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DOCTOR OF PHILOSOPHY

Promoting the implementation of occupational therapy home programmes for children with cerebral palsy based on evidence, theory and practice

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Award date:
2022

Awarding institution:
Coventry University

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Promoting the Implementation of Occupational Therapy Home Programmes for Children with Cerebral Palsy based on Evidence, Theory and Practice

By

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

April 2020

Coventry University

Abstract

Introduction Occupational therapists are expected to underpin and inform delivery of services and treatment with the best available evidence. However, the nature of 'best evidence' is much disputed, and difficulties in implementing best evidence, where it is available, are well documented. In addition, it is recognised that there are gaps in the evidence base for many therapy services delivered world-wide. Knowledge translation processes are designed to help move evidence, policy, and theory into practice to help close these gaps. A vital first step for knowledge translation interventions is to identify contextual changes required to adopt evidence, policy, and theory into practice.

Background Cerebral palsy affects a person's whole body, to varying degrees, impacting everyday occupations. Occupational therapy home programmes (OTHPs) are important for children with cerebral palsy (CWCP) since they can increase the overall amount of therapy provided to the child, by involving family members in addition to therapists, potentially leading to better outcomes. These parent-implemented programmes, with oversight from an occupational therapist, involve individualised goal-directed interventions and the routine application of measurement tools.

Aim In the absence of knowledge about the implementation of OTHPs, a need was identified for the creation of a body of evidence to identify how they are used within the context of evidence-based practice (EBP). The aim of this thesis is to draw together and discuss this evidence in relation to relevant theory and policy and highlight mechanisms of support needed to ensure the delivery of OTHP best practice.

Methodology The approach of subtle realism is adopted as the lens through which the analysis and discussion of the four-study collection of work is undertaken. This approach reflects the complexity of knowledge and of occupational therapy, within the realities of home programme delivery. Study designs include a cross-sectional survey, practice analysis, critical review, and qualitative interviews.

Findings The use and content of evidence-based OTHPs vary. Gaps in the evidence relate to standards of goal setting, evaluation, and uptake of effective interventions within a family-centred framework. Implementation barriers relate to lack of EBP knowledge, opportunity, and motivational processes. Support mechanisms include, use of profession-specific theories, mentorship, and collaborative partnership working between higher education and practice settings.

Conclusion This thesis provides a novel understanding of the factors influencing the delivery of OTHPs for CWCP. Change is warranted to value and implement EBP, capture outcomes, improve goal-setting and use occupational therapy theories to both enhance family-centred care and articulate the profession's unique contribution.

Table of Contents

List of abbreviations

Bimanual Training	BT
Capability, Opportunity, Motivation and Behaviour model	COM-B model
Children with Cerebral Palsy	CWCP
Evidence-Based Practice	EBP
Health and Care Professions Council	HCPC
Modified Constraint Induced Movement Therapy	m-CIMT
National Institute for Health and Clinical Excellence	NICE
Occupational Therapy Home Programmes	OTHPs
Person-Environment-Occupation model	PEO model
Royal College of Occupational Therapists	RCOT
The Gross Motor Function Classification System	GMFCS
Theoretical Domains Framework	TDF
World Federation of Occupational Therapists	WFOT

List of figures and tables

Figures

Tables

Preface to the thesis

I am a registered occupational therapist with the Health and Care Professions Council (HCPC) and Royal College of Occupational Therapists (RCOT). I have worked within the Faculty of Health and Life Sciences, at Coventry University since 2007, currently as an Assistant Professor in Occupational Therapy. I combine academic, clinician and researcher roles, which I believe enhances my knowledge, understanding and ability to critically appraise the issues involved in OTHP research. My interest in this research area started when home programmes were used as a focus of service delivery for children with cerebral palsy (CWCP) at a specialist centre where I worked. I then conducted a qualitative research study that reported on the parental experience of carrying out home programmes for CWCP as part of an Advanced Master's degree. Following this in 2008, I gained an honorary contract to work as a mentor for practitioners within an NHS occupational therapy children's service. Over the next three years, whilst continuing to work as an academic at Coventry University, I carried out research projects, and worked towards facilitating OTHP knowledge translation. Furthermore, I supported the development of a clinical pathway for CWCP. During this time, I became Research Lead for the National Committee of the Royal College of Occupational Therapists' Specialist Section for Children and Young People. Dr Carolyn Dunford, former Head of Research at the Children's Trust in Tadworth, became my occupational therapy supervisor. In 2013, Coventry University initiated a mentoring scheme, which was when I met Associate Professor (Health Psychologist) Dr Katie Newby, my PhD by portfolio mentor.

Part 1: Introduction

Occupational therapy is a client-centred profession which focuses on developing an individual's ability to participate and function to their highest level in daily activities in different settings (RCOT 2021a). For children with cerebral palsy (CWCP), occupational therapy is an integral part of their healthcare provision. Cerebral palsy (CP) is the most common physical disability in childhood affecting the whole body to varying degrees, which impacts on a child's ability to engage and participate in meaningful everyday activities. CWCP often receive interventions via OTHPs to complement their sessions of direct hands-on occupational therapy and increase the dose of therapy (Myrhaug et al., 2014).

OTHPs for CWCP 'target body structure, activities, and participation problems identified collaboratively by the parents and therapist' (Novak, Cusick, and Lannin 2009: 607). This

method of therapy modality aims to induce neuroplasticity and is proven to improve motor activity performance and self-care function through regular practice and participation in meaningful activities (Novak, Cusick, and Lannin 2009). Families of CWCP have further described OTHPs as being 'a form of guidance and advice, which become a way of life …. parents use the guidance and support that they gain from home programmes to build confidence about how to help their child' (Novak 2011: 209). Essentially, these programmes consist of meaningful goal-based tasks which are practiced by a child in the home environment, led by the parent with oversight from an occupational therapist.

Despite the efficacy of OTHPs being assured (Novak et al., 2020: 13), evidence-based OTHPs are complex to deliver and practitioners have indicated the need for training and skill development in using them (Sakzewski, Ziviani, and Boyd 2013). Furthermore, the extent to which practitioners implement OTHPs using an EBP approach is unknown. Therefore, to understand current practice, identify specific targets to improve implementation, and achieve the best outcomes for CWCP, an investigation into the extent to which this is happening within the UK context is worthwhile.

1.1 Overall aims and objectives of the thesis

To optimise the use of OTHPs, it is vital to sustain efforts to support knowledge translation for CWCP and help practitioners understand how to apply the best available OTHP evidence. The four publications in this thesis sought to build on and extend the home programme research area (Novak and Cusick 2006; Novak, Cusick, and Lowe 2007; Novak, Cusick, and Lannin 2009; Novak 2011), by identifying evidence-to-practice support for practitioners implementing OTHPs in order to improve the design and efficacy of these programmes. Hence, the aim of this thesis is to draw together and critically discuss these four publications in relation to relevant theory and policy, and to highlight the mechanisms of support needed to ensure that OTHPs are implemented based on the evidence of what works best. The two main objectives of this thesis were to identify, appraise and understand the:

(i) use, content and decision-making process supporting OTHPs for CWCP (output 1, 2, and 4);

(ii) supports and barriers to OTHP implementation, to inform the development of knowledge translation interventions and help practitioners implement OTHPs effectively in order to achieve the best outcomes (outputs 1, 2, 3 and 4).

1.2 Nature of the problem

At present, there is no known cure for CP, but there is compelling evidence that functional gains are possible for CWCP when interventions are individualised and goal-directed (Novak et al., 2020). However, despite the evidence, children around the world are receiving outdated care; there is an average lag of 17 years, a whole childhood equivalent, between the routine implementation of new evidence into practice (Hanney et al., 2015; Rodger, Brown, and Brown 2005; Saleh et al., 2008). From a UK perspective, only a small proportion of the children born with cerebral palsies every year receive the early and intensive intervention that could genuinely transform their lives, which suggests that CP is not a well-understood or resourced condition (Action for Cerebral Palsy 2015).

Helping the 30,000 children in the UK with cerebral palsies achieve their full potential in life is an area of policy interest for the current conservative government. In 2014 the Children and Families Act, (published under the 2010-2015 Conservative and Liberal Democrat coalition Parliament) introduced a system to support children with special educational needs and disabilities. In addition, following a parliamentary inquiry (2015) to help children specifically with CP, further recommendations were made which included the need for: (i) an appropriately anonymised National Cerebral Palsy register; (ii) improved training and best practice guidelines for clinical and educational practitioners working with CWCP; (iii) improved training for (and numbers of) therapists trained to work with CWCP; (iv) development of a national strategy for CWCP; and (v) better training and support for parents and wider family members (Action Cerebral Palsy 2016).

Subsequent follow-up reports regarding CP provision across the UK revealed that the 2015 parliamentary review's recommendations remained unmet (Action Cerebral Palsy 2016). To address the disparities in CP services across England, the 2020 Action for Cerebral palsy report (2020:4) reiterated several recommendations including: 'early identification, assessment and intervention for all children with, or at risk of, CP; a national register of CWCP to aid best practice pathways, provision planning and research; and improved

training and professional development of education and healthcare professionals, to increase their awareness and assist them in detecting the early signs of CP in babies and children.' So far, however, the Action for CP recommendations have not been fully realised, which is a problem, as families may not yet be receiving the healthcare they deserve to achieve the best outcomes (All-Party Parliamentary Group on CP 2021). Many aspects such as funding issues, lack of a family-centred approach to interventions and community therapy staff shortages are interfering with these CP recommendations being fulfilled (Richardson 2018). Evidence translated into practice is one of the aspects that influence the implementation of best practice. Therefore, to enhance the quality of healthcare and improve patient outcomes, it is imperative that all health professionals use an EBP approach (Melynk and Fineout-Overhold 2019). The related fields of knowledge translation and implementation science assist EBP, through their focus on specific methods and techniques to facilitate the transfer of evidence into practice.

1.3 Evidence-based practice and knowledge translation

Broadly accepted as being central to the complex activity of clinical decision-making (Crist 2010; O'Neill, Dluhy, and Chin 2005), EBP in occupational therapy is recognised as being important for the advancement of the profession and is endorsed by occupational therapy associations (The American Occupational Therapy Association (AOTA) 2021; RCOT 2021b; World Federation of Occupational Therapists (WFOT) 2021). EBP is understood to take into account 'the integration of the best available research evidence, together with the practitioner's clinical expertise and the service user's values and goals' (College of Occupational Therapists 2015:1). Yet, despite being a required professional standard and competency, only a small proportion of occupational therapists implement EBP, use evidence to make clinical decisions, or apply research findings to practice (Boström et al., 2018; Brown et al., 2010; Lyons et al., 2010; Salls et al., 2009; Upton et al., 2014; Wressle and Samuelsson 2015).

To guide clinical decision-making, three EBP dimensions need to be integrated: (1) evidence-based information (critically appraised evidence); (2) occupational therapist's expertise and judgment; and (3) the unique values and circumstances of the patient, client,

or community (Melnyk and Fineout-Overholt 2019). This has been illustrated below by figure 1.

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Figure 1: The three dimensions of EBP

Accordingly, occupational therapists must handle knowledge coming from different sources, including their professional expertise, judgement, and experiential practice knowledge of CWCP. Furthermore, due to the huge amount of evidence in literature published each year, occupational therapists likely experience 'information overload' (Wilson 2001). Efforts have been made to address the problem of information overload. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) for example, is a system for grading evidence endorsed by the World Health Organization (Guyatt et al., 2008). A complementary Evidence Alert Traffic Light System has also been designed to help practitioners obtain clear understandable answers to clinical questions (Strauss and Haynes 2009). To reduce the burden for occupational therapists trying to keep up-to-date by reading great amounts of CP research, researchers have provided systematic reviews making recommendations using the Evidence Alert Traffic Light System as a GRADE-complementary knowledge translation tool (Novak and Honan 2019; Novak et al, 2020). However, even guided by this accessible Traffic Light System, members of 'Mind the Gap: EBP' (a community of practice including clinicians and clinical academics in the UK, Ireland, Holland, Singapore and Australia) stated they needed guidance on how to begin applying evidence-based knowledge in their clinical settings.

Knowledge translation helps, therefore, guide the flow of information, incorporating review of the design and conduct of studies, as well as the dissemination and implementation of findings, and identification of practice-knowledge gaps (Canadian Institutes for Health Research 2015). The related research field of implementation science assists knowledge translation by promoting the uptake of research into practice and identifying how evidence can be used (Eccles and Mittman 2006). Both implementation science and knowledge translation are considered to largely overlap, as their main concern is to improve the application of EBP associated with change of practice and behaviours, and to provide better outcomes (Graham et al., 2006; Theobald et al., 2018).

1.4 Benchmarking OTHP best practices

Despite the benefits of interventions based on evidence, the translation of evidence and implementation of EBP by occupational therapists remains problematic, thus affecting the provision of care (Boström et al., 2018; Brown et al., 2010; Lyons et al., 2010). To examine the barriers to implementation, it is first necessary to define what best practice implementation is. This thesis is based on a benchmarking exercise whereby the best practice conclusions from the four papers are judged against existing literature. The process of comparison aims to strengthen the critical narrative of what the four outputs contribute to the thesis. As there is more than one source of information on best practice implementation, the first step in this process was to review the occupational therapy professional guidance and develop a common set of standards. OTHP evidence includes national evidence-based recommendations provided by the National Institute for Health and Clinical Excellence (NICE) which approves the use of occupational therapy programmes for CWCP. NICE is responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health and is an independent organisation that sits outside of the NHS. Successful implementation of NICE guidance helps ensure high standards of patient care and safety in line with the best available evidence on clinical and cost effectiveness. The NICE guidance papers relevant to the context of designing and delivering OTHPs for CWCP are, 'Spasticity in under 19s' (CG145) (2012), and 'CP in under 25s: assessment and management' (NG62) (2017).

