Combining Physical Activity with Psychological Therapies for Well-being and Behaviour Change of Young People Experiencing Homelessness

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Abstract

Youth homelessness in the United Kingdom is a complex, multifaceted issue encompassing numerous determinants, pathways, and often deleterious effects on mental health and well-being. Despite the disproportionately high prevalence of mental disorders amongst this population, few access or receive appropriate treatment, predominantly due to limited availability, lack of awareness, and fear of stigmatisation. Evidently, there is an urgent need to address the health inequalities experienced by young people experiencing homelessness (YPEH), through implementing novel strategies which encourage uptake, engagement, and adherence to effective treatments.

This Thesis explored the potential for physical activity (PA) as a viable means by which YPEH may be more likely to engage with psychological therapy. While this concept initially underpinned the primary aim of this project, a comprehensive review of the evidence-base indicated that psychologically-informed PA could offer a standalone treatment option- with comparable effects to psychological therapies. Utilising these findings, and evidence derived from the extant literature, a theoretically-informed intervention comprising PA and Dialectical Behavioural Therapy Skills Training (DBT-ST) was developed for YPEH, to establish feasibility, acceptability, and appropriateness of implementing this complex intervention with this population. While findings from this Pilot Study were evaluated per protocol, this period coincided with the onset of the global COVID-19 pandemic, which presented unprecedented challenges, and requirements to adapt this research project accordingly. Paradoxically, these extraordinary circumstances afforded a unique insight into the effects of isolation and restrictions on the well-being, self-esteem, and PA behaviours of relatively large sample (n = 50) of YPEH; with findings elucidating the need to incorporate sedentary behaviour (SB) as a distinct variable to PA, for the ensuing multi-site study.

A two-arm study comparing psychologically-informed group PA delivered either alone, or with adjunctive DBT-ST was designed, implemented, and evaluated with two groups of YPEH. Despite several implementation challenges, mixed-method evaluations of the interventions provided several important contributions to the field, including the effectiveness of group-based PA, barriers and facilitators to implementation, and postulated mechanisms of effect for supporting positive outcomes with this population. The accumulated evidence acquired throughout this Thesis provides novel, timely, and important insights into not only 'what works' when supporting YPEH, but also 'how, and why' opportunities can engender positive effects.

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List of Publications

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Chapter One: Introduction

1.1 Background

Young people experiencing homelessness (YPEH)[1] frequently report poorer social, physical, and psychological health compared with the general population (Edidin et al., 2012; Medlow et al., 2014), which is often associated with impaired coping mechanisms as a result of previous childhood trauma (Maguire, 2017). Indeed, findings from a recent survey suggests that young people in Wales exposed to over four 'Adverse Childhood Experiences' (ACE's), are *sixteen times* more likely to experience subsequent homelessness, compared with those who report no ACE's (Grey & Woodfine, 2019). How these early antecedents ultimately lead to homelessness in adulthood is a complex and multifactorial process, which involves interplay between physical, mental, and social functioning, as both a cause and consequence of this deleterious pathway (Fitzpatrick et al., 2013). For example, experiencing trauma and abuse in childhood is often predictive of deficient cognitive functioning and reduced ability to self-regulate emotions (Powell & Maguire, 2018), thereby increasing risk of homelessness through compromised psychological (i.e. poor mental health), social (i.e. inability to form secure relationships), and behavioural (i.e. maladaptive coping strategies) functioning (Gasior et al., 2018; Hopper at al., 2010). Such factors are also widely documented to perpetuate and maintain homelessness; resulting in a 'vicious cycle' in which these individuals become entrenched, and thus considered 'harder to reach' (Begun et al., 2018; Maguire, 2017).

Recent reviews have demonstrated some efficacy in potentially altering this trajectory through implementing *appropriate* and *acceptable* interventions for YPEH, according to psychological and socio-contextual factors of the study population (Coren at al., 2016). Specifically, cognitive-behavioural approaches which promote social connectedness,

[1] For the purposes of this Thesis, 'young people' includes individuals aged between 15 – 24 years, and 'experiencing homeless' is defined as houseless, or living in inadequate housing without a legal parent or legal guardian (i.e. sofa surfing, night shelters, supported accommodation; FEANTSA, 2020).

psychological well-being, and physical health have demonstrated some effectiveness for improving psychosocial outcomes amongst YPEH (Altena et al., 2010; Morton et al., 2020), however the relatively spare evidence-base of methodologically 'weak' studies with this population precludes any definitive conclusions pertaining to 'mechanisms of change' as treatment targets for future interventions (Hossain & Coren, 2015). Furthermore, despite evidence to suggest that the prevalence of psychiatric or co-morbid disorders amongst YPEH may be disproportionately high (88% and 73%, respectively), fewer than one-third volitionally access support through available mental health services (Hodgson et al., 2014).

Given the gap in knowledge and understanding of 'what works' for this population within a particular context, further research is clearly required to examine the processes related to engagement and intervention outcomes, while ensuring that those selected outcomes of interest are most relevant to the study population and corresponding research question (Coren et al., 2016).

1.2 Physical Activity and Mental Health

The relationship between physical activity (PA) and mental health is widely documented throughout the extant literature, including a vast evidence-base supporting the effectiveness of PA for improving symptoms of depression, anxiety, and post-traumatic stress disorder (PTSD) across heterogeneous samples of clinical and non-clinical populations (e.g. Rebar et al., 2015; Rosenbaum et al., 2015; Stubbs et al., 2017). The consensus that PA promotes and supports psychological well-being has become complexified through further research evidencing the intricate relationship between psychological *determinants* of PA and enacted PA *behaviour*, which may be further confounded by variability between individuals' perceived enjoyment of the PA (see Biddle & Mutrie, 2008). For example, volitional, self-regulated participation in PA conducive to individual preferences (e.g. format, type, intensity

etc.), is more likely to be associated with positive experiences than enforced or 'prescriptive' approaches to PA behaviour change (Rebar & Taylor, 2017). Consequently, such positive experiences and outcomes can reinforce further engagement in PA, which thereby promote long-term maintenance of regular, sustained PA behaviour (Biddle & Mutrie, 2008).

There is growing support for the utility of behavioural-based interventions (i.e. PA) as an alternative treatment approach to 'first-line' therapies (i.e. cognitive-behavioural therapy; CBT) for young people experiencing poor mental health (Bailey et al., 2018). Notwithstanding the non-stigmatised, accessible, and cost-effective advantages of PA interventions, evidence supporting the wider benefits associated with PA—such as reduced substance misuse, improved sleep quality, and protection against physical health comorbidities—provides further rationale for endorsing PA as an essential component of 'usual care' (Kandola et al., 2019; WHO, 2013b).

For YPEH, PA may offer a viable, evidence-based treatment option to improve mental health outcomes which commonly precede pathways into homelessness (i.e. depression, anxiety, cognitive functioning; see Biddle et al., 2018). Despite the well-documented neurobiological processes which associate PA with improved mental health (Pedersen et al., 2015), there is mounting evidence to suggest that observed effects in young people may operate predominantly through alternative mechanisms, such as improved self-esteem, self-confidence and increased feelings of social connectedness (Lubans et al., 2016; Holt et al., 2017). The lack of evidence between 'dose' of PA (frequency, intensity, time, type) and associated mental health effects (Biddle at al., 2018), further reinforces support for the role of psychosocial factors in mediating positive outcomes for young people (Lubans et al., 2016).

Many young people at risk of homelessness experienced a cycle of negative trauma-related cognitions, low self-esteem and social isolation (Kidd et al., 2018), which culminate in poor

mental health and increased risk of physical health conditions (Maguire 2016; Altena et al., 2010). Given the positive impact of PA on wider determinants of youth homelessness (see above), it is plausible that trauma-informed PA interventions could simultaneously counteract *multiple* risk factors commonly experienced by these vulnerable young people (Hermens et al., 2017; Liu et al., 2015) and encourage relatively greater engagement and acceptability, compared to 'treatment as usual' (TAU; Bergholz et al., 2016). Specifically, PA interventions may mitigate the barriers which often compromise effectiveness of psychotherapeutic interventions (i.e. DBT); through offering a non-stigmatising, inclusive and socially acceptable alternative (Vitopoulos et al., 2017); delivered in safe, non-threatening, non-clinical settings (Lynk et al., 2015).

1.3 Dialectical Behavioural Therapy

Dialectical Behavioural Therapy (DBT; Linehan, 1987) is an evidence-based therapeutic approach originally developed to treat adults diagnosed with borderline personality disorder (BPD). Conceptually, DBT is underpinned by the biosocial theory of emotion (Linehan, 1993), which professes that emotional dysregulation is the product of innate biological vulnerability combined with emotionally invalidating experiences in childhood; culminating in dysfunctional behaviours and adoption of maladaptive coping mechanisms. Standard DBT comprises individual therapy, group-based skills training, and phone-based coaching to address challenges and behaviours associated with BPD; with a full course of treatment typically requiring client commitment for around 1 year (Linehan, 1987). Given that resources, time, and client engagement are often limited in 'real-world' practice, there is a growing evidence-base for the effectiveness of adapted versions of this standard DBT format, which have been successfully applied as a transdiagnostic treatment approach, across various settings with diverse populations (Miga et al., 2019; Swales, 2019).

DBT for adolescents (DBT-A; Rathus & Miller, 2015), is a developmentally-appropriate treatment for this population, underpinned by environmental and biological factor which attribute to dysregulated behaviours and emotions. Studies implementing DBT-A have demonstrated efficacy for reducing anxiety, depression and self-harm of participants across a variety of treatment settings, such as those in looked after care (James et al., 2011), juvenile detention (Fasulo et al., 2015), and 'street-involved youth' (i.e. experiencing homelessness; McCay et al., 2015). When modified according to specific needs of youth transitioning from homelessness, significant improvements in mental health and well-being have been specifically attributed to learning and experiences participants derive through attending DBT skills groups (McCay et al., 2015; Vitopoulos et al., 2017); with this component of DBT-A described as "uniquely suited" to improving symptoms such as depression and anxiety in young people (Hollenbaugh & Lenz, 2018, p.126). Indeed, delivering DBT skills training (DBT-ST) as a 'standalone' treatment approach for common mental health disorders and associated maladaptive behaviours (such as substance abuse) has demonstrated effectiveness compared to 'active comparison' groups, or those receiving TAU (Valentine et al., 2015, 2020)- including evidence from a recent meta-analysis indicating the potential of DBT-ST for emotion regulation and symptom reduction when delivered in relatively small doses to heterogeneous study populations (12 sessions; see Delaquis et al., 2022).

Despite the positive outcomes associated with DBT, DBT-A, and DBT-ST (see above), implementing programmes in community-based settings is frequently compromised by inadequate resources and expertise (Valentine et al., 2015), which may consequently undermine integrity and thus treatment effectiveness (McCay et al., 2016). Furthermore, as sustained motivation and engagement are often integral to intervention success (James et al., 2011; Lynk et al., 2015), innovative strategies may be required which incentivise and

promote DBT to populations such as YPEH- who—despite being amongst the most 'at-risk'—are often also the 'hardest to reach' (Chaturvedi, 2016; Kidd et al., 2018).

