency.**
Location:
Emergency Contact

You are invited to take part in this focus group which gives you the opportunity to provide feedback on your and experiences of the online support programmeme and research. Before you decide to take part, you must **read the accompanying Participant Information Sheet.**

Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether you wish to take part.

If you are happy to participate, please confirm your consent by circling YES against each of the below statements and then signing and dating the form as participant.

1	**I confirm that I have read and understood the Participant Information Sheet for the above study and have had the opportunity to ask questions**	**YES**	**NO**
2	**I understand my participation is voluntary and that I am free to withdraw my data, without giving a reason, by contacting the lead researcher and the Research Support Office at any time until the date specified in the Participant Information Sheet**	**YES**	**NO**
3	**I have noted down my participant number (top left of this Consent Form) which may be required by the lead researcher if I wish to withdraw from the study**	**YES**	**NO**
4	**I understand that all the information I provide will be held securely and treated confidentially**	**YES**	**NO**
5	**I am happy for the information I provide to be used (anonymously) in academic papers and other formal research outputs**	**YES**	**NO**
6	**I have provided my location (where you will access the focus group) and emergency contact details and agree that these details will be used in case of an emergency.**	**YES**	**NO**
7	**I am happy to leave my video ON during the Focus group session**	**YES**	**NO**
8	**I agree for the focus group to be recorded to aid collection of data.**	**YES**	**NO**
9	**I agree to take part in the above focus group**	**YES**	**NO**

Participant's Name	**Date**	**Signature**
Researcher	**Date**	**Signature**

Thank you for taking part in this research. Your conrtibution is highly valued.
Sheriden Morley: morleys5@coventry.ac.uk

How did you come across the Laughter Yoga research?

Did you enjoy the Laughter Yoga sessions? Why?

Did you find the Laughter Yoga session beneficial? How?

Outside of the session, did you engage in any Laughter Yoga in your own time?

Will you continue with Laughter Yoga now the research has finished?

Participant No.

Participant ID:

About You

All answers will remain anonymous and will only be used in data analysis. You will only need to complete this once. You feel uncomfortable answering any question, please leave blank.

Age:

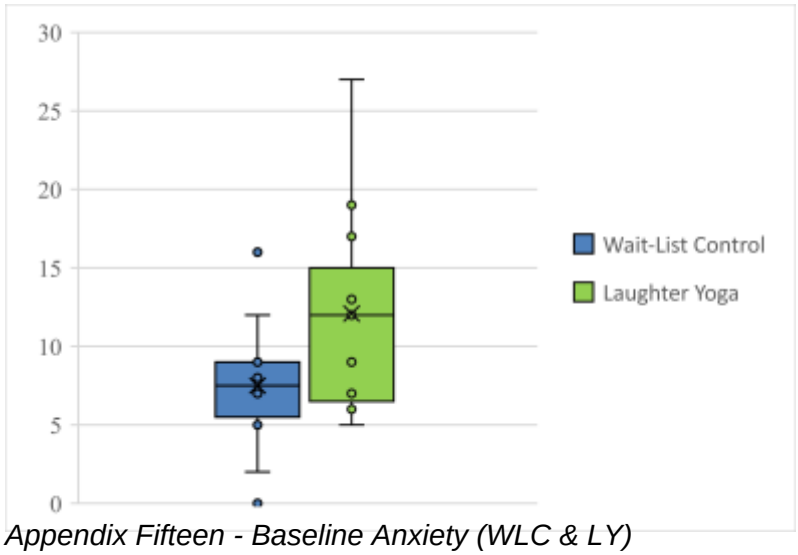
Nationality:

Gender:

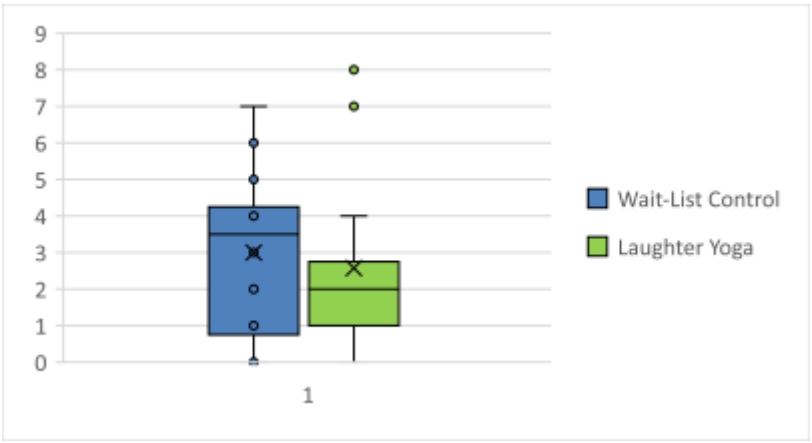
Department:

Years working at Coventry University:

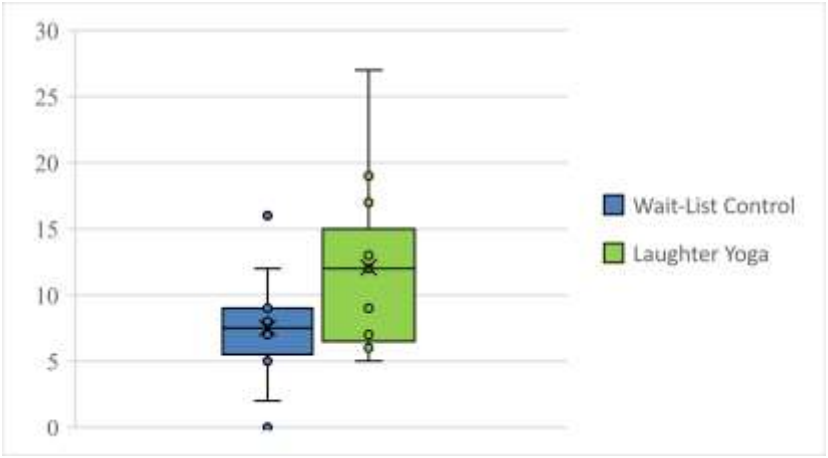
Appendix Fourteen - Baseline Depression (WLC & LY)



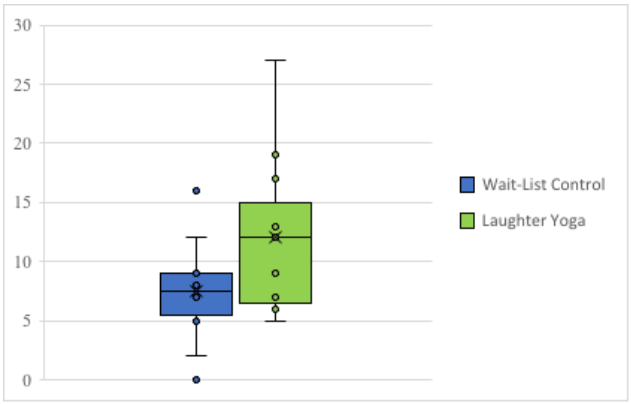
Appendix Fifteen - Baseline Anxiety (WLC & LY)



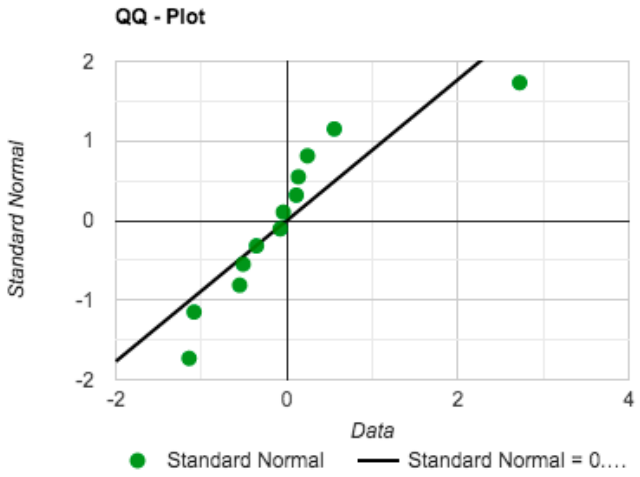
Appendix Sixteen - Baseline Stress (WLC & LY)



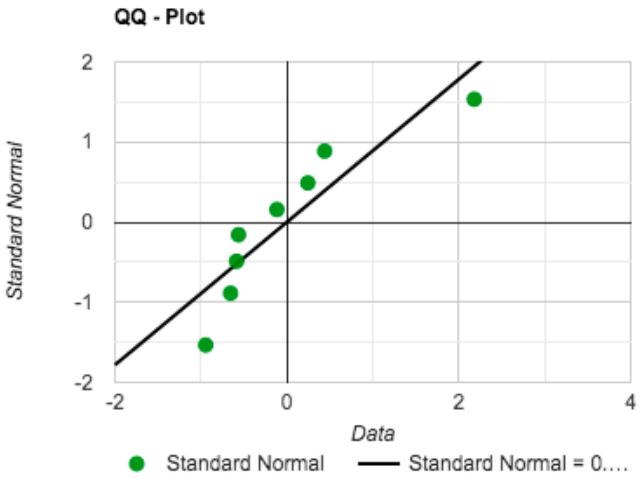
Appendix Seventeen - Baseline Insomnia (WLC & LY