Further sources of information on best practice include professional occupational therapy guidance and OTHP evidence (HCPC 2013; Novak and Berry 2014; Novak and Cusick 2006; RCOT 2021b). Table 1 shows five of the key NICE recommendations and professional occupational therapy guidance (HCPC 2013; RCOT 2021b; RCOT 2021c) mapped against the 5-step process of OTHP evidence from the literature (Novak and Cusick 2006). In summary, the table maps the guidance to illustrate the complementary and overlapping nature of the data. The six common principles of best OTHP practice that come to the fore across the data in Table 1 are that practice must be: (i) Based on evidence of best practice and informed by occupational therapy professional guidance; (ii) Designed in collaboration with each child and family in the best context for them; (iii) Individualised for each child and family; (iv) Occupation-centred and child and family-centred; (v) Shaped by a selection of effective interventions determined by the identified goals; and (vi) Evaluated to show the worth of the programme.

These six principles are important to highlight in that they provide a benchmark for how OTHPs should be used according to evidence and professional guidance informed by NICE recommendations, quality standards for occupational therapists and the RCOT Career Development Framework. The six standards also informed the development of data collection methods used for outputs 1 and 4 to reflect best practice. The conclusions from the four outputs were compared against the six principles to shed light on the aspects in need of further development and inform knowledge translation interventions necessary to improve practice, as the highest quality of programmes and best outcomes for CWCP and their families can only be realised when EBP is consistently implemented (Melnyk and Fineout-Overholt 2019). Examples of the benefits of using OTHPs based on evidence of best practice include: better child and family experience (Novak 2011); better efficacy, outcomes and quality of service (Novak, Cusick, and Lennin 2009); greater practitioner-reported feelings of professional confidence, competence, identify, and self-worth (Milton, Roe, and Newby 2020).

Table 1: NICE recommendations and professional guidance mapped against OTHP overview of evidence from the literature

*5-step OTHP process	**Professional guidance informed by NICE recommendations, quality standards and the RCOT Career Development Framework
1. Establish a collaborative partnership between the parent, child, and therapist	**NICE CG145 (2012)** – Recommendation '1.2.5 When deciding who should deliver physical (or occupational) therapy, take into account: Whether the child or young person and their parents or carers are able to deliver the specific therapy; What training the child or young person or their parents or carers might need; The wishes of the child or young person and their parents or carers.' **NICE NG62 (2017)** – Recommendation '1.5.2 Recognise that children and young people with cerebral palsy and their parents or carers have a central role in decision-making and care planning.' **Standards of proficiency for occupational therapists (HCPC 2013)**: '8.10 Be able, through interview and personal discussion, to understand the values, beliefs and interests of service users, their families, and carers.' **Professional standards for occupational therapy practice, conduct and ethics (RCOT 2021b)**: '4.2.1.2 You use national guidelines, current policy, research and best available evidence to underpin and inform your reasoning, rationale and practice. 4.2.1.3 Your practice is shaped or structured according to recognised theories, frameworks and concepts that are applicable to occupational therapy. 4.5.1 You work in partnership with those who access the service, agreeing their objectives, priorities and timescales for intervention.' **RCOT Career Development Framework (RCOT 2021c)**: '6.1 Actively listen to and reflect on the needs and views of people who access services, their families, and their carers.'

Note: * The 5-step process is based on literature (Novak & Cusick 2006; Novak, Cusick, and Lannin 2009). **Professional occupational therapy guidance is informed by: National Institute Health and Clinical Excellence (NICE) guidance papers 'Spasticity in Under 19s' (CG145 2012); and 'CP in Under 25s: Assessment and Management (NG62 2017). Standards of Proficiency for Occupational Therapists (Health and Care Professions Council (HCPC) 2013); Professional Standards for Occupational Therapy Practice, Conduct and Ethics (Royal College of Occupational Therapists (RCOT) 2021b); and the RCOT Career Development Framework: Guiding Principles for Occupational Therapy (RCOT) 2021c).

*5-step OTHP process	** Professional guidance informed by NICE recommendations, quality standards and the RCOT Career Development Framework
2. Set parent and child goals	**NICE CG145 (2012):** Recommendation '1.1.8 Agree assessments and goals that are appropriate and re-assess at regular intervals.' **Standards of Proficiency for Occupational Therapists (HCPC 2013):** 5.1 'Understand the requirement to adapt practice to meet the needs of different groups and individuals.' 13.8 'Recognise the value of diversity and complexity of human behaviour through the exploration of different physical, psychological, environmental, social, emotional and spiritual perspectives.' 14.15 'Understand the need to agree the goals and priorities of interventions in relation to occupational needs in partnership with service users, basing such decisions on assessment results.' **Professional Standards for Occupational Therapy Practice, Conduct and Ethics (RCOT 2021b)** 3.4.1.2 'You uphold the right of individuals and groups to make choices over the plans that they wish to make and the intervention that you provide. 4.2.1.3 Your practice is shaped or structured according to recognised theories, frameworks and concepts that are applicable to occupational therapy.' **RCOT Career Development Framework (RCOT 2021c):** '5.1 Maintain occupation at the centre of practice.' '6.1 Actively listen to and reflect on the needs and views of people who access services, their families and their carers.'

Note: * The 5-step process is based on literature (Novak & Cusick 2006; Novak, Cusick, and Lannin 2009). **Professional occupational therapy guidance is informed by: National Institute Health and Clinical Excellence (NICE) guidance papers 'Spasticity in Under 19s' (CG145 2012); and 'CP in Under 25s: Assessment and Management (NG62 2017). Standards of Proficiency for Occupational Therapists (Health and Care Professions Council (HCPC) 2013); Professional Standards for Occupational Therapy Practice, Conduct and Ethics (Royal College of Occupational Therapists (RCOT) 2021); and the RCOT Career Development Framework: Guiding Principles for Occupational Therapy (RCOT 2021c).

*5-step OTHP process	** Professional guidance informed by NICE recommendations, quality standards and the RCOT Career Development Framework
3. Select therapeutic activities that focus on achieving family goals	**NICE CG145 (2012):** Recommendation 1.2.2 'Offer a physical therapy (physiotherapy and /or occupational therapy) programme tailored to the child or young person's individual needs and aimed at specific goals, such as: Enhancing skills development, function and abilities to participate in everyday activities; Preventing consequences such as pain or contractures.' Recommendation 1.2.4 'When formulating a physical therapy programme for children and young people take into account: The views of the child or young person and their parents or carers; The likelihood of achieving the treatment goals; Possible difficulties in implementing the programmes; and Implications for the individual child or young person and their parents or carers, including the time and effort involved and potential individual barriers.' **Standards of Proficiency for Occupational Therapists (HCPC 2013):** '14.19 Be able to analyse, develop or modify therapeutic media and environments to service users, to build on their abilities and enhance their occupational performance.' **Professional Standards for Occupational Therapy Practice, Conduct and Ethics (RCOT 2021b):** '4.1.1.3 You enable individuals, groups and communities to change aspects of their person, the occupation or environment, or some combination of these, to enhance occupational performance, engagement and participation in life goals. 4.2.1.3 Your practice is shaped or structured according to recognised theories, frameworks and concepts that are applicable to occupational therapy. 4.5.2 You develop personalised intervention plans, or recommendations, based on the occupational needs, choices and aspirations of those who access the service, as identified through your assessment.' **RCOT Career Development Framework (RCOT 2021c):** '5.1 Use professional judgement and evidence-based critical reasoning to make decisions.' '5.1 Access, evaluate and implement evidence to inform practice.'

Note: * The 5-step process is based on literature (Novak & Cusick 2006; Novak, Cusick, and Lannin 2009). **Professional occupational therapy guidance is informed by: National Institute Health and Clinical Excellence (NICE) guidance papers 'Spasticity in Under 19s' (CG145 2012); and 'CP in Under 25s: Assessment and Management (NG62 2017). Standards of Proficiency for Occupational Therapists (Health and Care Professions Council (HCPC) 2013); Professional Standards for Occupational Therapy Practice, Conduct and Ethics (Royal College of Occupational Therapists (RCOT) 2021b); and the RCOT Career Development Framework: Guiding Principles for Occupational Therapy (RCOT 2021c).

*5-step OTHP process	** Professional guidance informed by NICE recommendations, quality standards and the RCOT Career Development Framework
4. Support parents to implement the programme	**NICE CG145 (2012):** Recommendation 1.1.10 'Help children and young people and their parents or carers to be partners in developing and implementing the management programme by offering: Relevant age and developmentally appropriate, information and educational materials; Regular opportunities for discussion; and Advice on their developmental potential and how different treatment options may affect this.' **Standards of Proficiency for Occupational Therapists (HCPC 2013):** '5.1 Understand the requirement to adapt practice to meet the needs of different groups and individuals. 8.8 Recognise the need to use interpersonal skills to encourage the active participation of service users.' **Professional Standards for Occupational Therapy Practice, Conduct and Ethics (RCOT 2021b):** '3.3.1.5 You are attentive to and seek to meet personal, spiritual, religious and cultural needs or choices within the intervention that you provide, following local policy. 3.4.1.2 You uphold the right of individuals and groups to make choices over the plans that they wish to make and the intervention that you provide. 4.5.7 In order to enable carers and/or family to be involved their requirements and needs are incorporated into the interventions and recommendations where necessary. 4.5.10 You review and modify your plans and interventions regularly in partnership with those who access the service. 4.2.1.3 Your practice is shaped or structured according to recognised theories, frameworks and concepts that are applicable to occupational therapy.' **RCOT Career Development Framework (RCOT 2021c):** '5.1 Deliver safe, effective, person-centred and ethical practice.' '5.11 Implement practices that promote participation, inclusivity and the rights of people who access occupational therapy services, their families and their carers, in line with their choices.'

Note: * The 5-step process is based on literature (Novak & Cusick 2006; Novak, Cusick, and Lannin 2009). **Professional occupational therapy guidance is informed by: National Institute Health and Clinical Excellence (NICE) guidance papers 'Spasticity in Under 19s' (CG145 2012); and 'CP in Under 25s: Assessment and Management (NG62 2017). Standards of Proficiency for Occupational Therapists (Health and Care Professions Council (HCPC) 2013); Professional Standards for Occupational Therapy Practice, Conduct and Ethics (Royal College of Occupational Therapists (RCOT) 2021b); and the RCOT Career Development Framework: Guiding Principles for Occupational Therapy (RCOT 2021c).

*5-step OTHP process	** Professional guidance informed by NICE recommendations, quality standards and the RCOT Career Development Framework
5. Evaluate outcomes	**Standards of Proficiency for Occupational Therapists (HCPC 2013):** '12.6 be able to evaluate intervention plans using recognised outcome measures and revise the plans as necessary in conjunction with the service user 12.7 recognise the need to monitor and evaluate the quality of practice and the value of contributing to the generation of data for quality assurance and improvement programmes.' **Professional Standards for Occupational Therapy Practice, Conduct and Ethics (RCOT 2021b):** '4.6.2 You use outcome measures to monitor, review and demonstrate the ongoing effectiveness of your intervention. 4.6.4 You include the views and experience of individuals and communities when evaluating your practice. 4.6.1 You evaluate the value and benefit of your intervention for those who access the service in terms of their occupational performance, participation, and wellbeing. 4.6.6 You collect and collate outcome data to meet the requirements of commissioners/funders of services. 4.6.7 Where possible you collect and use data to demonstrate the value for money of the service that you provide. 4.6.8 You use the information that you collect, with other national, local, and professional resources, to improve the quality, value and effectiveness of the service/s that you provide.' **RCOT Career Development Framework (RCOT 2021c):** '6.1 Actively listen to and reflect on the needs and views of people who access services, their families, and their carers.'

Note: * The 5-step process is based on literature (Novak & Cusick 2006; Novak, Cusick, and Lannin 2009). **Professional occupational therapy guidance is informed by: National Institute Health and Clinical Excellence (NICE) guidance papers 'Spasticity in Under 19s' (CG145 2012); and 'CP in Under 25s: Assessment and Management (NG62 2017). Standards of Proficiency for Occupational Therapists (Health and Care Professions Council (HCPC) 2013); Professional Standards for Occupational Therapy Practice, Conduct and Ethics (Royal College of Occupational Therapists (RCOT) 2021b); and the RCOT Career Development Framework: Guiding Principles for Occupational Therapy (RCOT 2021c).