Although the extant literature for DBT-ST with YPEH is relatively limited to date (see Kidd et al., 2018), promising findings for 'CBT-based' interventions in improving outcomes for YPEH (including DBT; see Wang et al., 2019), and the utility of DBT in reducing emotion regulation difficulties (Harvey et al., 2019) further support the incorporation of this psychotherapeutic approach in the context of the current research project. While alternative therapeutic approaches were considered during the project's developmental phase (i.e. Cognitive Behavioural Therapy, Motivational Interviewing, Life Skills Training; see Altena et al., 2010), the decision to implement DBT-ST was evidence-informed (see above), and based on recommendations from the organisation's clinical psychology team on which approach would be best suited to this population's psychosocial needs, and most applicable to current referral pathways for treatment-seeking young people supported by Llamau.

1.4 Rationale

There is emerging evidence to suggest that delivering PA interventions within a theoretical framework may augment positive outcomes through a concomitant 'behavioural activation' effect on young people's motivation for engaging in rewarding experiences, and self-regulating positive behaviour change (Bailey et al., 2018; Veale, 2008). Indeed, evidence suggests that incorporating a psychological approach into the design is integral to the most efficacious PA-based interventions; with self-determination theory (SDT; Deci & Ryan, 1985) offering one potentially effective method for supporting psychological, behavioural, and social outcomes for 'at-risk' young people (Altena et al., 2018; Nagpaul & Chen, 2019; Parker et al., 2016). Previous research has specifically highlighted the importance of supporting individuals' basic psychological needs for autonomy, competence, and relatedness

as determinants of self-determined behaviours, optimal functioning, and psychological well-being (see Basic Psychological Needs Theory, BPNT; Deci & Ryan, 2008). Common principles between PA and BPNT which may underpin these positive effects include: focusing on skills; identifying and reinforcing strengths; setting clear goals; and encouraging positive relationship building, which subsequently facilitate intrinsic motivation for continued engagement, mental well-being and positive behaviour change (Bergholz 2016; Altena 2018).

Given the alarming prevalence of mental disorders among YPEH as described earlier in this Chapter (Hodgson et al., 2014; see section 1.1), there is an urgent requirement for novel approaches with potential to *directly* improve physical, psychological and social well-being of YPEH, while *indirectly* increasing engagement, acceptability and uptake of recommended psychological therapies, such as DBT-ST. While previous studies have explored the potential for *integrating* psychotherapy into PA as a 'self-help' intervention for managing depression (e.g. Farrand et al., 2014), the current project will adopt a *combined* approach whereby DBT-ST and PA will be delivered as discrete, sequential intervention components to prioritise fidelity to the therapeutic component (i.e. manualised format, delivered by clinical psychologist), support the external validity of the research (McCay et al., 2016), and adhere to specified requirements of the partner organisation. To the researcher's knowledge, no previous studies have investigated whether PA may be an effective 'vehicle' for increasing young people's engagement in group-based psychological therapy. The impact of 'adjunctive' PA on mental, physical, and social well-being outcomes is also currently unknown, and thus warrants further investigation as to these effects in relation to therapeutic engagement.

1.5 Research Context

As a 'Knowledge Exchange Skills Scholarship' (KESS2) funded programme, this is a collaborative research project between Cardiff Metropolitan University and the national

charity, Llamau (llamau.org.uk). Llamau are a leading organisation for the prevention of homelessness across Wales, and work with young people who have been, or are at-risk of becoming homeless. The majority of YPEH supported by Llamau are aged between 16 – 24 years old, and live in mixed-gender supported accommodation projects with between one and eight other young people. Each young person has their own bedroom, and all projects include communal living spaces such as a lounge or shared kitchen area. In line with evidence presented above (see 1.1), internal research suggests that over 60% of the young people supported by Llamau have experienced at least four ACE's (Llamau, 2018), thereby increasing their risk of poorer psychological, emotional, social and physical health, and associated maladaptive coping behaviours (i.e. substance misuse, self-harm, social isolation). A previous study with Llamau's young people found the prevalence of psychiatric or comorbid disorders among this population was disproportionately high compared with matched population norms, yet fewer than one-third of these young people were accessing support via mental health services (Hodgson et al., 2014). As a consequence of these compounding factors, engaging Llamau's young people in positive activities can prove challenging- with many preferring to remain in the safety and comfort of their own space within the supported living projects, thereby perpetuating the deleterious relationship between the highly sedentary behaviours commonly reported amongst this population (excess sleeping, watching television, gaming) and the disproportionately high proportion of common mental health disorders (Sampasa-Kanyinga et al., 2020).

Collectively, this evidence underpinned Llamau's decision to commission further research into alternative treatment options for supporting the psychological, social, and physical mental health and well-being of the young people they support, while simultaneously exploring novel approaches for encouraging uptake and engagement in psychological therapies.

1.6 Aims and Objectives

The overarching aims of this research project are to: investigate whether physical activity is an effective vehicle for encouraging young people at-risk of homelessness to engage with psychological therapies; determine the differential effects of engagement in PA, psychological therapy, or both, on well-being, self-esteem, and behaviour change; and investigate possible mechanisms of change which mediate observed intervention effects.

These overarching aims will be achieved through completing the following research objectives:

1. Systematically review the evidence-based for the effectiveness of combining physical activity with psychological therapies on psychological and behavioural outcomes.

2. Design a theoretically-informed intervention comprising PA and psychotherapy components, including consideration of factors which may affect implementation.

3. Implement and evaluate a mixed-methods pilot study with the target population, to determine the feasibility, acceptability, and appropriateness of the methodological design.

4. Refine the intervention design and implementation process based on findings from objective 3, and implement a full-scale multi-site controlled trial to establish effectiveness under 'real-world' conditions.

5. Evaluate the trial utilising mixed-methods to explore barriers and facilitators to implementation, effectiveness under 'real world' conditions, and potential mechanisms of change.

6. Produce an optimal 'model' and toolkit of recommendations, to inform the design and delivery of further programmes for supporting well-being and positive behaviour change of similar populations.

1.7 Philosophical Positioning

To comprehensively address and interpret the aims and objectives of this mixed-methods research project necessitates a flexible philosophical and theoretical approach; suitable for transcending the constraints and parameters encompassing positivist and constructionist evaluation paradigms (Mingers et al., 2013). Critical Realism (CR; Bhaskar, 1998; Mingers, 2004) offers a credible alternative, through supporting the positivist ontological positioning on the existence of 'reality' beyond the researcher's thoughts and beliefs, yet equally accepting the epistemological assumption that 'reality' is subject to socio-contextual influence, and therefore not "theory-determined" (Fletcher, 2017; p.182).

Applied to the current research project, a CR approach will be integrated throughout the design, development, and evaluation phases, to acknowledge that mechanisms of change may be determined and influenced by contextual factors, which thereby determine intervention outcomes (Fletcher et al., 2016). Utilising a mixed-methods approach within a CR framework will therefore facilitate identification of 'what works' (i.e. effectiveness), further exploration of how, and under what conditions (i.e. mechanisms of change), and eventual formulation of '*meta-inferences*' (i.e. combined quantitative and qualitative findings) to inform real-world decisions in policy and practice (Zachariadis et al., 2013).

1.8 Structure of the Thesis

This Thesis comprises eight chapters which are presented in a chronological sequence, reflecting how the evidence and findings within each chapter were utilised to inform subsequent research decisions.

Chapter One begins with an overview of the literature with reference to the complexities associated with youth homelessness, followed by an evaluation of evidence for PA-based or DBT-based interventions to address the needs of this population. This concise, but relevant

introduction to these concepts provides justification for the rationale, and corresponding aims and objectives of the research project.

A systematic review of the evidence-base relating to interventions which combine PA and psychological therapy is presented in Chapter Two, with the format mirroring that of the paper which has been published in a high-impact, peer reviewed journal (*Journal of Affective Disorders*). Findings from this review informed the development and design of this project's intervention, including the optimal dose, format, contextual setting, and potential mechanisms of change for effective interventions. This included evidence advocating the potential for psychologically-informed PA interventions as a *standalone* treatment approach, rather than an adjunct to psychological therapy.

Chapter Three provides the reader with a comprehensive explanation of the theoretical framework and implementation-related factors which informed the development of this research project's multi-component intervention. Throughout this Chapter, the available evidence in relation to complex intervention design, combining PA + psychological therapy for well-being, and undertaking research with 'hard-to-reach' populations was continuously considered an applied accordingly. Potential mechanisms of change were also discussed in relation to intervention component (i.e. PA and DBT-ST), to ensure the interventions comprised the active ingredients associated with effective interventions.

Based on findings and evidence from the preceding research, Chapter Four describes the design, implementation, and evaluation of a Pilot Study intended to establish the feasibility, acceptability, and appropriateness of PA and / or DBT-ST interventions for YPEH. Using a mixed-methods approach, the findings from this study helped elucidate: the potential effectiveness of group-based PA either with or without adjunctive DBT-ST for psychosocial well-being and behaviour change of YPEH; whether PA is an effective and viable means to

encourage engagement in DBT-ST; potential mechanisms of change; and key barriers or facilitators to implementation of interventions with this population. In conjunction with findings from Chapter Two, this study supported evidence for group-based PA as a cost-effective and acceptable alternative to 'treatment as usual' for YPEH.

The sudden and unanticipated events associated with the global pandemic are described within Chapter Five, which provides an insight into how this impacted on the overall research project, and affected the use of longitudinal survey data; originally intended for comparing effects of a full-scale study with those reported over eight weeks of 'usual care'. In response to this challenge, the researcher recognised how this unique data (changes in well-being, self-esteem, and PA behaviours of YPEH from before to after national 'lockdown') presented an opportunity to further contribute to a limited evidence base in this field with this population, resulting in a second publication in a high impact peer review journal *(Mental Health and Physical Activity*). While indirectly related to the overall projects aims and objectives, this study provided further evidence for PA as an effective 'treatment' for mental health and well-being, and also introduced the nuanced relationship between SB (rather than PA) and psychological outcomes.

Chapter Six details the methodology for a mixed-methods 2-arm parallel group study comprising a psychologically-informed PA intervention, and a theoretically-informed DBT-ST intervention. The study design and implementation strategy are provided with reference to applying the accumulated evidence (as presented in the preceding Chapters) in the context of continued pandemic-related policy and restrictions. The content of each intervention component is thoroughly described, before providing the planned quantitative and qualitative data collection methods, and evaluation strategies in relation to the aims. Given the absence of comparative baseline data, and constrained sample size owing to the pandemic, this Chapter also explains the transition in design from a quantitatively-focussed effectiveness

study, to a mixed-methods evaluation of implementation, effectiveness, and postulated mechanisms of change.

Findings from the proposed study documented in Chapter Six, are presented and evaluated using mixed-methods in Chapter Seven of this Thesis. The introductory section of this Chapter describes 'what happened' during implementation of this pragmatic study, and subsequently justifies why it was necessary to amend the evaluation approach from that described in Chapter Six. Consequently, this Chapter constitutes two parts: 1. Mixed-methods evaluation of the effectiveness of a PA-based intervention for well-being, self-esteem, and behaviour change of YPEH; and 2. Process evaluation of implementing a combined PA + DBT-ST intervention for YPEH. Potential active ingredients, mechanisms of change, and barriers and facilitators to research with this population are identified and evaluated in detail.