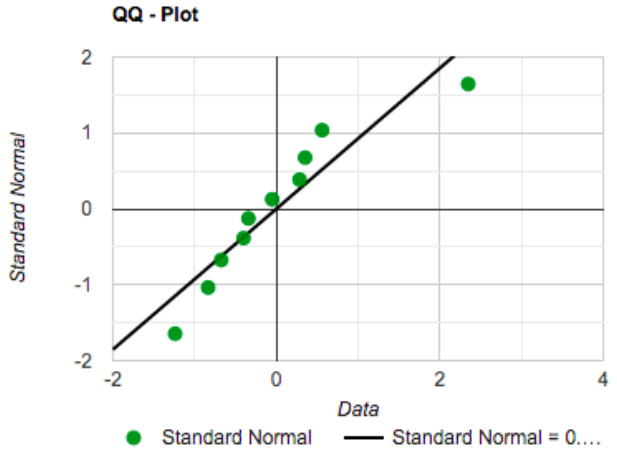
Appendix Eighteen – Baseline Cortisol AW- T0 (WLC)



Appendix Nineteen – Baseline Cortisol AW- T0 (LY)

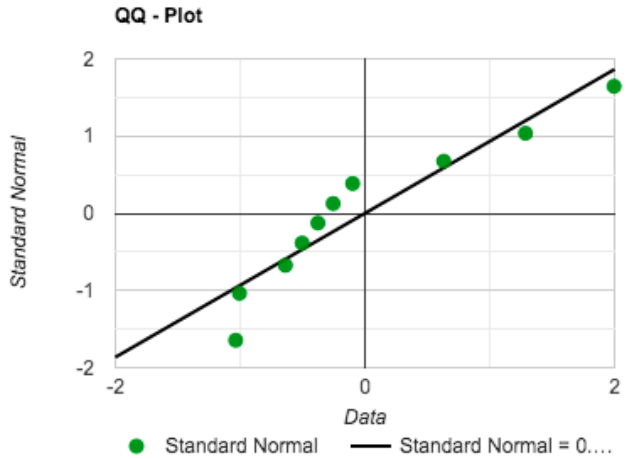


Appendix Twenty– Baseline Cortisol 30- T0 (WLC)

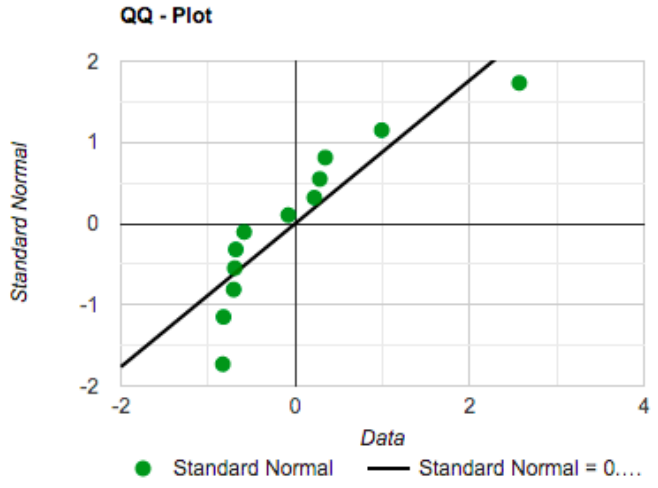


Appendix Twenty-One– Baseline Cortisol 30- T0 (LY)

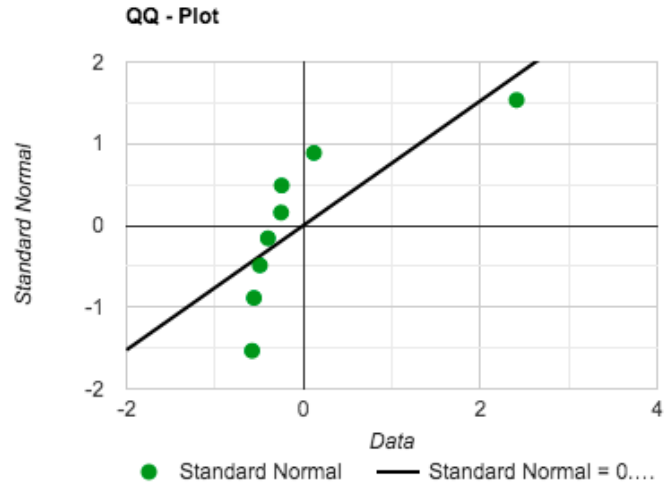
Appendix Twenty-Two– Baseline Cortisol MID- T0 (WLC)



Appendix Twenty-Three – Baseline Cortisol MID- T0 (LY)



Appendix Twenty-Four – Baseline Cortisol BED- T0 (WLC)



Appendix Twenty-Six– Baseline Cortisol BED- T0 (LY)