Part 2: Introducing the outputs

Research philosophies and analytical approaches

Moving on from the more historical and policy-driven discussion, it is important to connect this debate to the philosophies of research. The research situated within this thesis is borne out of particular contexts which shape the types of 'problems' identified as the focus for OTHP research, formulation of research questions, selection of research design and methods of data collection and analysis. Given that all research is context bound, it means that it is shaped and influenced by multiple factors reflected in ontology, epistemology, and methodology. Ontology is the philosophical study of being and describes what can be known and what can be considered fundamental (Crotty 2003). Epistemology is used to describe ways of knowing and the researcher's view regarding what constitutes acceptable knowledge. Taken together, ontology and epistemology provide insight into what the researcher believes to be the nature of truth, and in this case the nature of home programmes for CWCP, and ways of being in delivering OTHPs; they describe the world view about the orientation of research that the researcher brings to the outputs in this thesis (Creswell and Creswell 2018). Methodology is the plan of action for the choice of research design and use of specific methods including data analysis (Robson and McCartan 2016). Methodology emerges from the ontological and epistemological position of the researcher.

This thesis takes a realist ontological approach. Realist ontology holds that one single reality exists, that can be understood but recognises that a real world exists independent of human experience (Moses and Knutsen 2019). Therefore, in regard to home programmes, the researcher's understanding of the reality of using this mode of therapy provision cannot be only about occupational therapy practitioners, but also about how the world is (Nairn 2019). One form of realist understanding is 'subtle realism' (Hammersley 1992), which is identified as a postpositivist and realist approach (Smith and Heshusius 1986). According to this philosophical position, all knowledge involves subjective perceptions and various individuals including those of the researcher will contribute different pictures of the reality under study (Hammersley 1992). However, while subtle realism rejects the idea of multiple realities, it accepts that the beliefs and perspectives in this case held by occupational therapy

practitioners, are all valid and contribute to an understanding of the nature of home programme implementation (Phillips, 1987).

To embrace this complexity of knowledge and of occupational therapy within the realities of home programme delivery (Duncan 2021; Hinojosa, Kramer, and Royeen 2017), the subtle realist position (Hammersley 1992; Kirk and Miller 1986) has been employed as an overall research approach or analytical framework to bring together the four published outputs under the umbrella of this thesis. There are multiple benefits of this subtle realist framing. Firstly, subtle realism is a theory-led approach which develops a coherent body of knowledge, by providing a matrix to understand the relationship between individuals' beliefs and perspectives and their actual situations (Allmark and Machaczek 2018; Maxwell and Mittapalli 2010). Thus, subtle realism supports the aim of this thesis and helps to highlight the mechanisms of support needed to ensure OTHPs are implemented based on the evidence of what works best. Specifically, the use of theories of occupational therapy and behaviour change within this thesis guided the researcher's understanding of the contexts and mechanisms influencing the implementation of home programmes. Secondly, the collective body of work gathered here consists of both qualitative and quantitative research, which is of importance for occupational therapy's focus on occupation and interest in the reality of home programmes implementation (Cusick 2001). Since subtle realism treats qualitative and quantitative research as equally valid and useful this is particularly relevant for this thesis (Greene 2000; Mark, Henry, and Julnes 2000). Thirdly, due to these affordances, subtle realism is proposed as the best way for occupational therapists to approach the OTHP reality in practice and as a pragmatic solution to reaching the 'ontological and epistemological roots of knowledge' (Duncan and Nicol 2004: 455). As the work in this thesis is concerned with gaining an understanding of the complexities of OTHP delivery as well as identifying mechanisms of support for occupational therapists to change, this third point is congruent with the subtle realist position.

While adopting subtle realism as an overall analytical framework, the work brought together in this thesis may certainly be viewed through more than one approach, as research practices are not linked to a single philosophical stance, and any such approach may be informed by one or more paradigms (Greene 2000; Pitman and Maxwell 1992; Maxwell and Mittapalli 2010). One criticism of the subtle realist approach is that it cannot possibly offer the only truthful picture of the reality of OTHP implementation (Moses and Knutsen 2019). Since it

is possible to use more than one theory to explain research data, then the interpretation of research and the true picture of OTHP implementation can vary depending on the theory used. A realist's response to this criticism, and implicitly that of this thesis as well, is that having more than one theoretical position can be compatible with data (Allmark and Machaczek 2018). An alternative approach such as pragmatism was considered as a different lens through which to view the published work within this thesis because of its congruence with the occupational therapy profession (Ikuigu and Schultz 2006; Morrison 2016), non-commitment to any one system of philosophy, and flexibility to use whatever works to meet the needs of the researcher (Creswell and Creswell 2018; Robson and McCartan 2016). The pragmatist approach may have looked similar to subtle realism in terms of conclusions (Allmark and Machazek 2018), however, pragmatism has been criticised for placing greater importance on the research question and on action to solve problems than underlying methods, theories or paradigms (Doyle, Brady, and Byrne 2009; McCready 2010; Nowell 2015). For these reasons, pragmatism was unlikely to provide a theoretical framework to support the development of a coherent body of work (Johnson, Burke, and Onwuegbuzie 2004; McCready 2010). The pragmatist approach would not have supported the body of knowledge in the same way, reflecting the purpose-dependent view of knowledge. Hence, it was decided that subtle realism was more advantageous than pragmaticism in supporting the development of the thesis.

To summarise, subtle realism is a felicitous resolution for the researcher's clinical reality, that is to say, the home programme reality and implementation of OTHPs for CWCP. It is also congruent with the researcher's approach to knowledge construction given that subtle realism is identified as both a post-positivist and realist approach. Moreover, subtle realism aligns with the researcher's methodology, namely the use of quantitative and qualitative research designs and tactics (Robson and McCartan 2016).

The outputs

In light of the discussions so far, it can be argued that all research is context bound, influenced by a complex mix of ontological, epistemological, and methodological factors associated with the researcher, the professional and political environment, culture, and perceptions of 'the received view'. Therefore, a number of factors shaped the nature of the studies undertaken, their research questions, reporting and publications included in this

thesis. Firstly, the researcher's role as an occupational therapist and experience of using OTHPs for CWCP shaped the formulation of the original research questions; secondly, the literature base influenced the received view that professional practice must be consistently effective regardless of location or the therapist involved (Duncan 2021); and thirdly, the absence of evidence for the use of OTHPs in the UK influenced the methods of data collection.

The outputs shown in Table 2 are linked sequentially in academic logic, in that each informed the next stage of evidence construction. The first output is a **quantitative study** which reported on occupational therapists' use, content and decision-making process supporting OTHPs for CWCP in the UK. The implementation of home programmes links with the second output, a **practice analysis**, which illustrates the translation of professional guidance, family-centred care, and clinical expertise into a National Health Service community setting for CWCP. This occupational therapy initiative was part of a collaborative mentoring partnership between two occupational therapy practitioners working in different settings. The focus of CP within the studies then shifted to become more specific to a CP subgroup, namely children with unilateral CP (UCP). This change in focus reflects both that the largest UK provision of OTHPs is for UCP (Milton, Dunford, and Newby 2019), and that the most published research available is OTHPs for UCP.

The translation of professional guidance for OTHPs relates to the third output, a **critical review** of studies from the research literature, which identified the ways in which specific interventions and methods were used within OTHPs from an occupational perspective. The identification of ways to help translate evidence of home programmes into practice connects with the fourth output, a **qualitative study** which provided a deeper understanding of practitioners' perceived support and barrier factors to using OTHPs, based on evidence of best practice. Furthermore, output 4 revealed insights into specific areas where it was necessary to target change to increase the uptake of OTHPs based on evidence, such as occupation-focused goal setting and outcome measurement.

In finer detail, through the individual studies and then the development of the thesis, evidence has been built to answer several questions identified in the literature:

(i)   What is the extent to which OTHP evidence is used to guide UK home programme delivery?

(ii)   What interventions are being used in OTHPs for CWCP?

(iii)   Are OTHPs routinely designed in partnership with families?

(iv)   What is the current practice of home programme evaluation?

(v)   What strategies can be used to support OTHP practice and decision-making?

In retrospect, the work concerned best practice, hence the aim was to publish the papers in high-quality journals relevant to the field that speaks to practitioners. All outputs presented in the portfolio of evidence were accepted by the *British Journal of Occupational Therapy* (BJOT) which Scimago JR (Scimago Institutions Rankings, 2020) lists as Q2 (in the second quartile of Occupational Therapy journals) with a H-index of 44. A journal's H-index measures the number of papers published in that journal that have achieved more than that number of citations. BJOT is the top-rated UK occupational therapy journal with the 4th highest H-index on the SJR list of 18 occupational therapy journals (SJR 2020). The BJOT's impact factor is 0.96. The journal impact factor is the average number of citations that publications in that journal received within a 2-year time frame (Hurley, Denegar, and Hertel 2011). While it needs to be acknowledged that all work presented in this thesis was published in a single journal which could potentially limit its broader reach, however this journal is focused on the target group of UK occupational therapy practitioners and BJOT remains an important venue for the OTHP research in terms of readership and circulation. Moreover, the publication in the same journal that relates to UK practice also supports the coherence and consistency of the research narrative that all four outputs contribute. To maximise the value of the research, considerable effort was made to disseminate the papers' findings at both national and international conferences to further increase reach to researchers and healthcare professionals in the field (see Appendix 1 for details).

Table 2: The four outputs

Output number	Output name
One	Milton, Y.M., Dunford, C., and Newby, K.V. (2019) 'Occupational Therapy Home Programmes for Children with Cerebral Palsy: A National Survey of United Kingdom Paediatric Occupational Therapy Practice.' *British Journal of Occupational Therapy* 82(7), 443-451
Two	Milton, Y., and Logothesis, A. (2013) 'An Occupational Therapy Practice Initiative using the Bobath Concept: A Collaborative Partnership with Higher Education.' *British Journal of Occupational Therapy,* 76(10), 452-455
Three	Milton, Y., and Roe, S. (2017) 'Occupational Therapy Home Programmes for Children with Unilateral Cerebral Palsy using Bimanual and Modified Constraint Induced Movement Therapies: A Critical Review.' *British Journal of Occupational Therapy* 80(6), 337-349
Four	Milton, Y.M., Roe, S.A., and Newby, K.V. (2020) 'Home Programmes Based on Evidence of Best Practice for Children with Unilateral Cerebral Palsy: Occupational Therapists' Perceptions'. *British Journal of Occupational Therapy* 83(7), 447-457

Output One: Revealing the current landscape 2.1

Introduction

Output 1 is a significant step towards gaining an understanding of current practice of OTHPs in the UK. It is the first known study to discover that nationally OTHPs for CWCP are not being used routinely in congruence with the best quality evidence. This finding represents an important contribution to the body of knowledge available about OTHP practice for CWCP in the UK. This new evidence is highlighted by the results which show that the uptake and use of evidence-based home programme content varied, revealing evidence-practice gaps. Respondents reported challenges to implementing both evidence-based interventions and the routine, systematic application of a range of standardised measurement tools pre- and post- OTHPs within a family-centred framework. Whilst a qualitative approach was considered, the nature of the research question called for a quantitative approach, due to the primary concern for quantifying the level of OTHP used nationally and the systematic identification of content being delivered.

Methodology

Planning

The research question determined the selection of participants to the study. As the research question aimed to understand UK practice, recruitment of participants from UK specialist occupational therapy groups was an obvious choice. An adapted version of a previously used survey was chosen to gather data. The original survey was employed to describe occupational therapy practices in relation to the use and prescription of home exercise programmes for clients with neurological injuries in the United States of America (USA) as well as the clinical reasoning processes supporting their selection (Proffitt 2016). The decision to adapt the existing US-based survey, whilst being pragmatic, was made to enhance rigour. The original survey had been developed from semi-structured interviews and focus groups conducted by Profitt (2016), thus demonstrating a strong methodological approach to survey development. In addition, it had been piloted with 5 occupational therapists to determine readability and appropriateness of questions (Profitt 2016). The

population for which the survey had been developed (occupational therapists delivering home programmes) was very similar to the population of interest in the UK and thus required little adaptation.

The adapted survey consisted of 16 questions in total. A mixture of closed, open-ended, and Likert-scale questions were included. The questions were designed to answer the main research question. The survey was piloted with experienced occupational therapists in the UK (n=5) to determine face and content validity, which thereby helped to adapt the survey to a UK context. The completion of the survey was restricted to ten minutes. The reasoning behind this decision followed the results from the pilot and the feedback that this was the right duration. A pragmatic view was taken of what busy practitioners could be realistically and feasibly expected to do. There was a balance between the number of participants (sample size) with the length of the survey. Determination of the sample size was a trade-off between having a larger sample and the greater time and cost involved in recruiting more participants (Polgar and Thomas 2000). A longer survey could have been off-putting for potential participants because of the challenge of fitting it into a working day, and thereby reducing the sample size.

Although it was not possible to determine how the sample results may have generalised to a broader population of paediatric occupational therapists using OTHPs for CWCP, the survey design helped to make associations about relationships among variables and provided descriptive information about the distribution of a range of people's characteristics, and of relationships between such characteristics (Robson and McCartan 2016). Furthermore, the survey design helped to answer descriptive questions, such as 'what percentage of occupational therapists refer to evidence guidance when designing home programmes?' The answers to these types of questions allowed for a quantitative description of the trends, attitudes, and opinions of a sample of the paediatric occupational therapist population (Fowler 2014).

Formulation of the Aim

From the research problem, a clear aim emerged rather than a hypothesis, as there was not a hypothesis to be tested in any formal sense. The aim of this study was to identify the current use of OTHPs in the UK and the congruence of such use to the OTHP research evidence.