The final Chapter (Eight) commences with a summary of the research undertaken in fulfilment of the requirements for this project, including the extent to which each study's key findings contributed to addressing the overarching aims. Illustrating how this project evolved and adapted to 'real-world' events, the collective findings (with greater emphasis on those of the final study) are discussed through critical evaluation and comparison of PA-based interventions as a standalone treatment option for YPEH, versus interventions which include both PA-based and psychotherapeutic components. Recommendations for how the cumulative findings may be applied to routine practice are provided in the format of 'what' and 'how' to implement further opportunities and programmes for this population. The Chapter concludes with acknowledgement of the overall strengths and limitations of the research, before recommending future directions for furthering the preliminary findings afforded by this project.

Chapter Two:
Systematic Review

2.1 Introduction

This Chapter will provide a brief overview of the rationale underpinning the topic of the systematic review, before presenting the paper entitled: "Effects of combining physical activity with psychotherapy on mental health and well-being: A systematic review", as published in a high impact, peer-review journal (*Journal of Affective Disorders*, doi.org/10.1016/j.jad.2020.01.070). Implications of findings from the review will be discussed in the context of the overall project, including recommendations for conceptualisation and design of the intervention (further detailed in Chapter Four).

From the literature review presented in Chapter One, it is evident that the current project encompasses a broad range of topics and vast evidence base, culminating in difficulty establishing 'what works', in relation to the research aims. For example, how the 'dose' (frequency, intensity, time, type) of PA, and / or psychological therapy may influence various outcomes of interest (i.e. well-being, mental health, PA behaviour); what effect a 'combined' intervention (incorporating therapy and PA) has on these outcomes, compared to each component alone; and how socio-contextual variation may influence interventions which have demonstrated efficacy in alternative settings. Given this complexity, the systematic review presented in this Chapter was intended to evaluate *why* and *how* relevant studies (combining PA with psychotherapy) may or may not have 'worked', rather than adopting a reductionist "does it work" (hypothesis testing) approach (Fletcher et al., 2016, p. 288). The selection criteria for studies included in the review was intentionally broad to ensure synthesis of evidence derived from heterogeneous designs (i.e. population, setting, dose etc.), which—through evaluating efficacy, effectiveness, *and implementation context*— was interpreted to identify and explicate potential 'mechanisms of action' associated with positive effects, and subsequently inform the conceptualisation and design of this project's pilot study (as described in Chapter Four) (Petticrew, 2015).

2.2 Systematic Review Paper

Effects of Combining Physical Activity with Psychotherapy on Mental Health and Well-being: A Systematic Review

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Abstract

Objective: Despite a vast evidence-base advocating the psychological benefits of physical activity, relatively little is understood about how combining physical activity with psychological therapies may influence these positive effects. The aim of this paper is to systematically analyse evidence from studies adopting a combined approach, and identify potential mechanisms of action on clinical outcomes. **Methods:** The Embase, PsycINFO and Medline (PubMed and OVID) databases were searched for applicable trials published up to December 2018. Relevant data was extracted from eligible studies, and the Effective Public Health Practice Project (EPHPP) tool was utilised to objectively assess the quality of each study. **Results:** Twenty-two studies met the inclusion criteria, seven of which were rated as methodologically 'strong'. Combining physical activity with psychological therapy consistently engendered positive effects on outcomes compared with treatment as usual. Similar improvements in psychological outcomes were observed in most (7/8) groups receiving physical activity alone. Increased levels of physical activity were observed in psychologically-informed interventions, however this effect was unrelated to changes in psychological outcomes. **Limitations:** Clinical and methodological heterogeneity precluded meta-analyses of results, while risk of bias detected in the studies may compromise overall validity of the findings. **Conclusions:** Physical activity interventions may be a viable alternative to psychological therapies, provided psychological approaches are incorporated into the implementation design (i.e. behavioural activation). Improved psychological outcomes may be observed regardless of 'dose' received, however further research is required to ascertain whether psychosocial mechanisms of change mediate positive effects.

Keywords: physical activity; psychological therapy; behavioural activation; mental health; well-being

Introduction

The implementation of 'exercise as medicine' has been recommended as an effective treatment across a spectrum of psychiatric diseases (Pedersen & Saltin, 2015), and as an evidence-based alternative to current recommendations, may simultaneously address co-morbid physical conditions frequently associated with mental health issues (World Health Organisation, 2013). Indeed, evidence derived from previous reviews provides consistent support for physical activity (PA) interventions in reducing symptoms of depression (Cooney et al., 2013), anxiety (Stubbs et al., 2017), and post-traumatic stress disorder (PTSD) (Rosenbaum et al., 2015), when compared with non-active controls. Given the considerable heterogeneity between these reviews' populations, severity of disorder, and intervention 'dose' provided and received (frequency, intensity, time, type), the collective evidence strongly suggests that strategies to encourage PA should be implemented for such individuals; particularly those who may be resistant to 'traditional' pharmacological or psychotherapeutic approaches.

When comparing the effects of PA with first-line treatments such as cognitive behavioural therapy (CBT), reviews have consistently reported similar reductions in symptoms of common mental health disorders (Bailey et al., 2018; Stonerock et al., 2015). Whilst this indicates that exercise may be equally effective as currently recommended psychological approaches, there is a lack of consensus on which 'mechanisms of action' underpin the psychological benefits observed (Michie et al., 2017). This has led to an increase in comprehensive reviews of the evidence-base pertaining to multifactorial pathways through which PA can effectuate change (e.g. Lubans et al., 2016; Teixeira et al., 2012); and justifies its consideration as a credible adjunct treatment for mental health disorders. Given that the effects of PA may be mediated by numerous biopsychosocial factors (Pedersen & Saltin,

2015), it can be argued that the benefits attained may extend beyond those reported by studies assessing psychological symptoms.

The concept that PA may offer additive benefits to psychotherapeutic approaches, has led to a rise in research trials examining whether a *combined* approach may augment the effects compared with either component alone; yet the diversity between designs, methodologies, and sample characteristics hinders interpretation of contrasting results- particularly in identification of which mechanisms may mediate observed effects. Randomised control trials (RCT's) which have demonstrated efficacy of combined interventions over non-active controls (Euteneur et al., 2017; Gourgouvelis et al., 2018), have objectively attributed changes in neurobiological markers to improvements in self-reported depressive symptoms. While this insinuates that increased PA levels *directly* engender positive effects via biological pathways, further trials of combined interventions have speculated that significant effects may also be induced via behavioural or psychosocial processes, such as: greater perceptions of social support (Van der Waerden et al., 2013); increased sense of mastery and self-efficacy (Merom et al., 2008); or a general 'behavioural activation' effect derived from scheduling activities and positive reinforcement (Parker et al., 2016; Veale, 2008). It is plausible that all of these hypothesised mechanisms may contribute to combined intervention effects, however without further analysing the 'dose' of PA / psychotherapy received by relative comparator groups, it is not possible to accurately establish what works for whom, and under what conditions (Michie et al., 2017).

One recent review and meta-analysis evidenced partial support for combined approaches in improving various psychological outcomes, however limited its inclusion criteria to adults with chronic diseases (Bernard et al., 2018). Moreover, the complex interactions which exist between physical health, motivation for PA, and prevalence of mental illness (Everson-Hock et al., 2015; Machaczek et al. 2018), somewhat preclude delineation of the 'moderators of

efficacy' proposed within the review. Given that the diverse potential mechanisms of change (i.e. self-efficacy, self-esteem, behavioural activation, increased PA, sense of autonomy, social connections) are commonly underpinned by concepts related to motivation, utilisation of existing research and theory may prove useful when drawing conclusions as to how these may relate to subsequent well-being outcomes (Cooney et al., 2013; Hagger & Chatzisarantis, 2014; Sancassiani et al., 2018).

The purpose of the present review is to expand on the results of previous research, through evaluating the efficacy of interventions which combine psychotherapy with PA, on improving participants' psychological symptoms (i.e. depression, anxiety), and—where reported—increasing overall levels of PA. Through including a broader range of populations (i.e. adolescents), and intervention component designs (i.e. PA as an adjunct to psychotherapy, or integrating psychotherapy into PA content and delivery), findings will be interpreted in respect to content and dose, to subsequently identify and explicate the potential mechanisms of action associated with each approach.

Methods

Inclusion and Exclusion Criteria

Based on relevant 'PICO' elements (population, interventions, comparators, outcomes), a predetermined selection criteria was formulated to provide transparency and objectivity throughout the process (Centre for Reviews and Dissemination; CRD, 2009). To expand on previously published reviews and identify potential subgroup disparities, there were no restrictions on included populations- provided the sample used in the study was considered adolescent age or above (> 13 years). Any trials employing interventions which delivered psychological therapy in conjunction with physical activity were considered for inclusion in the final review, regardless of whether these were implemented as an alternative, or 'adjunct' to treatment as usual (TAU; i.e. providing PA to patients receiving CBT). Studies comparing

the effects of psychological therapy versus physical activity were excluded from the review, as were those which delivered components (PA and psychotherapy) as separate interventions, rather than simultaneously. Included studies required at least one between-groups comparator (i.e. PA alone, therapy alone, or TAU), and therefore those adopting a pre-post design were excluded from the review. Studies were considered for inclusion provided they utilised at least one psychometrically validated screening tool for mental health/well-being, either as a primary or secondary outcome measure.

Search Strategy

Following guidance specific to reviews of health interventions (CRD, 2009), a systematic search of the Medline (via OVID and PubMed), Embase and PsycINFO databases was conducted in November 2018. Key words and synonyms relating to the inclusion criteria (PICO) were identified to structure the search strategy (Appendix 1). A manual citation scan of relevant papers was also conducted for completeness and breadth.

After removal of duplicates and limiting the search to articles published in English language, titles and abstracts were reviewed for eligibility, and consequently full texts were obtained for 113 studies. Individual scrutiny of each remaining paper ensured only those which adhered to the inclusion criteria were included in the final review. At each stage of the searching process, the reasons for exclusion of papers were categorised and recorded accordingly.

Data Extraction

A data extraction template was used to record key characteristics of the selected studies, including: Authors, date and location of the study; sample size and participant information; intervention details (frequency, intensity, time and type of each component); details of the comparator/control(s); outcomes measured with corresponding tools. Given the clinical diversity of the samples, a meta-analysis was deemed unsuitable (Higgins & Green, 2011),

however findings in relation to outcomes of interest were extracted to identify any within group (pre-post test), or between-group (interaction) intervention effects.

Quality Assessment

The 'Effective Public Health Practice Project' (EPHPP, 2007) tool was used to assess the methodological integrity of each intervention, on the basis of six distinct components (selection bias; study design; confounders; blinding; data collection; withdrawals/dropouts). Informed by the tool's standardised dictionary, a rating for each component was derived from the information provided in each paper. Where information was not provided or unclear, protocols were checked for accuracy of the scoring. These ratings subsequently determined whether the quality of each study was considered to be strong (no weak ratings), moderate (one weak rating), or weak (> one weak rating) overall. All assessments and overall scoring were verified by a second reviewer (KT).