Research design

Given that the data collected was a numeric description of trends, attitudes and opinions of practitioners use of OTHPs at one point in time, a predetermined quantitative, non-experimental fixed design, cross-sectional survey research method was selected. The use of a cross-sectional survey design, administered nationally through an online survey, ensured that all respondents received exactly the same questions, gave access to a larger sample of the occupational therapist population than would otherwise have been possible, which helped gain better representation, and an objective, reliable measurement of self-reported practice (Vogt, Gardner, and Haeffele 2012). Furthermore, it was considered that an electronic survey would be the most cost-effective method of data collection and achieve a higher response rate with a quick turnaround, rather than for example, a postal questionnaire, telephone or face-to face interview.

However, it was also recognised that there could be limitations to this type of method. For example, it was accepted that the issue of non-responsive bias was likely in a cross-sectional study when respondents who had consented to take part were not representative of the population being investigated (Sedgwick 2014). That is why, although the survey was targeted at the appropriate population, it was probably the case that both those with more time, and those with issues regarding OTHP delivery, responded more readily. To minimise the limitations of using one method, the study could have been designed as mixed methods research to compare different perspectives and develop a comprehensive understanding of what and how OTHPs are used in practice (Creswell and Creswell 2018). However, a quantitative cross-sectional survey method was chosen for this study because a follow-on qualitative study was already planned to explore practitioners' perspectives for how OTHPs are used with CWCP.

Organisation and presentation of data

The decision to organise the study's data into approaches, interventions and measures was made to form smaller units of OTHP process. This unique approach facilitated a more granular and precise analysis of the mechanisms involved in OTHP implementation and was commended during peer review for publication. In finer detail, the data organisation enabled comparisons to be made with best practice implementation, and clear identification of

weaker practices, such as goal-setting. Moreover, the paper's structure of OTHP content will likely inform future investigations of OTHP delivery. Alternatively, the OTHP partnership 5-step process (Novak and Cusick 2006) could have been used, however, the data would not have been grouped as neatly nor the incorporation of theories, conceptual models of practice and frameworks made as explicit.

Data analysis

Data analysis was performed using SPSS (IBM SPSS Statistics Version 24) (IBM Corp 2016). Data was first screened for errors and omissions to ensure data integrity. Nominal and ordinal data were analysed using descriptive statistics. The demographics measured were years in service, employer and CP classifications, which are ordinal and nominal data. The frequency with which different approaches, interventions and measures were used, was measured using Likert scales. On reviewing the paper since publication in preparation for the critical overview, it was discovered that the last sentence in the demographics section was an error. Rather than 'No statistically significant correlations were found between respondent demographics and use of approaches, intervention, or measures' (Milton, Dunford, and Newby 2019:446) the sentence should read 'No relationships were found using Pearson's chi-squared test'. This sentence is incorrect as it is inappropriate to run correlation analysis with ordinal and nominal data. Instead, Chi-squared analysis was carried out in this study on this type of data, for instance to determine if there were associations in the use of outcome measures across employer setting. Analysis of these associations was needed because there was a lack of literature exploring the link between demographics and clinical reasoning within paediatric occupational therapy. For output 1, to keep within the 10-minute survey completion time, information on respondent demographics was limited. Therefore, it is difficult to provide a more detailed analysis. However, it is interesting to note that in the field of adult neurology in the USA, a recent study found that the number of years an occupational therapy practitioner had been in practice did not influence the choice of activities or home exercise programme dosage (Profitt 2019).

All the open-ended questions were coded by the first author and one other researcher and themes were identified from the data. One question that was asked was the average duration practitioners recommend a home programme is used for. In hindsight, the word 'time' should have been replaced with 'minutes' because the result was numbers that were difficult

to interpret. Another example of where a question could have been rephrased to improve clarity was question two, which asked respondents to identify a band over how many years since they had been qualified. When this data was analysed, the result was a categorical variable, for example 24.3% of participants had practiced between 6-10 years. Although a categorical variable is informative, it does not provide as much information as a continuous variable that can be further analysed to generate mean and dispersion measures. To do this the required question would have been re-phrased to ask the number of years the practitioners had practised as an occupational therapist and to round it up or down to the nearest whole year.

In comparison with the Profitt paper (2016), calculation of a response rate was not possible as unfortunately there is no data available on the total number of paediatric occupational therapists working in the UK. This dearth of data is a limitation because it is not possible to make a judgement about how representative the sample was; if something had been known about the demographics of the wider sampling frame, then a judgement could have been made regarding possible biases in the study. However, despite this limitation, the paper provides the best indication of the paediatric occupational therapy situation in the UK, given that the survey was promoted widely and repeatedly through specialist occupational therapy national organisations and training events.

Interpretation and conclusions

Whilst this study was relatively small scale, with 123 respondents, it is significant in its identification of an area of practice which lacks sufficient UK evidence base. The uptake of measurement pre- and post-OTHP was found to be low, hence, the evaluation of programmes is identified by the new evidence in this thesis as a specific area to improve in current practice. The remaining discussion will focus on two key areas of data analysis:

- First, the lack of reference to OTHP evidence by practitioners despite professional standards that require adoption of an EBP approach (RCOT 2021b);

- Second the use of a family-centred care framework by most practitioners was not congruent with their statements regarding OTHP design, location or method of measuring outcomes.

28

Lack of reference to OTHP evidence

Only two respondents referred to the evidence influencing OTHP development or professional reasoning, and none cited specific studies. This finding reveals that practitioners may generally not refer to the OTHP research evidence, which was expected given there are no published national clinical guidelines, which means that practitioners would need to search, retrieve, and synthesise guidance from a range of literature sources. Indeed, this task would be a big endeavour, especially as practitioners commonly report barriers to accessing evidence, such as a lack of time. Similarly, practitioners commented on how difficult it is to keep abreast of evidence when managing a large caseload of children with lots of different types of disabilities, not just CP. However, OTHPs are supported by strong evidence which practitioners need to know (Novak, Cusick, and Lannin 2009). To address this issue, it is imperative that local occupational therapy service providers identify unique contextual barriers and enablers to adopting OTHPs based on best evidence, to inform the design of targeted knowledge translation interventions to change practice.

Challenges to using family centred care

Survey respondents intended to design OTHPs based on evidence within a family-centred care framework, however, challenges to using this approach were identified. Implementing OTHPs within a family-centred care framework is problematic, but important as this approach helps practitioners to consider the needs of the broader family as well as the child, to promote wellness and optimise outcomes for children and families (Kuo et al, 2012; The Children and Families Act 2014). One of the recommendations of this thesis, therefore, is to improve the implementation of family-centred care within OTHPs.

To conclude, Table 3 shows how the findings from this output compare against the six OTHP benchmark principles derived from evidence and professional guidance shown in Table 1 (see Part 1 of the thesis) and specifies what the study adds to the collective body of work. This first output contributes by identifying the gaps between evidence and practice, highlighting weaknesses in areas such as the implementation of family-centred care and the routine application of standardised measurement tools and evidence-based interventions (Table 3). Furthermore, an important understanding is gained regarding UK practitioners' need for professional development and guidance to use OTHPs in an EBP context.

Table 3: Findings from output 1 mapped against the six OTHP benchmark principles

Six OTHP benchmark principles	Analysis of findings from this paper to determine whether OTHPs have used these features of best practice	What the paper adds to the thesis
1. Based on evidence of best practice and informed by occupational therapy professional guidance.	The use of a family-centred framework by most respondents was not congruent with their statements regarding OTHP design location or method of measuring outcomes. Logbooks to measure how much practice parents did were rarely used. Only 2 respondents referred to the evidence influencing OTHP development or professional reasoning.	Professional reasoning needs to be talked about in team meetings as this helps to incorporate evidence of best practice and professional guidance into practice.
2. Designed in collaboration with each child and family in the best context for them.	OTHPs were not always designed in collaboration with child and family in the home environment.	OTHPs needs to be designed in the child's home so the activities are more individualised and easier to incorporate into occupation-based daily activities.

3. Individualised for each child and family.	A majority of respondents reported that there was room for improvement with their OTHP goal setting practice.	Goal-setting skills need to improve; OTHPs need to be framed by parents and their child's goals.
4.Occupation-centred and child and family centred.	Respondents described the provision of support and training with parents as unsatisfactory (n = 38; 51%). OTHPS were not always occupation-centred and family-centred.	Occupational therapists need to provide regular parental support and coaching; OTHPs need to be occupation-centred and family-centred.
5. Shaped by a selection of effective interventions determined by the identified goals.	The uptake and application of evidence-based interventions was varied and inconsistent.	Effective interventions need to be used routinely; knowledge and the use of evidence to inform practice needs to improve.
6. Evaluated to show the worth of the programme.	Not all respondents evaluated outcomes with the family (n = 24; 32.4%). The uptake and use of measures was lacking.	Measures pre- and post- OTHP need to be used systematically to (a) determine the child's current level of function; (b) measure family and children's goals and (c) objectively measure post-OTHP outcomes.

2.2 Output Two: It's more than the intervention

Introduction

Output 2 is a practice analysis which details the mentorship and reflective learning collaboration between a National Health Service provider and a higher education institution. Kolb's (1984) four-stage cycle of learning was used as a framework to critically examine how the author of this thesis mentored an occupational therapist, as part of a practice initiative collaborative partnership (PICP). Crucially, the partnership's success reflected the alignment of: (i) both the mentor's and mentee's motivation and capability to take part; (ii) the family's willingness to participate; and (iii) the opportunity provided by the different employer organisations for both occupational therapists to work together (Melynnk and Fineout-Oversholt 2019; Michie, Atkins, and West 2014a). The authenticity of the paper was gained by situating the scope of its investigation within a real-life community setting.

A strength of this paper is that it provides an exemplar of how PICP fostered EBP decision-making for home programme implementation, within a family-centred framework. Key change mechanisms identified in the PICP learning experience included situated learning, mentorship, and reflective practice. Furthermore, the paper contributes to the limited body of evidence regarding critical examinations of how interventions are implemented in community settings (Dougherty et al., 2016). The paper also promotes the routine use of outcome measurement, a feature of OTHP best practice, and an essential part of occupational therapy (Unsworth 2001). The use of measurement is important, because despite endorsement by professional bodies, outcome measures are not reported to be commonly used in paediatric rehabilitation (Hanna et al., 2007; McConnell, Johnston, and Kerr 2012; Milton, Dunford, and Newby 2019, O'Connor et al., 2016; Saleh et al., 2008).

Methodology

Planning

To gain validity, the PICP was planned in a systematic, well-organised manner, and all ethical standards were meticulously upheld. In addition, throughout the direct family partnership work, all occupational therapy professionalism, record keeping, and mentorship

standards were adhered to (HCPC 2013; RCOT 2021b). The first author's clinical and teaching interests are reflected in the paper. Hence, the PICP incorporated adult learning theory, social cognitive theory, and reflective practice, which all helped to inform the pedagogy for OTHP implementation based on best practice. For example, it is necessary to support practitioners' use of reflection, both alone and with a mentor to enable effective integration of theory and research in the practice context (Alsop and Ryan 1996; Craik and Rappolt 2003; McKay 2009; Salter and Kothari 2016; Schön 1987). It was an instinctive decision, therefore, to draw on reflective tools to assist in the process and potential learning situations presented by the PICP in the planning of the paper.

Kolb's experiential learning cycle follows four steps defined in this thesis as the occupational therapist having a concrete experience followed by a period of reflection, discussion, analysis and evaluation. Kolb's theory (1984) implies that unless an occupational therapist reflects on and assesses the PICP experience, they are less likely to learn from the experience (Bergsteiner, Avery, and Neumann 2010). Thereby moving through this experiential cycle there is greater opportunity to gain a deep understanding, insight, motivation, and engagement in the learning process (Gibbs and Priest 2010). For example, in the second stage of the cycle 'Reflective Observation' the mentee was encouraged to reflect upon and analyse her experience when not actively doing the PICP. Schön (1992) differentiates Reflection-in-Action from Reflection-on-Action, and in this study reflecting when participating in the PICP was not always easy to do because of the complexity of working with different families and contexts, such that reflection on what was done was beneficial.

However, the use of reflective learning tools such as Kolb's (1984) could have the potential to generate a reductionist effect, resulting in a superficial description. To mitigate against a possible lack of deep reflection, notes of in-depth critical conversations with the co-author were kept throughout manuscript preparation. As an alternative to using the reflective learning tool, open questions could have been designed to prompt reflection (Duncan 2021), but a reflective tool was used because it provided a structured approach which facilitated the critique of the learning experience. Furthermore, as part of reflective practice and separate from the published paper, the parents' voice was captured via interview which informed the PICP service evaluation reports. Unfortunately, however, ethical permission and consent was not gained to publish these data within the paper.

Study aim

Rather than test a hypothesis, generate data, or demonstrate the efficacy of an intervention, this study aimed to illustrate the value of using a PICP to support practitioner capabilities within a family-centred framework. A non-empirical design method typically focuses on theories, methods, and their implications for educational research (Stacks, Salwen, and Eichorn 2019). The chosen design reflects the ontological and epistemological view that: (i) both research and practice are important for the process of EBP (Sackett et al., 1996); and (ii) the knowledge and skills gained from the PICP are just as valuable for knowledge acquisition and education as empirically derived data (Reagon, Bellin, and Boniface 2008; Reagon, Bellin, and Boniface 2010; Tomlin and Dougherty 2014). However, it is acknowledged that evidence in research is viewed differently than it is in practice (Thomas and Law 2013). For instance, as in the three dimensions of EBP, practitioners recognise evidence as more than research literature and rely additionally on clinical expertise and evidence from other sources within and outside the intervention context, such as patient and family feedback, the views of colleagues and information from conferences (Finlayson and Braveman 2016; Thomas and Law 2013).

Participatory action research (PAR) is an alternative design that was considered for this study. Using a PAR approach involves gathering and using information so it benefits the people directly affected by it (Kindon, Pain, and Kesby 2007). Participants, engaging in PAR, typically have a bigger role to play than just providing data. Instead, participants are involved throughout the research process from the step of defining the problem onwards (Letts 2003). However, one of the limitations to using PAR is achieving the right balance between the external researcher and other investigators in the group, so that everyone is authentically an active participant in the process. Therefore, in the current non-empirical study, PAR was not used because a pragmatic approach was taken to delivering the initiative in practice first with publication of the outcome later. For a future empirical study, PAR could be designed to include parents of CWCP, as these are the people who need to take a lead role in producing and using knowledge about OTHPs.

Organisation and presentation of paper

As it was not the intention of the study to generate data, the content for the paper was informed via verbal and written reports. The narrative was organised in two main sections:

first, a statement of context which included a description of how the PICP was informed by relevant policy, occupational therapy theory and research; and second, a critical reflection of the gains of PICP and how it supported practitioner expertise-related competencies. The suggested criteria for the PICP service and the issues for future consideration and recommendations were shown in tables. Alternatively, the narrative could have been organised into the sections that followed the stages of a reflective model, such as Kolb (1984) or Gibbs (1988) shown in figure 2. However, using the stages of a theory to present the paper may not have illustrated the different perspectives and complexity of the learning experience, plus the separation between the stages in the cycle could have been artificial (Jasper 2013; Pickles and Greenaway 2016).

Kolb's experiential learning cycle

Gibbs reflective cycle (1988)

Figure 2: The 4 stages of Kolb's experiential learning model and the 6 stages of the Gibb's Reflective model (University of Cambridge 2021)

Reflection on the intervention approach

Since planning the study, further evidence has been found that questions the use of the Bobath concept. In the same month the output was published, a systematic review graded the Bobath approach as weak and suggested that it should be discontinued in favour of more proven effective interventions (Novak et al., 2013). In a more recent systematic review, Novak and Honan (2019) state that recommendations for the use or discontinuation of the Bobath concept cannot be made with certainty, which in part reflects that due to the large variation in Bobath fidelity, the concept no longer stands for a valid universal therapy approach (Mayston, 2016: 994). Currently, CP interventions with greater strength of evidence are recommended for use with CWCP (Novak et al., 2020).

As a technical intervention, however, the Bobath concept was the mechanism for mentorship and was useful in facilitating the PICP relationship. Moreover, OTHPs are a complex method of service delivery and more than one factor is involved in their success. Indeed, the

PICP revealed that other components, such as individualised programmes, administration of assessments pre- and post-OTHPs, and the use of gold-standard goal-setting tools, may have been equal if not mitigating factors. In retrospect, it may have been preferable not to have used the umbrella term of 'Bobath' in the title of output 2, because Bobath was not central to the paper. As one of the paper's reviewers commented, 'much of what is reported' within output 2 'is good occupational therapy practice, i.e., individualising home programmes, family-centred care framework, determination of child and family based goals, modelling and parental education and support, client-centred assessments and programme reviews etc. rather than specific to the Bobath concept *per se*.'

Interpretation and conclusions

The strengths of output 2 are twofold. Firstly, the research explains how the PICP supported a rich learning experience; and secondly, it provides an exemplar of the way OTHPs can be used within a family-centred framework. These findings are important, because they provide direction for future studies that are needed to establish evidence of the potential of PICPs to change how OTHPs are implemented in practice. It will be necessary, in such studies, to gather data of mentee's OTHP knowledge and skills pre- and post-PICP, as well as any resultant improvement in outcomes, including family experiences and insights.

In conclusion, translating learning into practice can take a variable and unpredictable amount of time (Balas and Boren 2000). The PICP contributed towards generalising learning from one context to another and supported OTHP delivery. Table 4 shows what the paper adds to the thesis and the evidence for this. On reflection, although changing practice is possible, it is not easy because it takes time and relies on the alignment of many support factors. In retrospect, the mentorship within the PICP worked well because of the culture of mutual respect, effective communication, context of situated learning and reflective practice. In addition, the use of the 'Canadian Occupational Performance Measure' (COPM) (Law et al., 2019) facilitated the programmes to have an occupational and client-centred focus, thereby helping to bridge professional theory to practice (Fearing et al., 1997; Foster et al., 2013). Indeed, as shown in Table 4, the use of outcome measurement tools, shown by the mentor to the mentee, is in good congruence with the evidence for how they should be used. Table 4 shows how the findings from this output compare against the benchmark of OTHP principles derived from Table 1 (Part 1 of the thesis) and specifies what the study adds to the collective body of work.

Table 4: Findings from output 2 mapped against the six OTHP benchmark principles

OTHP benchmark principles	Analysis of evidence to support this in the paper	What the paper adds to the thesis
1. Based on evidence of best practice and informed by occupational therapy professional guidance	Parents were supported to implement OTHPs that were tailored to suits their needs and learning styles	Exemplar of supporting families to carry out OTHPs by grading and adapting activities to help families
2. Designed in collaboration with each child and family in the best context for them	Two therapists working in different settings provided opportunities for the development of an OTHP protocol for use in the home environment	Exemplar of the way (what and how) OTHPs are used within a family-centred framework
3. Individualised for each child and family	Use of the PICP intervention facilitated the occupational therapy community service to individualise OTHPs for the first time	Mentorship, reflective practice, situated learning are useful tools to help move evidence into practice, such as individualising OTHPs for each child and family
4. Occupation-centred and child and family centred	The mentee had not used the occupation and client-centred Canadian Occupational Performance Measure (COPM) prior to the PICP	Exemplar for the use of occupation-centred and family centred OTHP practice
5. Shaped by a selection of effective interventions determined by the identified goals	OTHPs were goal directed determined by goals identified through COPM	Evidence for the value of collaborative partnerships between higher education and practice to enhance goal directed OTHP delivery
6. Evaluated to show the worth of the programme.	The COPM was used in partnership with the families pre- and post- OTHP to evaluate the programmes.	Exemplar of a valuable measurement tool to use for OTHPs to enhance an occupational focus and family partnership

2.3 Output Three: A new occupational Perspective

Introduction

Contemporary motor-based upper-limb (UL) interventions are recommended for occupational therapists to use for CWCP because they are supported by high-quality evidence and help improve children's functional use of their hands (Hoare et al., 2019; NICE 2012; UK and Ireland Upper Limb Rehabilitation Network 2019). However, despite strong efficacy, practitioners lack the knowledge, skill, and confidence to routinely implement these methods as part of home programmes (Milton, Dunford, and Newby 2019; Sakzewski, Ziviani, and Boyd 2013). One way of supporting practitioners is to gather the evidence, review, summarise, and pull out the key implications for best practice. Reviews of literature have an important role in KT and changing practice (Sutton et al., 2019). Hence, the purpose of this review was to identify key implications for how methods such as, bimanual therapy (BT) and/or modified-constraint induced movement therapy or constraint induced movement therapy (m-CIMT/CIMT), should be used as part of an EBP home programme.

The Person-Environment-Occupation (PEO) model (Figure 3: Law et al., 1996) helped synthesise the review's findings to develop a new occupational and theoretical view of how intensive UL methods are used in OTHPs. This is a notable strength of the study because theory-driven models for occupational therapy practice, as well as professional standards are known to provide a clear structure for sound decision-making (Duncan 2021; HCPC 2013). Consequently, practitioners may feel more supported to consider how they might implement these UL methods to enhance OTHP outcomes.

Whilst a key outcome of this output was to generate practical guidance for occupational therapists on how to implement these interventions within home programmes, it is acknowledged that the findings will not generalise to all practitioners and contexts. This is a limitation but is reflective of the unique context of OTHPs, children and families. For instance, the review's findings might not be suitable for children of all ages and types of CP, nor suitable for use in rural settings, where it would be more difficult for therapists to travel large distances to provide direct support. Furthermore, because most of the included papers

in the review were randomised controlled trials (RCTs), the way the methods were used in these studies for research purposes may not be comparable to practice outside of research. Arguably, the practitioners involved in the RCTs had easier access to resources, and assurances would have been gained beforehand that they had relevant experience in using the interventions.

Nevertheless, all studies where there was a focus on implementation were included in the review. Notably only 5 studies of this kind were found, indicating a paucity of research with detailed descriptions of how these types of OTHPs are applied. However, given that, ideally, practitioners want to know a) which interventions work, and b) how should they be implemented in practice, it is encouraging that this review identified studies with sufficient level of detail to gain a deeper understanding of their application.

Methodology

Planning

A post positivist philosophical framework provided the context for this review whereby developing, modifying, and expanding theory is considered important (Onwuegbuzie and Frels 2016). For studies situated in this paradigm more emphasis is likely to be placed on quantitative than qualitative findings, which can result in the production of an overly deductive approach (Onwuegbuzie and Frels 2016:53). However, in retrospect, the PEO mitigated against this issue by promoting a wider perspective on how OTHPs using intensive UL methods had been implemented.

The adoption of the PEO model (Law et al., 1996) is a strength of this review because as well as being used by occupational therapists for professional training and clinical practice, PEO both requires and helps practitioners to: (i) employ a client-centred approach; (ii) consider the environment intentionally; (iii) consider the dynamic interaction between person, occupation and environment; and (iv) understand the many factors involved when using OTHPs to enhance occupational performance (Brown 2019). More specifically, in this review, the application of the PEO model (Figure 3) helped identify and critically evaluate

how UL methods had either supported or hindered the occupational performance of the children included in the studies. In addition, another benefit of having used the PEO is the focus on occupation which makes the data more relevant, accessible and applicable to occupational therapists.
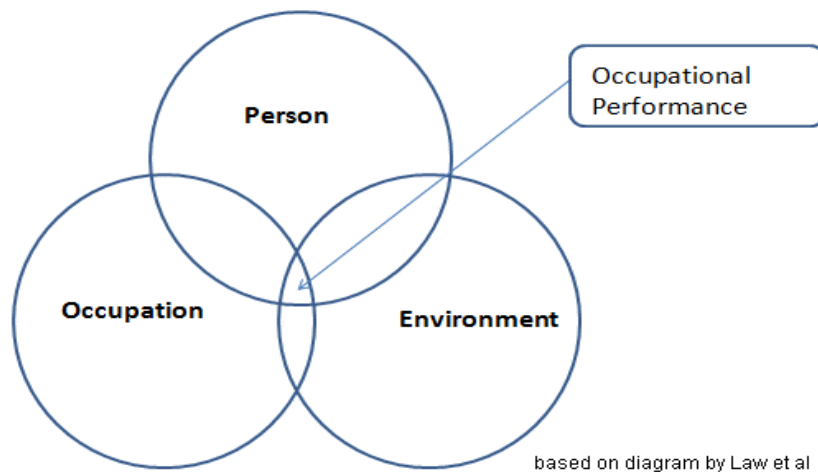

Figure 3: The PEO model, based on a diagram by Law et al., 1996. This Photo by Unknown Author is licensed under CC BY-SA-NC

Formulation of the Aims

The primary aim of the study was to appraise and make sense of how BT and/or m-CIMT/CIMT methods are applied within OTHPs, from an occupational perspective. Originally, there had been two research questions: firstly 'how does the OTHPs research literature inform how BT and/or CIMT methods are used in OTHPs for UCP?'; and secondly 'what was the family and clinician's experience of using these methods in OTHPs?' During the peer review process, to strengthen the review's findings, it was decided to only use the first research question. The second question was reserved for the study's discussion. On reflection, the impact of the decision to only use the first research question during the peer review process was highly influential in shaping the review's inclusion criteria.

Inclusion criteria

At the time that the review was undertaken in 2016, much of the discourse reflected high valuing of evidence derived using quantitative research methods and a focus on hierarchies

of evidence supporting this stance. It was this emphasis, as well as the impact of a second research question being omitted through peer review, which led to the review's inclusion criteria of only quantitative studies and exclusion of qualitative research evidence. This inclusion criteria meant that the lens used to analyse the evidence base was limited in scope, and valuable evidence generated through non-quantitative research methods were omitted. Whilst the evidence included answered questions about the effectiveness of an intervention(s), the main purpose of the studies was not to explain how the interventions were used in practice.

As such, whilst the stringent inclusion criteria, as well as the systematic, transparent, and replicable steps that were taken in the review have ensured the rigour of the review, the downside might be considered the narrow focus and exclusion of other forms of 'best evidence'. For example, studies were rejected if there was over-interpretation of results, with commentary beyond the scope of the article or lack of evidence to support conclusions. Papers were also rejected if they offered poor quality clinical evidence. Overall, however, despite the potential of an overly deductive approach, the research question was answered due mostly to the application of the PEO model and because relevant data was found in the methods, discussion, and conclusion sections of the selected quantitative studies. It is acknowledged that because the question was more explorative than causal, it would have potentially been better aligned with a qualitative or mixed-design instead of a quantitative design.