Results

Search Results

Database searches yielded 2153 citations in total, which reduced to 1144 following deduplication and application of limits. From reviewing the remaining titles and abstracts, a further 1031 papers were removed, as they failed to meet the full inclusion criteria. Of the 113 full texts screened, a total of 21 were eligible for inclusion in the review, which increased to 22 after identification of one further study through manual screening of relevant papers. A PRISMA flow diagram (Liberati et al., 2009) detailing the search process is presented in Figure 2.1.

Characteristics of Included Studies

A summary of each studies' sample, design, intervention, comparator(s) and outcomes can be found in Table 2.1. Sample sizes ranged from 19 - 779 participants, whose mean ages were between 14.7 - 79.3 years. Most of the studies included mixed sex samples, for which

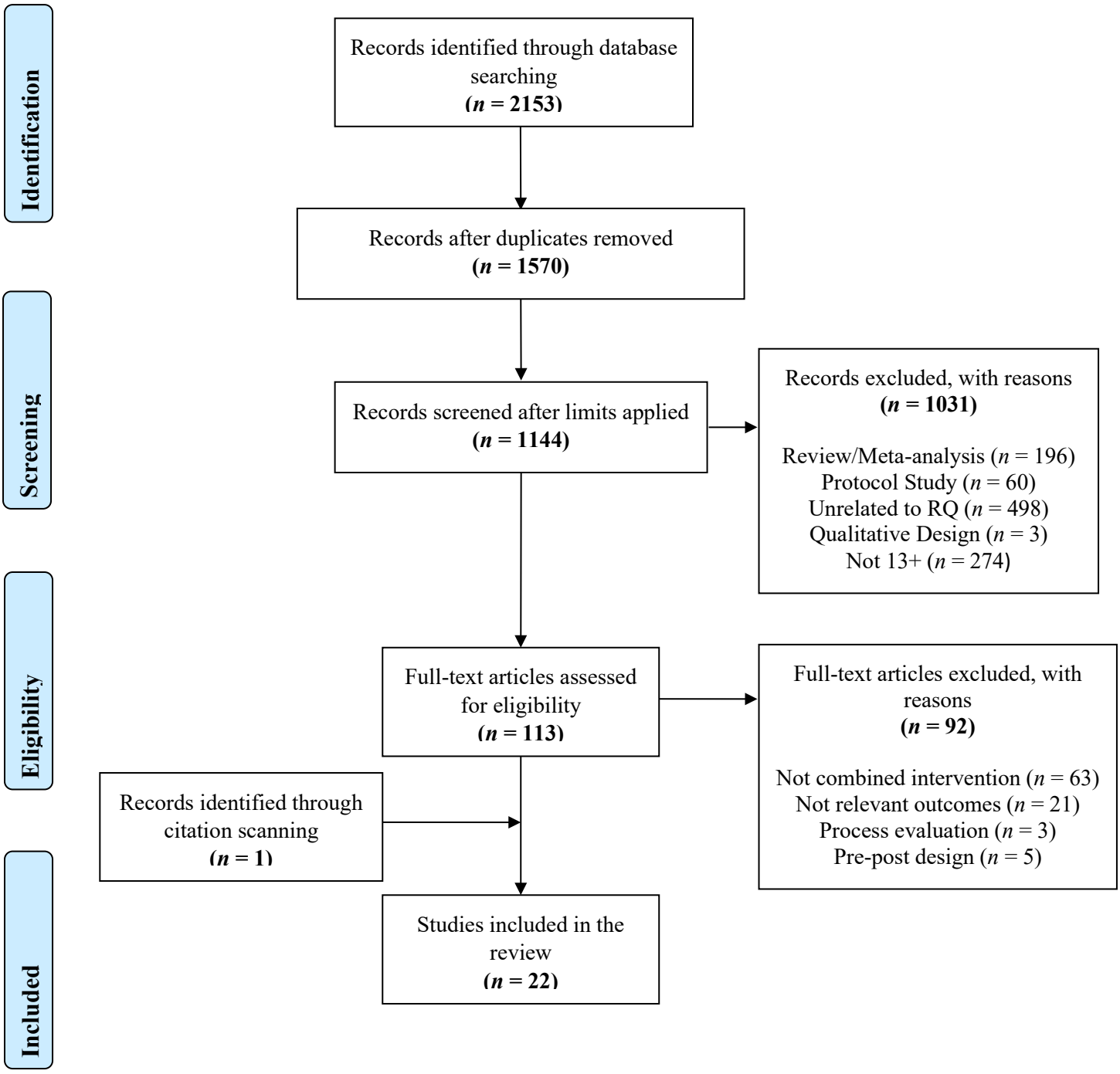

Figure 2.1. *PRISMA flow diagram of study selection process.*
Note: RQ = Research Question.

the ratio female participants varied from 45.9 - 90%. Two studies were conducted with male participants only (Engberg et al., 2017; McGale et al., 2011); three recruited an exclusively female sample (Duijts et al., 2012; Lera et al., 2009; Van der Waerden et al., 2013).

Table 2.1
Characteristics of the Included Studies

Authors	Sample	Design	Intervention Details PA	 PSYC	Comparator(s)	Outcome Measures	Recommendations
Abdollahia et al., (2017) (Iran)	*n* = 54 54.3% female *M* age = 48.4 Moderate depression	RCT	F: 3 x p/w I: Moderate Ti: 40mins. T: Group aerobic **12 weeks**	F: 1 x p/w Ti: 90 mins. T: Group CBT **12 weeks**	1. Group CBT	Depression (BDI) Daily activity (BIADL)	- Control group (PA only) - Follow-up data - Social influence on outcomes
Brovold et al., (2012) (Norway)	*n* = 108 65.7% female *M* age = 79.3 Day hospital patients	RCT	F: 2 x p/w I: Moderate Ti: 45 mins. T: Balance exercises + prescribed resistance training **3 months**	F: 1 x p/w Ti: 30 mins. T: Group counselling on benefits of exercise **2-3 weeks**	1. Group counselling + balance exercises	- QOL (SF-36) - PA levels (SR)	- Control group - LT effects - Effect of varied resistance / intensity exercise
Duijts et al., (2012) (Holland)	*n* = 422 100% female Breast cancer patients	RCT	F: Self-directed I: 60-80% MHR Ti: 150-80 mpw T: Tailored PE programme **12 weeks**	F: 1 x p/w Ti: 90 mins. T: Group CBT **6 weeks**	1. Group CBT 2. PE programme 3. WL control	- Distress (HADS) - QOL (SF-36)	- Strategies to improve adherence
Engberg et al., (2017) (Finland)	*n* = 168 100% male *M* age = 40 CVD risk	RCT	F: 1 x p/w I: Moderate Ti: 60 mins. T: Group aerobic + resistance **3 months**	F: Once Ti: 90 mins. T: 1:1 'Health Counselling' **1 session**	1. 1:1 HC 2. WL control	- Self-rated Health - SWB (single item) - Depression (PHQ-2)	- HC addressing well-being - Other psychometric measures - Objective PA measures

Euteneur et al., (2017) (Germany)	*n* = 98 48% female *M* age = 37.3 Major depression	RCT	F: 4 x p/w I: Moderate Ti: 40 mins. T: Prescribed aerobic **16 weeks**	F: 1 x p/w Ti: 50 mins. T: 1:1 Behavioural Activation with exercise + CBT **16 weeks**	1. 1:1 Behaviour Activation without exercise + CBT 2. WL control	- Depression (BDI) - PA (IPAQ) - Inflammation (blood)	- Objective PA measures - Long-term follow-up
Fremont & Craighead (1987) (USA)	*n* = 49 73.4% female Age 19-62 Moderate depression	RCT	F: 3 x p/w I: Moderate Ti: 20 mins. T: Group running **10 weeks**	F: 1 x p/w Ti: 60 mins. T: 1:1 CBT **10 weeks**	1. 1:1 CBT 2. Group running	- Depression (BDI) - Anxiety (STAI) - Mood (POMS)	- Role of social support - Objective physiological measures
Gary et al., (2010) (USA)	*n* = 74 57.1% female *M* age = 65.8 Heart failure + depression	RCT	F: 3 x p/w I: Moderate Ti: <60 mins. T: Tailored walking prescription **12 weeks**	F: 1 x p/w Ti: 60 mins. T: 1:1 CBT **12 weeks**	1. 1:1 CBT 2. Prescribed walking program 3. TAU (Heart failure medication)	- Depression (HAM-D) - PA (6MWT) - HRQOL (MLHFQ)	- Control for/measure effect of social interaction - Objective PA measures (pedometer/accelerometer)
Gourgouvelis et al., (2018) (Canada)	*n* = 38 60.5% female *M* age = 30.1 Major depression	CT	F: 3 x p/w I: 60-80% MHR Ti: <60 mins. T: Prescribed aerobic + resistance **8 weeks**	'Cognitive behavioural group therapy' (details NR)	1. Cognitive behavioural group therapy	- Depression (BDI/ HADS) - Anxiety (HADS-A) - VO2 Max.	- Effect of baseline fitness - Larger sample
Jacobsen et al., (2013) (USA)	*n* = 286 67.8 % female *M* age = 57.8 Cancer patients	RCT	F: 3-5 x p/w I: 50-75% MHR Ti: 20-30 mins. T: Prescribed walking program	F: Once Ti: 15 mins. 1:1 + 20 min. video T: Self-directed	1. Stress Management 2. Prescribed walking program	- QOL (SF-36) - Depression (CES-D) - Anxiety (BAI) - PA (LTEQ)	- Dose-response measures - Effect of different types of PA - Internet delivery/monitoring

			12 weeks	Stress Management' **12 weeks**	3. TAU (Access to psychosocial services)		
Jacquart et al., (2014) (USA)	*n* = 78 61.5% female *M* age = 59.7 Major depression	RCT	F: Daily I: Moderate Ti: 30 mins. T: 1:1 walking **2 weeks**	F: Daily Ti: 30 mins. T: Integrated 1:1 'Validation therapy' **2 weeks**	1. Validation therapy 2. TAU (Medication and group therapy)	- Psychiatric + social functioning (BASIS-32) - Depression (GDS)	- LT follow-up - Effect of various therapeutic approaches - Ex only group
Kashikar-Zuck et al., (2018) (USA)	*n* = 40 90% female *M* age = 15.4 Fibromyalgia	RCT	F: 2 x p/w I: Moderate Ti: 45 mins. T: Group strength + resistance **8 weeks**	F: 2 x p/w Ti: 45 mins. T: Group CBT **8 weeks**	1. Group CBT	- Depression (CDI) - Pain (VAS)	- Group-based 'booster' sessions - Longer-term follow-up - Ex only arm
Lera et al., (2009) (Spain)	*n* = 83 100% female *M* age = 50.2 Fibromyalgia	RCT	F: 1 x p/w I: Moderate Ti: 40 mins. T: Group CV exercise + stretching **10 weeks**	F: 1 x p/w Ti: 90 mins. T: Group CBT **15 weeks**	1. Group CV exercise + stretching	- QOL (SF-36) - Mental health (SCL-90-R)	- STAI/BDI measures - Long-term FU - Include males
McBeth et al., (2012) (UK)	*n* = 442 65.5% female *M* age = 56.2 Chronic pain	RCT	F: 3-5 x p/w I: 40-85% MHR Ti: 20-60 mins. T: Tailored exercise program **6 months**	F: 1 x p/w Ti: 30-45 mins. T: Telephone CBT **8 weeks**	1. Telephone CBT 2. Tailored exercise program 3. TAU (Usual care from physician)	- QOL (SF-36) - Psychological distress (GHQ)	- Longer-term FU