Research design

The critical review methodology was chosen, because a strength of this design is that the literature on a research topic is not just described but assessed, critiqued, and synthesised. This process is done in a way that enables new theoretical frameworks and perspectives to emerge, thereby the development of the topic can be expanded (Torraco 2005). One limitation suggested of this review approach is that the interpretative elements are subjective due to a lack of emphasis on formal quality assessment, absence of search details and lack of analytical methods (Grant and Booth 2009; Robson and McCartan 2016:84). To overcome this and respond to calls for greater systematicity in reviews (Sutton et al., 2019), a number of quality features were incorporated, and methods were reported with reference to the PRISMA statement (Liberati, et al., 2009). The Critical Appraisal Skills Programme (CASP) provided a structured and systematic evaluative approach to the review's selected

articles (Public Health Resource Unit 2013). This appraisal of the evidence was important to determine the potential relevance, trustworthiness and impact the articles would have on the research question (Aveyard 2019; CASP 2020). Quality appraisal was completed via a step-by-step process of critically reviewing both the appropriateness of each study's design and methods used (Hurley, Denegar and Hertel, 2011).

The Relationship between the PEO and the Evidence Review Process

Discipline-specific theories known as models of conceptual practice or occupation-focussed models are believed to be a form of evidence with the potential to influence every part of occupational therapy clinical practice (Sugden and Dunford 2007; Wong and Fisher 2015). The PEO model conceptualises how the three aspects of person, environment and occupation interact to determine occupational performance (Figure 3). When these three aspects fit closely together, occupational performance is optimised (Law et al., 1996).

In the context of this evidence review, the benefit of the PEO model was that it provided a rigorous organisational structure that avoided personal biases (Duncan 2021:41). Furthermore, through application of the PEO model, it was possible to identify and critically evaluate details of the relevant supports and barriers to using OTHPs from a theoretical and occupational perspective. First, the content of the selected papers were reviewed, the strengths and limitations of each one organised using the categories person, environment, and occupation from the PEO model. Then, tables were used to compile the data, which facilitated the process of understanding the included papers' findings on how OTHPs using UL methods had been implemented.

After summarising the content of the papers, the next step was to compare the studies against each other, as well as the features of best OTHP practice (see part one of the thesis). The PEO facilitated the integration and interpretation of how the motor methods had been used, considering any similarities and inconsistencies (Aveyard 2019:113). The supports and barriers to each aspect of the PEO were then identified, critically analysed, and evaluated. On reflection, emphasis was also placed on the elements of qualitative data during data analysis, to address the review's research question. Relevant data was found in the methods, discussion, and conclusion sections of the selected quantitative studies as aforementioned. This was possible because research papers potentially contain quantitative and qualitative

data, meaning every literature review lends itself simultaneously to the analysis of quantitative and qualitative information (Onwuegbuzie and Frels 2016).

A possible alternative approach is the International Classification of Functioning, Disability, and Health (ICF) (World Health Organisation, 2007) which is an internationally accepted clinical framework for assessment, intervention, and research. However, the ICF as the sole framework for analysis would not have provided the study with an important occupation-focused lens, nor a sufficient discipline-specific language to interpret the data, which supports the profession's unique perspective of occupation (AOTA 2020).

A further possible alternative to the PEO model would have been the Canadian Model of Occupational Performance and Engagement (CMOP-E) (Polatajko et al., 2013) which also conveys the client centred perspective which occupational therapists are expected to use in their practice (Canadian Association of Occupational Therapists 2002; RCOT 2021b). In a similar way to PEO, the CMOP-E has the concept of occupational performance at its centre (Duncan 2021). The PEO model, however, was considered the best option because not all elements of the CMOP-E model might have been applicable or easy to use. During the peer review process for publication of the journal paper, the application of PEO model was commended by the reviewers, who stated that 'using the PEO model as a tool to extract the knowledge in the research question was a good choice,' and 'the evaluation of the included studies is well described including the process'.

Interpretation and conclusions

Supporting the use of sound clinical thinking, reasoning and decision making is important because these processes provide a firm foundation for evidence-based intervention design and practice (Mayston 2017). Essentially, by applying the lens of the PEO model, the critical review not only describes how UL methods are used within OTHPs but also assesses, critiques, and synthesises the literature to inform EBP decision making (Sutton et al., 2019). Collectively, the narrative types of methodology, including the generic style critical review, are valuable because they play an important role in helping to expand the knowledge base around a specific topic in a field that might inform clinical practice (Greenhalgh, Thorne, and Malterud 2018:2; MacLure 2005). On reflection, different review types offer different kinds of truth, yet reviews are not mutually exclusive; they have been found to lack

methodological clarity, as well as consistent terminology (Grant and Booth., 2009; Paré et al., 2015; Sutton et al., 2019). Another issue of 'growing divergence' is the inferior status and positioning of narrative review types in comparison to systematic reviews (SRs) within traditional hierarchies of secondary research evidence (Greenhalgh, Thorne, and Malterud, 2018: 2). Yet this view of the relative value of reviews is controversial within the scientific community – not all commentators agree that SRs and overviews of SRs, with inclusion criteria preferentially seeking SRs and RCTs, are exclusively the highest level of evidence (Cesar, Habicht, and Bryce 2004; Ercikan and Roth 2016; Novak et al., 2020; Paré et al., 2015). In retrospect, a more reasonable position on the concept of 'gold standard' research studies is not that one type of review is better than another. Different types of review serve different purposes and potentially SRs and other types of review can be considered as complementary (Greenhalgh, Thorne, and Malterud 2018: 2).

As the purpose of this critical review was not to describe interventions that have demonstrated evidence of effectiveness, a SR would not have been an appropriate alternative type of review to conduct. By their nature, SRs do not typically describe how interventions should be implemented. Hence, practitioners may still not understand how to apply the evidence to practice because the review would not be able to convey this to them, so if the study had been a SR it would probably not have had the same impact. Furthermore, there appears to be a degree of confusion in the literature over what constitutes a SR. Surprisingly, there is no standard or consensus definition of a SR (Martinic et al., 2019). In the absence of a standard SR definition, the way in which SRs are undertaken and used could be affected, leading to inaccurate misleading results. In addition, for a single researcher to conduct a full Cochrane-style SR would not be realistic, because these types of review are known to be a major undertaking, typically involving a team of experts in the field.

A scoping review is a type of evidence synthesis approach that follows a structured process along the same lines as a SR (Munn et al., 2018). The key difference between a scoping review and a critical review is that scoping reviews do not aim to produce a critically appraised and synthesised outcome to a specific question. Instead scoping reviews focus on addressing a broad question and providing an overview map of the available evidence (Anderson et al., 2008; Arksey and O'Malley 2005). As the purpose of this critical review was to assess, critique, and synthesise the literature to address a specific question to guide OTHP decision making, a scoping review would not have been an appropriate alternative type of review to conduct.

For future research, OTHP studies that test efficacy and those that test effectiveness in the real-world context are needed to enable practitioners to translate evidence into practice. Recommendations for future researchers who develop and test interventions to use within OTHPs are to 'close the loop' by providing protocol papers with detailed descriptions of their interventions, and guidance on how to implement core aspects which must be delivered in order to be effective. Further recommendations for future projects would include conducting a review and synthesis of qualitative evidence, to address the second research question which was to explore the family and clinician's experience of using these methods in OTHPs, as this could add value to OTHP practice and clinical decision-making. Indeed, the use of qualitative research in review methodologies has potential to interpret the context of OTHP implementation more deeply. A further alternative would be to conduct a mixed method review which, apart from examining the effectiveness of OTHPs, would enrich understanding around their implementation.

Out of all the many different types of review available, the critical review was considered to be the best choice of review to meet the purpose of the study which was to enable new theoretical frameworks and perspectives to emerge, thereby expanding the development of home programmes within the field of CP (Torraco 2005). To conclude, Table 5 shows how the findings from this output compare against the OTHP benchmark principles derived from Table 1 (Part 1) and specifies what the study adds to the collective body of work. Output 3's findings are significant as they:

(i) provide an OTHP-specific modified PEO theory, which speaks directly to the target audience of occupational therapy practitioners and informs clinical decision-making (AOTA 2020);

(ii) serve as a potential launch pad for a new phase of conceptual development (Grant and Booth 2009);

(iii) demonstrate an original perspective to the OTHP evidence base and provide recommendations for practice;

(iv) lend support to the value of a critical reviews as a research methodology.

Table 5: Findings from output 3 mapped against the six OTHP benchmark principles

Six OTHP benchmark principles	Analysis of evidence to support this in the paper	What the paper adds to the thesis
1. Based on evidence of best practice and informed by occupational therapy professional guidance	The methods used in implementing upper limb interventions within OTHPs were found to require the combination of motor and non-motor approaches, core occupational therapy skills, working within individual contexts and valuing family preferences. The child's voice in defining goals was absent from the programmes.	OTHPs should reflect the use of occupational therapy core skills, theories, grading and task analysis. Occupational therapists should use child-specific goal-setting instruments to strengthen the child's voice in home programmes and promote participation within a wider range of occupations.
2. Designed in collaboration with each child and family in the best context for them	The programmes were designed in the home environment in collaboration with the family.	OTHPs should be designed in collaboration with families in the home environment.
3. Individualised for each child and family	OTHPs were individualised for each child and family.	OTHPs should be individualised for each child and family.

4.Occupation-centred and child and family centred.	Occupation-focused goals, activities and measures were commonly used. Parental education was provided but the provision of parental support was not described. Challenges in optimising occupational balance surfaced as a gap in the programmes.	OTHP goals, activities, and measures should be occupation-focused. It is important that both parental education and support are provided to help with family empowerment and wellbeing. Further research is needed to understand how parental support is provided when using upper limb interventions within OTHPs.
5. Shaped by a selection of effective interventions determined by the identified goals.	Effective interventions were determined by the goals. Enhanced descriptions of OTHP intervention content were not described.	Effective interventions should be matched to parent and child-identified goals. For researchers, detailed specification of intervention OTHP content, length of time taken to develop and types of restraints (including pictures and modifications with details of what the issues were and how they were addressed) will help to drive forward the body of evidence for which methods work for who, how and why.
6. Evaluated to show the worth of the programme.	All programmes were evaluated using valid outcome measures.	All OTHPs should be evaluated to show their outcomes using valid outcome measures.

2.4 Output Four: Facilitators and barriers to delivery

Introduction

Occupational therapists can be supported to adopt evidence-based OTHP practice behaviour with the use of targeted implementation strategies. However, in order to develop a valid, feasible and sustainable implementation strategy, it is essential to know what helps foster best practice and what needs to change in occupational therapy service delivery (Curtis et al., 2017). This qualitative study, in congruence with the subtle realism position, provided a significant step towards understanding the complexity of the occupational therapy that was possible to implement within the realities of a home programme, as an understanding was gained of the relationship between the practitioners' perspectives and their actual situations (Allmark and Machaczek 2018; Maxwell and Mittapalli 2010). The findings contribute to the limited published body of knowledge pertaining to this commonly used method of service delivery.

Notably, it is the first known study to identify what changes are needed to align OTHP implementation with EBP, using capability, opportunities, or motivational processes. Regarding capability and occupation-focused goal setting, the findings suggest practitioners' decision-making skills could be improved with the explicit use of occupational therapy theory. This is significant, because intervention strategies informed by this data can be developed to strengthen the connection between theory and home programme implementation. In turn, practitioners' understanding of families' occupational perspectives will deepen, leading to better programme designs and OTHP outcomes (Fearing, Law, and Clark 1997; Foster, Dunn, and Lawson 2013; Law et al., 1996; Melnyk and Fineout-Overhold 2019; Milton, Roe, and Newby 2020).

Research design

The research question was the following: 'what are the supports and barriers to using OTHPs based on evidence of best practice for children with unilateral CP in the UK?' This study's qualitative, descriptive design was guided by framework analysis and behaviour change theories (Gale et al., 2013; Mitchie, Atkins, and West 2014b). These tools helped manage the complexity of OTHP investigation and identify specific OTHP implementation behaviours that need to be targeted for change towards best practice. Yet, it is acknowledged that the use of

theory does not necessarily ensure an effective intervention will be produced, though Michie and colleagues suggest that if carried out well, it can be worthwhile (2014b). The findings of this study were intended to contribute towards the development of a knowledge translation intervention to support the use of OTHPs, and to support future investigations of OTHP implementation within local contexts.

A strength of this study is that it provides a research template, which can be replicated to identify and explore practitioner-perceived supports and barriers to using OTHPs in different geographical areas and settings. This is important because practice in local areas will vary, and to be effective, interventions need to be specific and targeted. Furthermore, the careful description in the paper of how the theoretical tools were used makes it possible for others to follow, replicate and modify according to the context of their own services, regardless of the size of the service, availability of resources or location, adding to the significance and value of the paper. Moreover, this application of KT analysis to individual contexts is also supported in the literature (Sakzewski, Ziviani, and Boyd 2016).