				(Extra session at 3 and 6 months)			
McGale et al., (2011) (Ireland)	*n* = 104 100% male *M* age = 28 Sedentary	RCT (pilot)	F: 2 x p/w I: Moderate Ti: 55 mins. T: Group football **10 weeks**	F: 2 x p/w Ti: 55 mins. T: Integrated group CBT **10 weeks**	1. Individual exercise 2. WL control	Depression (BDI) Social Support (SPS)	- CBT only comparator - LT follow-up (12months) - Cost effectiveness
Melnyk et al., (2009) (USA)	*n* = 19 72% female *M* age = 15.5 Hispanic	Cluster RCT (Pilot)	F: 2-3 x p/w I: NR Ti: 15-20 mins. T: Group activities **15 sessions**	F: 2-3 x p/w Ti: 30 mins. T: Group psychoeducation **15 sessions**	1. 'Attentional control' ('healthy teens' education)	- Dep/Anx (BYI)	- Strategies to encourage 'homework' - Long-term FU
Melnyk et al., (2013) (USA)	*n* = 779 51.6% female *M* age = 14.7 Students	Cluster RCT	F: 1 x p/w I: NR Ti: 15-20 mins. T: Group activities (i.e. dancing, kick-boxing) **15 weeks**	F: 1 x p/w Ti: 30 mins. T: Group psychoeducation + homework **15 weeks**	1. 'Attentional control' ('healthy teens' education)	- Dep/Anx (BYI) - Social Skills (SSRS) - Substances (YRBS) - PA (pedometer)	- Measure fidelity - Wider sample - Fidelity measures - Mediating variables (PA/CBT?)
Melnyk et al., (2015) (USA)	*n* = 625	Cluster RCT **(F/U)**	As above (F/U)	As above (F/U)	1. 'Attentional control' ('healthy teens' education)	- Depression (BYI)	- Monitoring of intervention fidelity and quality of delivery

Merom et al., (2008) (Australia)	*n* = 74 78.5% female *M* age = 39.1 GAD/PD/SP	Cluster RCT	F: 1 x p/w I: Moderate Ti: 30 mins. T: Prescribed self-directed walking (goal= <150 mpw) **8 weeks**	F: 1 x p/w Ti: 90 mins. T: Group CBT **8 weeks**	1. Group CBT + dietary advice	- Depression, Anxiety, Stress (DASS-21) - PA levels (SR)	- Longer program duration - Measures of mechanisms i.e. self-efficacy - Social exercise effects - Objective PA measures
Parker et al., (2016) (Australia)	*n* = 176 61% female *M* age = 17.6 Moderate depression/ anxiety	RCT	F: 1 x p/w I: Self-directed Ti: Self-directed T: 1:1 'Behavioural activation' **6 weeks**	F: 1 x p/w Ti: NR T: 1:1 'Problem solving therapy' **6 weeks**	1. Psychoeducation control 2. Supportive counselling control	- Depression (BDI/MADRS) - Anxiety (BAI) - PA levels (IPAQ)	- Objective PA measures - Measure mediators: self-efficacy/social support
Pentecost et al., (2015) (England)	*n* = 60 48.4% female M age = 44.4 Severe depression	RCT	F: 1 x p/w I: Self-directed Ti: Self-directed T: Behavioural activation for PA **13 weeks**	F: 1 x p/w Ti: 35 mins. T: Integrated 1:1 low-intensity CBT **12 weeks**	1. Behavioural activation (TAU)	- Depression (CIS-R/ PHQ-9) - QOL (SF-36) - PA levels (7-day recall/ accelerometer)	- Record fidelity to intervention - Establish methods to improve recruitment/retention - Report variance (between-group) differences in outcomes
Smeets et al., (2008) (Holland)	*n* = 172 45.9% female *M* age = 42 Back pain	Cluster RCT	F: 3 x p/w I: 60-80% MHR Ti: 105 mins. T: Group aerobic (30mins)+strength (75mins) training **10 weeks**	F: 1 x p/w Ti: 90 mins. T: Group 'Problem solving therapy' **10 weeks**	1. Group problem solving therapy 2. Group aerobic training 3. WL control	- Depression (BDI) - Pain (PRI-T) - PA tasks	- Sub-group analyses of different treatment effects - Identify mechanisms of change - Compare individually tailored treatment effects

Van der Waerden et al., (2013) (Holland)	*n* = 161 100% female *M* age = 43.9 Depression + Low SES	RCT	F: 1 x p/w I: Low-moderate Ti: 60 mins. T: Group strength + resistance, stretching and relaxation **8 weeks**	F: 1 x p/w Ti: 60 mins. T: Group psycho education on coping with depression **8 weeks**	1. Group stretching and relaxation 2. WL control	- Depression (CES-D) - Stress (PSS)	- Objective dose-response measures - Effect of social exercise - P only group - Longer duration **- Initial motivation strategies to increase adherence**

Notes: PA: Physical Activity; PSYC: Psychotherapy; RCT: Randomised Controlled Trial; CT: Controlled Trial; *n:* Sample size; *M*: Mean; F: Frequency; I: Intensity; Ti: Time; T: Type; p/w: per week; mpw: Minutes per week; mins.: Minutes; MHR: Maximum heart rate; TAU: Treatment as usual; WL: Wait-list; NR: Not reported; CBT: Cognitive-behavioural therapy; SES: Socioeconomic status; F/U: Follow-up
BDI: Beck Depression Inventory; SF-36: Short Form Health Survey (PCS: Physical Component Summary; MCS: Mental Component Summary; FS: Functional Status; EW: Emotional Well-being) HADS: Hospital Anxiety and Depression Scale; PHQ-2: Patient Health Questionnaire-2; HAM-D: Hamilton Rating Scale for Depression; CES-D: Centre for Epidemiological Studies for Depression Scale; BAI: Beck Anxiety Inventory; GDS: Geriatric Depression Scale; BASIS-32: Behavioural and Symptom Identification Scale; CDI: Children's Depression Inventory; SCL-90-R: Symptom Checklist-90-Revised; BYI: Beck Youth Inventory; DASS-21: Depression Anxiety and Stress Scale; MADRS: Montgommery-Asberg Depression Rating Scale; STAI: State Trait Anxiety Inventory; SRC: Stress Reduction Checklist; PRI: Pain Rating Index; PSS: Perceived Stress Scale; MLHFQ: Minnesota Living with Heart Failure Questionnaire; GHQ: General Health Questionnaire; BIADL: Barthel Index of Activities of Daily Living; 6MWT: 6-minute walk test; IPAQ: International Physical Activity Questionnaire; rec.HR: Recovery Heart Rate; VO2max: Maximal oxygen consumption test; LTEQ: Godin Leisure-Time Exercise Questionnaire; 5MWT: 5-minute walk test; SR: Self-reported

Participants with diagnosed depression were purposively recruited in nine of the studies, from settings including: outpatient clinics (Abdollahia et al., 2017; Euteneur et al., 2017; Gary et al., 2010; Gourgouvelis et al., 2018; Pentecost et al., 2015); inpatient psychiatric units (Jacquart et al., 2014); youth mental health centres (Parker et al., 2016); GP referral (Van der Waerden et al., 2013); or self-referral following public service announcements (Fremont & Craighead, 1987). In two of the trials, non-clinical samples were recruited via: inviting identified men with increased CVD risk (Engberg et al., 2017); or locally advertising for sedentary males (McGale et al., 2011). The three studies by Melnyk and colleagues (2009; 2013; 2015) were all based in a high school setting, and included any pupils enrolled in the schools' health education courses. One study included adults who had presented at a geriatric day hospital with various admission diagnoses (Brovold et al., 2012), while all other samples were recruited from selected outpatient clinics for: generalised anxiety and panic disorder (Merom et al., 2008); fibromyalgia (Kashikar-Zuck et al., 2018; Lera et al., 2009); cancer (Duijts et al., 2012; Jacobsen et al., 2013); pain (McBeth et al., 2012; Smeets et al., 2008); and heart failure (Gary et al., 2010).

Five of the studies were cluster RCT's- two of which had randomised groups at school-level (Melnyk et al., 2013; 2015), one at class-level (Melnyk et al., 2009), one based on patient diagnosis (Merom et al., 2008), and one in groups of four patients (Smeets et al., 2008). One controlled trial adopted a parallel group design, however failed to describe the method of group allocation (Gourgouvelis et al., 2018). The remaining 16 studies all randomised participants at the individual level. In addition to the intervention arms, comparator groups included PA alone in three studies (Lera et al., 2009; McGale et al., 2011; Van der Wearden et al., 2013), psychological therapy alone in thirteen studies (Abdollahia et al., 2017; Brovold et al., 2012; Engberg et al., 2017; Euteneur et al., 2017; Gourgouvelis et al., 2018; Jacquart et al., 2014; Kashikar-Zuck et al., 2018; Melnyk et al., 2009; Melnyk et al., 2013; Melnyk et al., 2015; Merom et al., 2008; Parker et al., 2016; Pentecost et al., 2015), and both PA and

psychological intervention arms in six of the studies (Duijts et al., 2012; Gary et al., 2010; Fremont & Craighead, 1987; Jacobsen et al., 2013; McBeth et al., 2012; Smeets et al., 2008). Nine studies also included a TAU/wait list control group.

Intervention Content

There was considerable heterogeneity between the 'dose' of PA and therapy provided (length, frequency and total duration) across the studies' intervention designs, as well as extensive variation across the type, content and mode of delivery. For the PA component, eight of the studies 'prescribed' individual tailored exercise to participants (Brovold et al., 2012; Duijts et al., 2012; Euteneur et al., 2017; Gary et al., 2010; Gourgouvelis et al., 2018; Jacobsen et al., 2013; McBeth et al., 2012; Merom et al., 2008), whereas eleven delivered activities in groups. Most studies implemented moderate intensity aerobic activities, including walking (Gary et al., 2010; Jacobsen et al., 2013; Jacquart et al., 2014; Merom et al., 2008), running (Fremont & Craighead, 1987), and football (McGale et al., 2011). Six studies also included a form of strength/resistance-based training in the sessions (Brovold et al., 2012; Engberg et al., 2017; Gourgouvelis et al., 2018; Kashikar-Zuck et al., 2018, Smeets et al., 2008; Van der Waerden et al., 2013). Three studies incorporated 'behavioural activation' with PA, whereby participants were provided with workbooks and diaries for self-monitoring of activity and associated mood (Parker et al., 2016; Pentecost et al., 2015; Euteneur et al., 2017). Design of the PA component of the 'BAcPAc' intervention (Parker et al., 2016) was further underpinned by principles derived from self-determination theory (SDT; Deci & Ryan, 2008).