Methodology

Framework analysis

The framework method of analysis is not aligned with a particular epistemological, philosophical, or theoretical approach. Hence, a strength of this tool is that different forms of analysis can be used with it. However, subtle realism aligns most closely with this method of analysis (Snape and Spencer 2003). It is the philosophical stance that reality exists independently of how an individual occupational therapist may subjectively understand it. Moreover, gaining an understanding of reality is possible only through practitioners sharing their experience of using OTHPs, which the researcher then proceeds to interpret further within a world context (Hammersley & Atkinson 1995; Maxwell 2012; Nairn 2019). Alternative forms of analysis such as phenomenology, grounded theory, ethnography, as well as thematic analysis were considered. However, the framework method was chosen because of its compatibility with behaviour change theory analysis, as well as its structured, rigorous, and flexible approach to managing qualitative data (Gale et al., 2013; Smith and Firth 2011; Swallow et al., 2011). Essentially, framework analysis reduced and summarised the data to answer the research question through a matrix comprising of rows (interview participants),

columns (codes) and units of summarised data. This structure helped to compare data across the matrix more easily for analysis (Ritchie and Spencer 1994; Ritchie and Lewis 2003).

Framework analysis is useful for informing both policy and practice (Ward et al., 2013). Given the purpose of the study was to identify specific targets modifiable for practice change to inform a KT intervention, a largely deductive rather than inductive version of framework analysis met this aim. The deductive version focused the analysis on the application of pre-selected themes and codes derived from behaviour change theories and facilitated management of a complex data set (Robson and McCartan 2016). Some open coding was done at the initial stages of data analysis, to mitigate the pre-determined framework limiting the discovery of any unexpected aspects of the respondents' experience. Alternatively, if an inductive approach had been used, rather than applying pre-selected themes, they would have instead been generated from the data through open coding (Gayle et al., 2013). In future projects, different approaches to qualitative analysis using the framework method could be explored. For example, inductive and deductive versions used together would be valuable to examine a specific OTHP issue and also give opportunity for unexpected themes to emerge (Gayle et al., 2013).

Theoretical tools

Originating from behavioural science, the Capability, Opportunity, Motivation and Behaviour (COM-B) model and the Theoretical Domains Framework (TDF) are theoretical tools that can help gain an understanding of behaviours relating to implementation, and support of KT (Michie et al., 2014b). The decision to use the COM-B model and TDF was motivated by the following six reasons: i) the research question; ii) the value of behaviour-change theories to understand the main drivers of behaviour and behaviour change; iii) the clear conceptualisation of COM-B, that, in order to change behaviour in clinical practice, practitioners must have the capability, opportunity, and motivation to do it (Michie, Atkins, and West 2014a); iv) the TDF facility in being able to break COM-B components down further, thus enabling a more fine-grained and deeper understanding of the behaviour (Milton, Roe, and Newby 2020); v) the use of TDF in the original design of the interview schedule (Sakzewski, Ziviani, and Boyd 2013); and vi) the support for use of existing theories in qualitative designs (Holloway and Galvin 2017).

Essentially, TDF is a synthesis of several different theories combined into one overarching theory. As an alternative to TDF, the researcher could have selected a single behaviour theory, such as the Theory of Planned Behaviour (Ajzen 1991), the Self-Efficacy Theory (Bandura 1977), or the Self-Regulation Theory (Michie et al., 2014b). However, the study purpose was to gain a deep theoretical understanding of the use of evidence-based OTHPs, hence in comparison with TDF, it is unlikely that one single theory would have addressed the same breadth of constructs as TDF (Francis, O'Connor, and Curran 2012). Although COM-B could have been mapped with other theories, it was decided that TDF then later COM-B, would provide the most coherent narrative and systematic approach for an exploration of the full range of potential levers for change (Michie, Atkins, and West 2014a).

Interview schedule

The interview schedule, data analysis and interpretation were all informed by evidence-based OTHP principles, which served to benchmark the programmes (see Part 1 of the thesis). The semi-structured interview schedule contained a mixture of pre-planned questions, which all participants were asked in the same order, as well as prompts to follow up respondents' thoughts and interests. The use of a structured interview schedule could have been chosen as an alternative, in order to limit the potential for interviewer effects as well as being more likely to be time efficient and easier to control in terms of managing the direction of the interview (Holloway and Galvin 2017). However, the use of a semi-structured interview style was considered to be the most appropriate for this study because it ensured that all TDF domains and the six benchmark OTHP principles would be covered, in addition to providing allowance for occupational therapists to expand further where necessary.

The questions in the interview schedule were open-ended in style rather than yes and no answers so that participants would be encouraged to talk (Michie, Atkins, and West 2014a). Furthermore, the questions were mapped to each of the TDF domains. This was done to enable the researcher to explore each of the possible influences on behaviour across the 14 domains, including 'knowledge', 'skills', 'beliefs about capabilities', 'optimism', 'beliefs about consequences', 'intentions', attention and decision processes', 'environmental context and resources.' For example, the question asking participants to describe how easy or difficult they think it is to use goal setting as part of OTHPs, would be mapped to 'beliefs about capabilities.'

If the practitioners reported they thought that it was difficult to set occupation-focused goals with families, then they would probably be less inclined to routinely use goals in practice. Hence, goal-setting would become a potential target for change that needed to be examined more carefully in terms of prioritisation (Michie, Atkins, and West 2014a).

Interviews

Data for the study was collected from semi-structured interviews with fourteen respondents based in work settings spanning England, Wales, and Scotland, with a mean of 17 years clinical experience. Sharing the same professional background could have resulted in a lack of independence from the participants, hence it was not possible to eliminate all interviewer effects. In addition, despite assurances of confidentiality and anonymity, it is possible that participants may have had feelings of being judged in their interviews. This output was a follow-on study to output 1 which had collected data via a survey, hence, there was some capacity for triangulation. However, in future studies, the researcher would speak to different groups, including parents of CWCP, and use different types of data collection methods, because an improved understanding about a target behaviour as well as increased confidence in analysis are informed by multiple perspectives and methods (Michie, Atkins, and West 2014a). The use of focus groups, for example, would enable the interaction of participants within a focus group creating more opportunities for expressing thoughts and feelings, which might not otherwise be generated via one-to-one interviews. Another example would be observation of the delivery of OTHPs in the field. Pragmatically, the decision to use telephone interviews to collect data reflected several factors namely the researcher's prior experience, absence of travel, reduction in time, ease of transcription management, and compatibility with the choice of framework analysis (Polgar and Thomas 2000; Holloway and Galvin 2017).

How the choice of theory influenced the data analysis and findings

The complexity of the occupational therapy that was possible to implement within the realities of a home programme was revealed, as an understanding was gained of the relationship between the occupational therapists' perspectives and their actual situations (Allmark and Machaczek 2018; Maxwell and Mittapalli 2010). The analysis and findings, specifically in terms of capability, opportunities, or motivational processes, were directed by behaviour change theories (Michie et al., 2014a). It was possible to see that components could overlap

and influence behaviour, for instance, both opportunity and capability affected occupational therapists' motivation for using outcome measures. In addition, it was possible to gain a deeper understanding of the factors guiding particular aspects of OTHP practice. Motivation to implement home programmes based on evidence, for example, appeared to be supported by having the opportunity for mentorship in the workplace. The theory used helped to explore and identify the supports that could potentially change EBP behaviours to inform KT interventions and improve practice. Furthermore, by constantly comparing and analysing the indexing of support and barrier factors against TDF, before being categorised by the COM-B model, led to greater critical reflection and appraisal.

On reflection, TDF is characterised as a 'theory of everything' which facilitates a top-level view of determinants. Although having an overview of different behaviours is valuable, other types of theory, however, focus on more specific aspects of behaviour which if used instead of TDF could have led to greater depth and revealed more nuances in the data. For example, the occupational therapy practice theory, PEO model (Law et al., 1996) could have been used as an alternative to TDF. In a similar way as the PEO model was used in output 3, the same theory could have served as a framework and provided an occupation-focused lens to help identify the support and barrier factors to OTHP implementation. The identified support and barrier factors, which would have included specific aspects of occupation-focused behaviour, could then have been compared against the benchmark of best OTHP practice (see Part 1 for details). However, the PEO model would not have facilitated an analysis within the context of capability, opportunity, and motivational processes, which is notable especially because motivation, despite its importance, is rarely looked at within complex interventions. Furthermore, such a broad understanding, from a behavioural change theoretical perspective, of the range of different behaviours involved in OTHP implementation could not have been provided by PEO.

Conclusion

To conclude, the overall findings of output 4 indicate that in order to be effective, there is an urgent need to capture OTHP outcomes, record parental practice, further integrate 'occupation' within goal-setting, and develop the use of occupational therapy theories (conceptual models for practice) to enhance family-centred care, articulate the occupational therapy profession's unique contribution and adhere to professional standards (Table 6). On reflection, the choice

of using TDF and COM-B provided a certain lens to view the practitioner-perceived supports and barriers to implementing programmes. The use of these behaviour change theories directed the analysis and findings specifically in terms of capability, opportunities, or motivational processes. It is appreciated that if a different method or theory had been used, such as the PEO model, then this would have generated different data, which in turn would have influenced and resulted in alternative analysis and interpretation, however the current study provides a unique analysis which will be important to inform future OTHP practice for CWCP.

Table 6: Overall contribution this output makes to the thesis and the evidence base

This paper's overall contribution to the thesis and the evidence base
1. Behaviour change theories are valuable to facilitate analysis of this topic and can be replicated in future studies. The application of theory-based tools provides an example of knowledge translation from one discipline (behavioural science/psychology) to another (occupational therapy).
2. Practitioners need to implement OTHPs in ways that consistently align to a best practice approach.
3.Practitioners need to engage with professional support networks and evidence-based practices such as keeping up with OTHP evidence literature relevant to this method of service delivery. Practitioners need to advocate for EBP mentorship within the workplace.
4. Practitioners need to use discipline specific theory-driven models for occupational therapy practice to understand families' occupational perspectives and inform their EBP decision-making.
5. Occupational therapy leaders need to advocate for the value of EBP as well as encourage and motivate practitioners to adopt an evidence-based approach. Furthermore, opportunities must be created to facilitate knowledge translation and professional growth for best OTHP implementation.

> **This paper's overall contribution to the thesis and the evidence base**
>
> 6. Practitioners should consistently use outcome measures as part of OTHP delivery to inform clinical reasoning, capture change and enhance a sense of professional efficacy.
>
> 7. Researchers need to explore the use of digital platforms to promote communication with families, including recording of home programme practice and reviewing specific outcomes to evaluate OTHP effectiveness.

Conclusion and future directions

The overall purpose of the doctoral thesis was to identify evidence-to-practice support for practitioners implementing OTHPs in order to improve the design and efficacy of these programmes. Through the critical review of the four publications, the two main objectives of this thesis were to identify, appraise and understand the: (i) use, content and decision-making process supporting OTHPs for CWCP; and (ii) supports and barriers to OTHP implementation, to inform the development of knowledge translation interventions to help practitioners implement OTHPs effectively and achieve the best outcomes. The four publications collectively build on existing home programme evidence (Novak and Cusick 2006; Novak, Cusick, and Lowe 2007; Novak, Cusick, and Lannin 2009; Novak 2011) and thus achieve the overall purpose and objectives of the thesis making an original and novel contribution to knowledge in several ways:

- This work fills a gap in the evidence base by gaining a significant understanding of the current use, content and decision-making process supporting OTHPs for CWCP, as well as the changes needed to align OTHP implementation with EBP, particularly regarding capability, opportunities, and motivational processes. In regard to the decision-making process supporting OTHPs for CWCP, the findings from this research indicate that practitioners do not routinely refer to the evidence nor explicitly use theory-driven models for occupational therapy.

- The thesis identifies specific supports with potential for building capacity, and barriers with potential for removal or modification that could lead to positive changes in home programme practice. For example, the research indicates that practitioners need further education, skill development and greater organisational assistance to implement OTHP evidence-based interventions within a family-centred care framework. Moreover, the need for improvement in the use of occupation-centred goal setting, theory-driven models for occupational therapy, and OTHP evaluation is warranted. Processes of change highlighted include: mentorship, direct observation, support and encouragement from leadership for collaborative partnership working between higher education and clinical settings, and good access to resources that support best practice.

- The supports and barriers to OTHP implementation highlighted in this thesis will be useful to inform occupational therapy leaders both clinical and academic for EBP. A lack of positive beliefs and attitudes towards the implementation of evidence into practice are barriers to knowledge translation (McCluskey and Cusick 2002). The influential role allied health professional managers can have on the implementation of EBP in terms of creating a supportive culture and environment, as well as the importance of supervisors having an awareness of the supports and barriers to implementation is recognised in the literature (Bianchi et al., 2018; Sredl 2008; Wilkinson, Nutley and Davis 2011). To address the difficulties of using evidence in practice it is vital that EBP is promoted and valued by good occupational therapy leadership, so that it is embedded into the workplace and occupational therapists can use it effectively (Aarons 2006). The benefits of occupational therapy managers who advocate and facilitate knowledge translation within teams is highlighted here, as this style of leadership enables information from OTHP research to become integrated into clinical practice which corresponds with an increase in work motivation and pride (Milton, Roe and Newby 2020). Indeed, leadership that is focused on EBP is important to improve the confidence, as well as the sense of responsibility and accountability of clinicians (Bennett et al., 2016).