For the psychological component, most (n = 17) studies adopted a CBT-based approach, which was delivered in groups for eleven of the trials. Individual CBT was provided in six interventions, either face-to-face (Euteuner et al., 2017; Fremont & Craighead, 1987; Gary et al., 2010; Jacquart et al., 2014; Pentecost et al., 2015), or via the telephone (McBeth et al., 2012). Of the remaining studies, two offered 'counselling' support programmes with a focus on PA (Brovold et al., 2012; Engberg et al., 2017), two delivered 'problem-solving therapy',

either individually (Parker et al., 2016) or to a group (Smeets et al., 2008), and one provided materials to participants containing instructions for self-directed 'stress management' techniques (Jacobsen et al., 2013). Design of the combined interventions also varied substantially between the RCT's, with five describing a simultaneous approach, in which PA was integrated with the psychological therapy (Jacquart et al., 2014; McGale et al., 2011), or incorporated as a part of the 'skills-building' session (Melnyk et al., 2009; 2013; 2015). Most studies (*n* = 15) provided PA separately to psychological therapy, delivering sessions for each concurrently throughout the intervention period. The therapeutic component for one intervention (Engberg et al., 2017) consisted of one 90-minute motivational talk regarding the benefits of PA, with Brovold et al., (2012) implementing a similar approach and providing participants with exercise diaries.

Outcomes

Statistical findings relating to the research question are presented in Table 2.2, which displays reported intervention effects for studies' psychological and physical outcomes. Studies' variability in measures of key variables, and statistical heterogeneity precluded calculation of standardised effect sizes for cross-study comparison of results. Therefore, a visual summary was deemed most suitable for interpretation of within-group (pre-post) effects, with any relevant between-group (intervention) effects presented according to the published data (Thomson & Thomas, 2012).

Psychological Effects

For the psychological outcomes of interest, scores generally improved for participants within the PA, therapy, and combined intervention arms. Where reported, this contrasted with a negative trend for corresponding scores in the TAU/control groups, with the exception of one

Table 2.2

Visual and Narrative Summary of Intervention Effects

Authors	Outcomes	Within-group effects				Between-group effects
		INT	PSYC	PA	TAU	
Abdollahia et al., (2017)	Dep (BDI-II)	+	+			Group x time interaction for INT (b = 3.30; p < .05)
	PA (BIADL)	+	+			Group x time interaction for INT (b = 3.21; p < .001)
Brovold et al., (2012)	QOL (SF-36)	+	+			3-month INT. effect for 'vitality' (MD= 9.5; p= .01) and 'bodily pain' (MD=10; p= .04)
	PA (6MWT)	+	+			NSF
Duijts et al., (2012)	Dep (HADS)	NR	NR	NR	NR	NSF
	Anx (HADS)	NR	NR	NR	NR	NSF
	QOL (SF-36-PF)	+++	+++	++++	-	6-month PA effect for 'physical functioning' (d= .41; p= .002)
Engberg et al., (2017)	Dep (PHQ-2)	++	++		-	INT. group overall greatest decrease in diagnosed depression (-16%; p= .078)
	QOL (SR)	++	++		++	NSF
Euteneur et al., (2017)	Dep (BDI-II)	+	+		-	Group x time interaction INT v TAU only (t= 2.90; p= .005). NSF for INT v PSYC
	PA (IPAQ)	+	-		-	INT effect for vigorous activity v PSYC (t= 2.74; p= .008) and TAU (t= 2.0; p= .049)
Fremont & Craighead (1987)	Dep (BDI)	++++	++++	++++		NSF
	Anx (STAI)	++++	++++	++++		NSF
	Fitness (rec. HR)	NR	NR	NR		Moderate correlation between change in BDI score and rec. HR for PA group (r = .37)
Gary et al., (2010)	Dep (HAM-D)	+	+	+	+	INT effect for moderate-major depression at 12 (p= .001) and 24-weeks (p= .014)
	QOL (MLHFQ)	+	+	+	-	NSF
	PA (6MWT)	++++	-	-	-	Group x time interaction for INT at 24-weeks (F= 6.9; p= .001)
Gourgouvelis et al., (2018)	Dep (BDI-II)	++++	++			Group x time interaction for INT (d= 2.38; p= .007)
	Dep (HADS)	++++	++			Group x time interaction for INT (d= 1.63; p= .0004)
	Anx (HADS)	+++	++			NSF
	PA (VO2max.)	++	+			31% increase for INT group (t= 2.17; p= .073) (vs 17% increase for PSYC group)

Jacobsen et al., (2013)	Dep (CES-D)	++	NR	NR	-	Group x time interaction INT v TAU (*t*= 2.38; *p*= .019)
	Anx (BAI)	+	NR	NR	-	Group x time interaction INT v TAU (*t*= 1.99; *p*= .049)
	QOL (SF-36)	NR	NR	NR	NR	NSF
	PA (LTEQ)	++	NR	NR	-	Group x time interaction INT v TAU (*t*= 2.75; *p*= .007)
Jacquart et al., (2014)	Dep (GDS)	NR	NR		NR	Post-test INT effect v PSYC (MD= 7.09) and TAU (MD= 10.60) (*p*< .001)
	QOL (BASIS-32)	NR	NR		NR	Post-test INT effect v PSYC (MD= .43) and TAU (MD= .87) (*p*< .001)
Kashikar-Zuck et al., (2018)	Dep (CDI)	+	+			NSF
	Pain (VAS)	++	+			3-month INT effect for pain (MD= 1.62; *p*= .11)
Lera et al., (2009)	Distress (SCL-90-R)	-		+		NSF
	QOL (SF-36 FS)	+		-		NSF
	QOL (SF-36 EW)	++		+		NSF
McBeth et al., (2012)	Distress (GHQ)	+	+	+	+	NSF
	QOL (SF-36 MCS)	+	+	+	+	NSF
	QOL (SF-36 PCS)	+	+	+	+	Group x time interaction INT v TAU at 6 (*b*= 3.5; *p*< .05) and 9-months (*b*=3.6; *p*<.01)
McGale et al., (2011)	Dep (BDI-II)	+++		+++	-	Group x time interaction INT v TAU (*d*= .66; *p*< .05) and PA v TAU (*d*= .81; *p* <.01)
Melnyk et al., (2009)	Dep (BYI-II)	+	-			NR
	Anx (BYI-II)	++	+			NR
Melnyk et al., (2013)	Dep (BYI-II)	-	+			INT effect for major depression post-test v PSYC (*F*= 6.98; *p*= .02)
	Anx (BYI-II)	+	+			NSF
	PA (Pedometer)	++	-			Group x time interaction for INT (MD= 4062; *p*= .003)
Melnyk et al., (2015)	Dep (BYI-II)	-	+			INT effect for major depression sustained at 12-months v PSYC (*F*= 5.78; *p*= .03)
Merom et al., (2008)	Dep (DASS-21)	+	+			Group x time interaction for INT (*d*= 1.39; *p*= .001)
	Anx (DASS-21)	+	+			Group x time interaction for INT (*d*= 1.36; *p*= .002)

	PA (mins. per week)	NR	NR			INT effect for walking (MD= 21; *p*=. 02). NSF for overall PA
Parker et al., (2016)	Dep (BDI-II)	++	+		NR	Group x time interaction for INT (MD= 3.76; *d*= .41; *p*= .02)
	Dep (MADRS)	++	+		NR	INT effect pre-post change (MD= 3.17; *d*= .48; *p*= .04)
	Anx (BAI)	+	+		NR	NSF
	PA (IPAQ)	NR	NR		NR	NSF
Pentecost et al., (2015)	Dep (CIS-R)	+	+			NR
	Dep (PHQ-9)	+	+			NR
	QOL (SF-36 MCS)	+	+			NR
	QOL (SF-36 PCS)	+	+			NR
	PA (Accelerometer)	-	-			NR
Smeets et al., (2008)	Dep (BDI)	+	+	+	NR	PA effect pre-post change v INT (MD = 2.17; $p < .05$)
	Pain (PRI)	+	+	+	NR	NSF
	PA (5MWT)	+	+	+	NR	NSF
Van der Waerden et al., (2013)	Dep (CES-D)	++		++	+	Negative PA effect for major depression v TAU (*d*= .56; *p*= .009)
	Stress (PSS)	+++		+++	+	INT effect for participants with low education v TAU (*d*= .53; *p*= .02)

Notes: + positive effect (non-significant); ++ ($p < .01$); +++ ($p < .01$); ++++ ($p < .001$); - negative effect
INT: Combined PA+PSYC; PSYC: Psychological therapy only; PA: Physical activity only; TAU: Treatment as usual/control
NR: Not reported; NSF: No significant findings ($p > .05$); MD: Mean difference

BDI: Beck Depression Inventory; SF-36: Short Form Health Survey (PCS: Physical Component Summary; MCS: Mental Component Summary; FS: Functional Status; EW: Emotional Well-being) HADS: Hospital Anxiety and Depression Scale; PHQ-2: Patient Health Questionnaire-2; HAM-D: Hamilton Rating Scale for Depression; CES-D: Centre for Epidemiological Studies for Depression Scale; BAI: Beck Anxiety Inventory; GDS: Geriatric Depression Scale; BASIS-32: Behavioural and Symptom Identification Scale; CDI: Children's Depression Inventory; SCL-90-R: Symptom Checklist-90-Revised; BYI: Beck Youth Inventory; DASS-21: Depression Anxiety and Stress Scale; MADRS: Montgommery-Asberg Depression Rating Scale; STAI: State Trait Anxiety Inventory; SRC: Stress Reduction Checklist; PRI: Pain Rating Index; PSS: Perceived Stress Scale; MLHFQ: Minnesota Living with Heart Failure Questionnaire; GHQ: General Health Questionnaire; BIADL: Barthel Index of Activities of Daily Living; 6MWT: 6-minute walk test; IPAQ: International Physical Activity Questionnaire; rec.HR: Recovery Heart Rate; VO2max: Maximal oxygen consumption test; LTEQ: Godin Leisure-Time Exercise Questionnaire; 5MWT: 5-minute walk test; SR: Self-reported

study (Engberg et al., 2017) which reported a significant pre-post difference in single-item ratings of health and well-being. In the 'COPE Healthy Lifestyle TEEN programme', overall depressive symptoms increased for the combined group post-intervention (Melnyk et al., 2013), and at 12-month follow-up (Melnyk et al., 2015), however this difference was not clinically significant or meaningful, as scores were still within the normal range.

Analyses of post-intervention effects for combined interventions versus therapy alone was performed in most of the studies, apart from a preliminary small-scale pilot study (Melnyk et al., 2009), and a feasibility trial conducted to identify methodological issues (Pentecost et al., 2015). Of the studies which assessed depression, nine reported a significant intervention effect, whereby the combined treatment engendered a greater reduction in symptoms compared with psychological therapy alone (*n* = 6/14: Abdollahia et al., 2017; Engberg et al., 2017; Gourgouvelis et al., 2018; Jacquart et al., 2014; Merom et al., 2008; Parker et al., 2016), and/or TAU (*n* = 5/10: Engberg et al., 2017; Euteneur et al., 2017; Jacobsen et al., 2013; Jacquart et al., 2014; McGale et al., 2011). For two studies, significant intervention effects were only observed in subgroup analyses of participants with major depression; both post-intervention (Gary et al., 2010; Melnyk et al., 2013), and at long-term follow-up (Melnyk et al., 2015). For the studies comparing combined intervention effects with PA alone, most (*n* = 6/7) found no significant differences between the change in depression scores, apart from one study (Smeets et al., 2008) which reported a significantly greater mean reduction in participants' scores, which favoured the PA-only group. Conversely, sub-group analyses in one study (Van der Waerden et al., 2013) showed that any combined intervention effects were confined to participants *without* depression, whereas those scoring within the mild-moderate range, reported significantly *more* depressive symptoms when assigned to receive PA alone.

There were mixed findings for studies which measured anxiety (n = 8), with only two reporting a significant combined intervention effect when compared with CBT alone (Merom et al., 2008), or TAU (Jacobsen et al., 2013). Group differences for QOL measures were also equivocal, however reported effects of the combined intervention appeared to be greatest for sub-scales related to physical measures, (Brovold et al., 2012; Jacquart et al., 2014), which—compared with TAU—were sustained in one study at 6, and 9-months (McBeth et al., 2012).

Physical Effects

Measures relating to physical outcomes were obtained in twelve of the studies, including: physical functioning tests conducted by research assistants (Brovold et al., 2012; Gary et al., 2010; Smeets et al., 2008); validated assessments of cardiovascular fitness (Fremont & Craighead, 1987; Gourgouvelis et al., 2018); self-reported questionnaires of weekly PA (Abdollahia et al., 2017; Euteneur et al., 2017; Jacobsen et al., 2013; Merom et al., 2008; Parker et al., 2016); and objectively recorded PA using pedometers (Melnyk et al., 2013) or accelerometers (Pentecost et al., 2015). Pre-post measures were not reported in three studies (Fremont & Craighead et al., 1987; Merom et al., 2008; Parker et al., 2016), however significant improvements were recorded in four studies' combined intervention groups (Gary et al., 2010; Gourgouvelis et al., 2018; Jacobsen et al., 2013; Melnyk et al., 2013), with either non-significant or negative changes reported in all comparator groups. This trend was observed in one study's PA-arm (Gary et al., 2010)- leading the authors to suggest that the addition of psychological therapy may have been integral to motivation and adherence to exercise.

One study did not conduct inferential analysis (Pentecost et. al., 2015), however post-intervention descriptive statistics showed that overall levels of PA were higher in the combined intervention group than those receiving 'behavioural activation for PA' alone. Most interventions yielded significant between-group differences in mean PA change, when

compared psychological therapy alone (Abdollahia et al., 2017; Euteneur et al., 2017; Gary et al., 2010; Gourgouvelis et al., 2018; Melnyk et al., 2013; Merom et al., 2008); and when compared with PA alone (Gary et al., 2010). In one multi-arm study, significant effects of the combined treatment were reported for comparisons with TAU (Jacobsen et al., 2013), however omission of any further between-group contrasts restricted identification of the component mechanisms of change. Of the remaining trials, three found no significant differences in PA-change when comparing combined treatment effects with: therapy alone (Brovold et al., 2012; Parker et al., 2016); or either therapy, PA, or TAU arms (Smeets et al., 2008). Finally, despite not reaching statistical significance, the trial combining running with CBT (Fremont & Craighead, 1987), found a stronger correlation between improvement of fitness levels and change in depression, for the group who received running alone (r = .37 v r = .11). Notwithstanding, as causality cannot be established, this result should be interpreted with caution.

Quality Assessment

A full breakdown of each trial's component ratings can be found in Appendix 2. Eleven of the interventions were deemed methodologically weak overall, predominantly due to: evidence of selection bias (8/11); non-reporting/lack of participant or assessor blinding (8/11); and either failure to describe dropouts, or attrition rates falling below the acceptable level (< 60%). Other components which increased the risk of bias included failing to control for between-group confounders (i.e. gender; Melnyk et al., 2009), and non-reporting of the method of randomisation (Gourgouvelis et al., 2018). Four studies received a moderate global rating; two of which presented a high risk of selection bias, due to poor levels of participation (McBeth et al., 2012; Van der Waerden et al., 2013). Non-reporting of blinding (Abdollahia et al., 2017), or randomisation (Gary et al., 2010) techniques precluded these studies from receiving a strong global score. Seven studies met criteria to be considered as

methodologically strong, however all presented moderate risk of selection bias, due to referral of participants from a clinical source (i.e. medical specialist). Although four studies sufficiently evidenced blinding of outcome assessors, it was not possible to blind participants to the research question, resulting in moderate component ratings overall (Jacquart et 2014; Parker et al., 2016; Pentecost et al., 2015; Smeets et al., 2008). Finally, while withdrawals and drop-outs were adequately described in all of the 'strong' studies, three were ascribed moderate overall, due to <80% follow-up rate (Brovold et al., 2012; Lera et al., 2009; Pentecost et al., 2015).

Discussion

This systematic review provides up-to-date information pertaining to the effects of combined psychotherapeutic and PA interventions, on psychological and physical outcomes across clinically and demographically diverse populations.

It was apparent from the findings that combining psychological therapy with physical activity yielded positive results on psychological outcomes, in contrast to the negative trend observed for wait-list participants or TAU. Despite this generally positive effect, less than half (10/22) of the combined interventions *significantly* improved any psychological outcome (i.e. depression, anxiety, QOL, stress), and with the exception of one study (Parker et al., 2016), similar pre-post effects were observed within 'active comparator' groups. Between-group findings provided equivocal evidence for the efficacy of combined interventions over psychotherapy alone, with overall results suggesting that adjunctive PA engendered positive changes in just over half of the studies (9/15). Conversely, of the seven studies which included a PA group, none reported significant benefits to participants receiving the combined intervention, thus implying that PA-alone is at least equally effective as when combined with psychotherapeutic support. Nonetheless, considerable heterogeneity between studies' samples, methodologies, and overall quality impedes identifying the 'active

ingredients' of positive changes observed in the most effective interventions (Michie et al., 2013). Consequently, consistencies and differences between the salient results will be scrutinised in relation to these factors, in an attempt to draw inferences and explain findings in relation to the existing evidence-base.

Combined Interventions and Psychological Outcomes

Studies involving participants with mild-moderate levels of depression demonstrated efficacy for group-based interventions over one-to-one psychotherapy in reducing individuals' symptoms (Abdollahia et al., 2017; Fremont et al., 1987; Van der Wearden et al., 2013). In contrast, for participants with clinically major depression, the most effective interventions 'prescribed' PA, regardless of whether the psychological component was delivered individually (Gary et al., 2010; Jacquart et al., 2014), or as a group (Gourgouvelis et al., 2018); indicating that effective treatment for this population may necessitates a 'tailored' approach to PA, in accordance with individual needs. In exception, focusing on the 'behavioural activation' aspect of CBT engendered similar reductions in self-reported symptoms when combined with exercise, or euthymic activities (Euteneur et al., 2017), inferring that—for major depression—this technique can reduce symptom severity either with or without additional PA. Paradoxically, incorporating principles of 'behavioural activation' into the PA component of the intervention (Parker et al., 2016), significantly reduced symptoms of depression irrespective of the adjunctive psychological component (problem solving therapy or supportive counselling). Moreover, positive changes were unrelated to symptom severity at baseline, or self-reported change in levels of PA. The study's lack of objective and / or physiological measures precludes any definitive explanation, yet the evidence suggests that delivering combined interventions within a 'behavioural activation' framework may be an effective method of reducing depression, notwithstanding: individual differences, such as severity and age; and methodological variations, such as group-based or

one-to-one delivery. Nonetheless, as biological (Euteneur et al., 2017) and / or psychosocial (Parker et al., 2016) factors evidently mediate this relationship, further research is required to ascertain the optimal dose-response of intervention components, and delineate mechanisms of change according to psychological, physical and social needs (Bailey et al., 2018).

Combined Interventions and PA Levels

Twelve of the studies included in the review recorded at least one PA-related outcome measures, which indicated that participants receiving combined interventions were more likely to increase levels of PA, compared to those receiving psychotherapy alone or TAU/wait list controls. There was limited, yet consistent evidence that participants receiving combined interventions experienced significantly greater improvement in PA-outcomes than those allocated to individualised, 'prescribed' PA alone- the latter of which were comparable to reported levels for TAU or wait-list controls (Gary et al., 2010; Jacobsen et al., 2013). Taken together, this insinuates that—at least for the samples included in these studies—effective strategies to increase levels of PA necessitate incorporation of evidence-based psychological techniques, which may reflect synergies between the intervention targets (i.e. self-regulation, goal-setting), and the principles underpinning effective PA behaviour change techniques (i.e. autonomous motivation, self-efficacy) (Hagger & Chatzisarantis, 2014; Michie et al., 2017). In contrast, delivering 'physical treatment' (aerobic exercise and muscle strengthening) to *groups* of participants, rather than 'prescribing' PA individually, was found to be equally effective in increasing PA as the treatment incorporating psychological techniques (Smeets et al., 2008). Overall, this indicates that social interaction and reinforcement may have mediated observed effects, and highlights the need for social support measures in future studies, including direct comparisons between PA and psychotherapy groups.

Effects of PA on Psychological Outcomes

Despite the considerable heterogeneity between samples, intervention content and methodological quality, the effect on psychological outcomes for participants allocated to PA alone (n = 9), was generally at least equivalent to those receiving the adjunctive therapy; with some studies reporting *larger* effect sizes for 'physical functioning' (Duijts et al., 2012), and depression scores (McGale et al., 2011; Smeets et al., 2008), and a stronger association between changes in fitness and depression scores for these participants (Fremont & Craighead, 1987). While scarcity of objective PA measures hinders the ability to identify causative mechanisms, the tendency for combined interventions to effectuate the greatest increases in overall PA (see above), indicates that changes in psychophysiological markers associated with mental health (Euteuner et al., 2017; Gourgouvelis et al., 2018), may have been mediated by psychosocial factors, rather than changes in fitness or PA levels *per se*. Moreover, efficacy of both combined interventions and PA alone in improving psychological outcomes (i.e. depression, stress, QOL), implies that establishing commonalities between psychosocial processes underpinning each component, may enable identification of the 'active ingredients' associated with effective interventions (Michie et al., 2013).

Drawing on findings presented in this review, and research published elsewhere (Lubans et al., 2016), such mechanisms include changes related to: feelings of competence and self-efficacy; sense of mastery and autonomy; and perceived support and connectedness. This may additionally explain evidence for the efficacy of interventions which comprised of techniques know to moderate these processes (i.e. goal-setting, self-regulation and social contact), regardless of the studies' sample, methodology, or overall quality rating. Furthermore, heterogeneity between the content or 'dose' of psychotherapy or PA (frequency, intensity, time, type), reinforce the concept that individuals may respond better to theory-

based interventions which incorporate effective behavioural change techniques, such as 'behavioural activation' (Michie et al., 2017).

Conclusions

Findings from the current review suggest that incorporating PA into psychotherapeutic approaches has a positive effect on psychological outcomes, however similar benefits may be attained by providing theory-based PA programmes alone. In accordance with evidence published elsewhere (Biddle et al., 2018), the efficacy of PA interventions may be unrelated to the 'dose' received, indicating that psychosocial mechanisms of change (i.e. self-efficacy and social support) may explain the association between PA and well-being. Despite this evidence for PA-alone, the finding that a combined approach produced greater increases in PA levels, reinforces the importance of basing such interventions on key psychological principles which underpin sustained behaviour change (i.e. goal-setting and self-regulation), and thus effectuate change to wider predictors of mental health and well-being (i.e. neuro-biological) (Lubans et al., 2016).