- A modified PEO theory is presented specific to OTHPs, which speaks directly to the target audience of occupational therapists facilitating greater understanding of the

OTHP evidence and informing clinical decision making (Boniface et al., 2008; Cohn and Coster 2019; Cusick 2001; Reagon, 2012; Rycroft-Malone and Bucknall 2010).

- A research template for the TDF and COM-B model is provided, which can be replicated to identify and explore practitioner-perceived supports and barriers to using OTHPs in local contexts. Additionally, this model provides an example of knowledge translation from one discipline (behavioural science/psychology) to another (occupational therapy).

Notably, this work identified the need for, and contributed toward informing the content of a unique knowledge translation tool to support practitioners' understanding of the evidence regarding OTHPs (Dunford et al., 2020). To date, the web statistics for the published knowledge translation home programme tool are 7097-page views and 1,322 downloads suggesting that this is a valuable resource. The evidence-to-practice support tool is now also being used by occupational therapists outside of the UK, following its translation into Dutch for use in the Netherlands. Likewise, most recently, the research presented in this thesis contributed to a successful bid for a prestigious national research award to facilitate the implementation and adoption of evidence in practice by paediatric occupational therapists across the UK (Elizabeth Casson Trust 2021).

In keeping with this practical dimension, the research also lends support to the UK Occupational Therapy Research and Development Strategy 2019-2024. The specific strategic aims promoted by this body of work are:

(1) 'to strengthen the effective understanding and implementation of existing evidence in occupational therapy practice'

(2) 'to advance the generation of new knowledge and the continued expansion of the evidence base underpinning the practice of occupational therapy, demonstrating its clinical and cost effectiveness' (RCOT 2019).

In terms of future directions, several actions are indicated.

- From an academic-practitioner perspective, in order to promote learning within the profession, there is a need to develop and deliver targeted pre- and post-registration

education sessions with a behaviour change intervention, to facilitate OTHP knowledge translation;

- Taking a practitioner-researcher perspective, research-related activities need to continue to focus on supporting practitioners to implement OTHPs using an EBP approach. In line with current RCOT research priorities (RCOT 2019), emphasis will be placed on investigating:

  - the ways in which practitioners ensure that an occupation-focused and family-centred approach is central to home programme implementation;
  - family perspectives of using home programmes to inform the future development of this method of service delivery and ensure that the highest quality of healthcare outcomes for CWCP are achieved;

- Furthermore, it would be valuable to investigate the use of inter-disciplinary home programmes within a family-centred framework, as promoting cross working with other allied health professionals could be a real strength to meeting the needs of CWPC and their families, sharing expertise and resources.

Overall, the new and significant knowledge discussed within this thesis warrants further action by the profession, as the highest quality of programmes and best outcomes for CWCP and their families can only be realised when an EBP approach is consistently implemented (Melnyk and Fineout-Overholt 2019). The mechanisms of support identified in this body of work include: (i) leadership that promotes the value of EBP and motivates practitioners to use OTHPs based on evidence of best practice; (ii) mentorship which helps translate evidence into practice in the workplace; and (iii) the explicit use of occupational therapy theory that deepens therapists' understanding of occupational perspectives and enhances the use of occupation-focused goals. These identified specific supports should be taken as the active steps towards ensuring this mode of therapy provision is most likely to be effective and achieve the best outcomes. The future is bright for the delivery of OTHPs for CWCP based on evidence of best practice, as change is undertaken to value and implement EBP, capture outcomes, further integrate 'occupation' within goal-setting, and develop the use of conceptual models for practice to both enhance family-centred care and articulate the profession's unique contribution.

Statement of contribution to the field

This thesis builds on a collection of four published papers which have been purposely chosen to demonstrate the thematic development of this original research over the period 2013 to 2020. Throughout this body of work, the golden thread is the critical analysis of factors that support or inhibit the evidence-based implementation of home programmes for CWCP. This research contributes to knowledge firstly, by reviewing the OTHP evidence and professional guidance to identify a common set of principles to benchmark the best use of home programmes for CWCP; secondly, by analysing the outputs' findings using relevant and accessible theoretical frameworks; and thirdly, by highlighting the mechanisms of support needed to promote the implementation of OTHPs based on evidence of best practice. The overriding objective was to gain a significant understanding of the changes needed and support required, to align OTHP implementation within a context of EBP so as to achieve the best outcomes.

This innovative analysis has been used to inform an OTHP research summary and accompanying infographic, which has been published by the profession's national organisation, the Royal College of Occupational Therapists (Dunford et al., 2020). The research summary and infographic were developed in collaboration with the 'Mind the Gap' community of practice, comprised of a group of occupational therapists committed to promoting the use of EBP for children, young people, and families. Reviewed by a panel that included parents, this unique knowledge translation tool makes a significant step towards increasing the accessibility of research and raising awareness of the role of evidence in OTHPs for CWCP.

Overall, the synergist effect of the work contributes to the expansion of capability within the occupational therapy profession by role modelling the value of combining different roles (researcher, practitioner and academic) and showing the applied effect of building on a body of relatively small-scale studies. New knowledge is revealed to support the use of theory-driven models for occupational therapy and EBP implementation of home programmes, which can be incorporated into current practice and used to inform OTHP knowledge translation interventions.

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Therapy* 22(3), 226–234

Appendix 1 Additional research activity relevant to the portfolio submission

Conference presentations

Dunford, C., Milton, Y.M., Powrie, B., Ferreira, F., and Members of the Mind the Gap: Evidence-Based Practice Group. Home programmes for children, young people, and their families: A knowledge translation tool. Abstract Submitted for oral presentation at the World Federation of Occupational Therapy Congress, 'Occupational R-Evolution,' Paris, France, March 2022. This links to the contribution this thesis makes to OTHP knowledge translation up to now.

Milton, Y.M., Dunford, C., and Newby, K.V. Occupational therapy home programme delivery for children with cerebral palsy in the United Kingdom: Does it reflect evidence of best practice? Abstract submitted for oral presentation at the World Federation of Occupational Therapy Congress, 'Occupational R-Evolution,' Paris, France, March 2022. This links to output 1.

Dunford, C., Milton, Y.M., Powrie, B., Ferreira, A., and Members of the Mind the Gap: Evidence-Based Practice Group. Evidence summary for collaborative, parent/carer led, occupational therapy home programmes for children and young people: An important knowledge translation tool. Oral presentation to the CYPF Annual National Conference 'Unlocking Occupational Potential' ONLINE, November 2020. This links to the contribution this thesis makes to OTHP knowledge translation.

Milton, Y.M., Roe, S.A and Newby, K.V. Facilitators and barriers to delivering evidence-informed home programmes for children with cerebral palsy: Identifying strategies to support knowledge translation. Results from a study in the United Kingdom. Paper presentation to the European Academy of Childhood Disabilities Conference 'From Childhood to Adulthood with Disability' Poznan, Poland, November 2020. This links to output 4.

Milton, Y.M., and Roe, S.A. There's no place like home: Therapists' experiences of implementing home-based programmes for children with hemiplegia using a best-evidence approach. Poster presentation to the Royal College of Occupational Therapy Annual Conference, Birmingham, UK, June 2019. This links to output 4.

Milton, Y.M., and Roe, S.A. Occupational therapy home programmes using contemporary motor interventions for children with cerebral palsy. Poster presentation to the World Federation of Occupational Therapists Congress, Cape Town, South Africa, May 2018. This links to output 3.

Milton, Y.M., and Roe, S.A. Occupational therapy home programmes: A best evidence approach. Oral presentation to the RCOT Specialist Section -Children, Young People and Families National Conference 'Broadening horizons: Celebrating Collaborative Practice', Leeds, UK, November 2017. This links to output 3.

Milton, Y., and Roe S. Amplifying families and children's voices in occupational therapy home programme design. Oral presentation to the European Network of Occupational Therapy in Higher Education, Zagreb, Croatia, May 2017. This links to output 3.

Milton, Y., and Roe, S. Occupational therapy home programmes for children with unilateral cerebral palsy using bimanual and modified constraint induced movement therapies: A critical review. Oral presentation to the European Academy of Childhood Disabilities Conference 'Steps into the Future', Amsterdam, The Netherlands, March 2017. This links to output 3.

Milton, Y.M., and Logothetis, A. An occupational therapy practice initiative using the Bobath concept: A collaborative partnership with higher education. Poster presentation to Royal College of Occupational Therapists Specialist Section - Children, young people and families conference, Harrogate, UK, November 2014. This links to output 2.

Milton, Y.M., and Logothetis, A. Partnership working between higher education and practice. Poster presentation to the Royal College of Occupational Therapists 38th Annual Conference and Exhibition, Brighton, UK, June 2014. This links to output 2.

Other publications

Milton, Y.M., Roe, S., and Newby, K.V. (2020) Facilitators and barriers to delivering evidence-informed home programmes for children with cerebral palsy: Identifying strategies to support knowledge translation. Results from a study in the United Kingdom. Oral Presentation 109. *Developmental Medicine and Child Neurology,* (supplement 4) 62: 43

Dunford, C., Milton, Y.M., Powrie, B., Ferreira, A., and Members of the Mind the Gap: Evidence-Based Practice Group. (2020) *Evidence Summary for Collaborative, Parent/Carer-Led, Occupational Therapy Home Programmes for Children and Young People.* Royal College of Occupational Therapists [online] available from < RCOT SS: Children, Young People and Families Resources>[16 September 2020]

Milton, Y.M., and Roe, S. (2017) Occupational Therapy Home Programmes for Children with Unilateral Cerebral Palsy using Bimanual and Modified Constraint Induced Movement Therapies: A Critical Review. Oral Presentation 3. *Developmental Medicine and Child Neurology,* (supplement 2) 59: 4

Knox, V. and Usen-Milton, Y. (2000) Clinical review of the Pediatric Evaluation of Disability Inventory. *British Journal of Occupational Therapy*, 63(1), 29-32

Clinical and professional related work

Milton, Y. Occupational therapy, and children with hemiplegia. Invited speaker. Oral presentation to the Early Years Conference, HemiHelp National Charity for Children with Cerebral Palsy, Birmingham, January 2016.

Milton, Y. Occupational Therapy for Children with Cerebral Palsy: Upper limb and Hand Function. Oral presentation Cerebral Palsy Training, Wakefield, June 2015.

2008-2015 Cerebral Palsy Clinical Advisor & Research Link officer for the Royal College of Occupational Therapists Specialist Section on the National Executive Committee for the Royal College of Occupational Therapists Specialist Section – Children, Young People and Families.

2009-2012 Cerebral Palsy Mentor: Honorary Contract with the Children and Young People's Occupational Therapy Service, Coventry & Warwickshire, Coventry Community Health Service.

Usen-Milton, Y. Occupational therapy for children with cerebral palsy based on best practice and theory: Oral presentations and training workshops. Monterrey, Mexico, June 2007.

Usen-Milton, Y. Motor and sensory approach informed occupational therapy for children with cerebral palsy: Oral presentations and training workshops. Belfast, Northern Ireland, June 2006.

Usen-Milton, Y. Outcome Measures for Children with Cerebral Palsy: Oral Presentations and Training Workshops. Glasgow, Scotland, June 2005.

Appendix 2 Author contributorship

Output 1: Since the paper was published in July 2019 there has been a total of 2,029 downloads and four citations to date. Significantly, to showcase the survey results, the paper was presented at the Royal College of Occupational Therapists' annual conference held in Birmingham in June 2019 to reach a national audience. The first author, whose contribution is estimated to be 85%, conceived the study paper and design, researched the literature, applied for ethical approval, developed, and promoted the survey, collected data, and led on manuscript preparation. All authors contributed to data analysis and critical review and edited the manuscript.

Output 2: Since the paper was published in October 2013 there has been a total of 364 downloads and one citation to date. The paper was presented at two national audience conferences: The Royal College of Occupational Therapy Conference; and the Specialist Section-Children, Young People and Families Conference in 2014. The paper was conceived, synthesised, and written by the first author whose contribution is estimated to be 90%. The remaining 10% contribution was from the second author who commented on drafts of the paper.

Output 3: Since the paper was published in September 2016 there has been a total of 2,496 downloads and four citations to date. The paper's findings were presented for an oral presentation at the European Academy of Childhood Disability (EACD) Conference in Amsterdam in May 2017. Subsequently, the EACD scientific committee selected the paper's abstract to be one of the best 250 abstracts. Significantly, this resulted in the paper's abstract being published in the acclaimed Child Neurology and Developmental Medicine Journal; rated by SJR as a Q1 journal. In addition, the paper's findings were presented at the World Federation of Occupational Therapist's Conference in Cape Town, South Africa in May 2018 reaching a global occupational therapy audience. Dr Newby and Dr Dunford provided guidance in the development of the research questions and design. The co-author (SR) read and commented on drafts of the manuscript. The first author's contribution is estimated to be 90%.

Output 4: Since the paper was published in 2020 there has been a total of 913 downloads and one citation to date. Notably, to showcase the study's findings the papers was presented at the European Academy of Childhood Disability Conference in November 2020 which reached an international audience. The first author, whose contribution is estimated to be 85%, conceived the study paper and design, researched the literature, applied for ethical approval, collected, and transcribed the interview data, and led on manuscript preparation. All authors contributed with data analysis and critical review and edited the manuscript. All authors approved the final version of the manuscript.