The overall findings derived from this review raises an interesting concept; that rather than regarding PA as an 'adjunct' to psychotherapeutic treatment, a theory-based PA programme may offer a viable, and effective alternative from which numerous biopsychosocial benefits may be attained. Specifically, current findings suggest that integrating 'behavioural activation' into the design and delivery may be a particularly effective technique, to instil positive and sustained changes across outcomes related to such factors. Although usually associated with CBT, the activity planning and use of goals highlights how and why this specific approach may be particularly compatible with PA for improving psychological outcomes, and substantiates existing research arguing for greater focus on behavioural changes, over challenging maladaptive cognitions and schemas (Veale, 2008).

Limitations and Future Recommendations

The results of this review provide a comprehensive assessment of studies which combine psychotherapy with PA, attained through: an exhaustive predetermined selection criteria; a broad and thorough search strategy; systematic extraction of key data; and use of a validated assessment tool to evaluate overall quality of the evidence-base. Despite the questionable quality ratings applied to half of the included studies, it is important to note that these reflected aggregated scores derived from constructs which largely reflect reporting methods (i.e. dropouts, blinding, randomisation etc.), and arguably prioritise efficacy over effectiveness under "real-world" conditions (Khorsan & Crawford, 2014). Nonetheless, it is acknowledged that findings must be interpreted within the context of the review's limitations. While the extensive inclusion criteria returned a wide variety of compliant studies, high levels of clinical and methodological heterogeneity rendered the data unsuitable for meta-analyses (Higgins & Green, 2011), and somewhat limits confidence in the generalisability of proposed 'mechanisms of action'. Assessment and synthesis of qualitative evidence is recommended for future reviews, to further understanding of what mechanisms are effective, for whom, and why (CRD, 2009).

Although the findings presented consistently suggest that the effects of PA on psychological outcomes are at least equivalent to combined interventions, this was based on a relatively small number of studies, due to the paucity of trials with an 'active' comparator (PA-alone). Furthermore, while between-group comparisons of combined and psychotherapy interventions insinuate that differences resulted from the adjunctive PA, it is possible that unintended contamination may have influenced these results- particularly given that most studies did not randomise at cluster-level, and employed an 'intention-to-treat' analysis (Sussman & Hayward, 2010). In addition to measures of fidelity and adherence to the intervention, future studies should ensure that reliable measures of PA are obtained from both

intervention and comparison groups (Ehlers et al., 2016), to thereby control for PA within analyses, and establish the influence of PA as a potential facilitator of any observed psychological effects.

2.3 Implications of Findings

Collective evidence derived from this comprehensive review unequivocally confirms that interventions which incorporate PA and psychotherapy demonstrate efficacy for improving mental health and well-being across diverse populations. While reinforcing the rationale for the current project, the scope of this review was intended to advance from quantifying *if* the intervention works, to investigating why, how, and for whom; thereby ensuring an intervention design grounded in evidence and theory (Fletcher et al., 2016). Through comparing study designs, implementation processes, and socio-contextual factors (i.e. setting, sample characteristics etc.), it was possible to postulate *how* intervention mechanisms had influenced outcomes of interest, and *why* variations in effectiveness may have occurred between studies.

It is imperative that key finding from the systematic review are further interpreted in respect to the current project- i.e. identifying what 'ingredients' are most likely to facilitate both implementation *and* effectiveness of this intervention, for this population. The suggestion that a psychologically-informed PA component (in terms of design, content, and delivery approach) may effectuate positive outcomes—*irrespective* of engagement in psychotherapy—raises numerous questions which warrant further investigation during the pilot feasibility phase. For example, while PA was initially intended as a 'hook' for encouraging YPEH to engage in psychological therapy, the ambiguity around necessity of the therapeutic component, and indeed, whether this adjunct translates into increased positive effects requires further investigation. Furthermore, while it was difficult to ascertain the

optimal 'dose' of either the PA, or psychotherapeutic components, group-based programmes demonstrated efficacy for improving symptoms in participants reporting mild-moderate depression at baseline. This would suggest that rather than adopting a prescribed, individualised intervention approach, the population of the current project would benefit from a flexible, autonomy-supportive design with emphasis on positive reinforcement and social interactions as facilitators of psychological well-being, and sustained behaviour change.

The concepts derived from this systematic review will be discussed further in Chapter Three, in which key findings will be applied to inform the development and design of this research project's pilot study (Chapter Four). Evidence pertaining to the optimal delivery format will inform the implementation approach, while potential mechanisms of action will be incorporated into the theoretical framework underpinning the intervention.

Chapter Three:

Intervention Development and Design

3.1 Introduction

This Chapter will detail the theory and theoretical framework underpinning the development and design of each intervention component, before explaining how the overall conceptual model is likely to effectuate positive change.

Given the complexity surrounding this project's population, intervention components, and deciphering of any 'synergistic effects' attained through a combined PA + psychotherapy programme (Weiner et al., 2012), development of the intervention necessitates a flexible approach, beyond standardised and highly-intricate frameworks such as 'Intervention Mapping' (Bartholomew et al., 2001). Nonetheless, it is widely agreed that establishing a thorough understanding of the interplay between socio-contextual factors and the perceived 'problem' to be targeted, is crucial during the initial stages of conceptualisation, and intervention development (Campbell et al., 2007). In the context of the current project, defining the problem in its most basic form can be reduced to two inter-related issues:

1. Young people experiencing homelessness display disproportionately poor levels of mental health and well-being.

2. Young people experiencing homelessness report low access, uptake, and engagement in services.

In contrast to the relative simplicity of defining the problem, to consider these facts amid the myriad of determinants, mechanisms, and contextual influences on outcomes highlights the challenges and complexities associated with identifying plausible 'solutions', which—in a real world setting—are most likely to demonstrate overall effectiveness (i.e. implementable, efficacious, cost-effective, and sustainable; see O'Cathian et al., 2019).

Chapter's One and Two of this Thesis were intended to identify the evidence-base pertaining to *what is known* in relation to factors encompassing the current project, and investigate *what*

has worked in previous interventions which incorporate both PA and psychotherapy. In accordance with the updated Medical Research Council guidance (Craig et al., 2008), this first step in the development phase is integral designing complex interventions grounded in evidence and theory, to thereby facilitate subsequent understanding of potential mechanisms of change. Although much uncertainty remains around whether this intervention will achieve intended outcomes (increase engagement and improve well-being), and—if so—what variables mediate these effects, the theoretical knowledge gained thus far provides a solid foundation for development of a credible and appropriate intervention for this population, in this context (Campbell et al., 2007).

The remainder of this Chapter will illustrate how the evidence and theory accumulated through this project's literature and systematic reviews, have informed the development and design of each intervention component. Potential causal mechanisms of change will be explained in the context of each component alone, before discussing how the theoretical rationale underpinning the *combined* intervention could induce synergistic effects. While demonstrating some adherence to documented guidance and principles (see Craig et al., 2008), a relative degree of pragmatism has been applied to ensure the 'product' (i.e. intervention) is implementable in a real world setting, and amenable to necessary refinement or change (O'Cathian et al., 2019).

3.2 Development and Design of the Physical Activity Component

3.2.1 Application of Evidence

From the literature discussed in the Thesis thus far, it is evident that sport / exercise / physical activity offer an effective means to improve mental health and psychological well-being, irrespective of the target population's characteristics (i.e. diagnosis, severity, age), or socio-contextual setting of the intervention (i.e. in-patient unit, community-based).

Contrary to the evidence-base, implementation and effectiveness of complex interventions are often compromised by idiosyncratic challenges emanating from individual differences and socio-contextual dynamicity, thereby limiting external validity and generalisability to other contexts (Wells et al., 2012). It is therefore imperative to establish a thorough understanding of the target population and context from the outset of intervention development- to ensure determinants, facilitators, and barriers to the 'problem' are addressed through application of the most *appropriate* evidence and theory available (O'Cathian et al., 2019).

As evidenced previously in this Thesis, the mental health and well-being of disadvantaged young people (i.e. youth homeless) can be influenced by, and indeed influence, multiple factors in a bi-directional, or cyclical manner (Fitzpatrick et al., 2013). Targeting these factors is therefore integral to developing an effective intervention, through both protecting *and* promoting the mental health and well-being of this vulnerable population. Three of the most common, yet diverse determinants cited across the literature include: self-esteem, social connectedness, and emotional regulation- which exemplifies the complexity associated with developing strategies to support these young people (Edidin et al., 2012; Kidd et al., 2018). Incidentally, the evidence-base associating PA with well-being frequently attributes positive effects to comparable mediating factors (e.g. Bailey et al., 2018); thus consolidating the rationale for incorporating these constructs as 'mechanisms of change' in the conceptualisation and development of the current intervention.

Considerable similarities are also apparent when scrutinising evidence pertaining to vulnerable young people's *engagement* in sport / exercise / PA programmes, which—given the potential to compromise positive effects on well-being—warrant consideration as plausible barriers or facilitators to both implementation and effectiveness of the intervention. Self-esteem, for example, is often associated with self-efficacy (one's belief in their abilities),

which has proved integral to subsequently influencing whether an individual is likely to engage in a given task or activity (Bandura & Locke, 2003). The low self-esteem often reported by this study's population, coupled with limited opportunities to engage in sport / exercise / PA (Bruce et al., 2019), therefore presents a potential barrier to initial uptake and engagement in the intervention, and necessitates consideration from the outset of development. For example, consistent use of the term 'physical activity', and outcomes such as 'social' and 'fun', could alleviate initial doubts emanating from negative perceptions of 'exercise' / 'sport', which are perpetuated by perceived deficits in fitness, skill, and competitive ability (Quarmby & Pickering, 2016). It is therefore imperative to avoid conflation of these terms when designing, and delivering initial recruitment information (i.e. flyers; participant information etc.), and ensure framing of the PA component is based on what the young people may need (i.e. opportunity to socialise) and want (flexible, fun), and avoid semantics which connote guidelines or rules (Nobles et al., 2020).

This initial messaging around content and design of the intervention's PA component, also presents an opportunity to address emotional regulation- as a determinant of both engagement in the PA sessions, and well-being effects following participation. Young people experiencing homelessness often present difficulty in regulating emotions, which can result in behaviours such as impulsivity, and resistance towards authority and instruction (Hopper et al., 2010; Maguire, 2017). In the context of developing the PA intervention, incorporating activities or games which require knowledge or adherence to rules, could elicit a negative emotional response through undermining perceived competence and self-efficacy (Bruce et al., 2019). Given that emotion regulation mediates the relationship between PA and positive affect (Bernstein & McNally, 2018), it is crucial to implement an *adaptable* rather than prescriptive programme design, in which activities and games are suitably modified according to the capabilities of the group- including gradual incorporation of attainable

'challenges', to encourage development of problem-solving skills (Whitley et al., 2018). From a PA perspective, this approach may be integral to fostering a sense of progression, and thus growth of self-efficacy beliefs (Bandura & Locke, 2003); while in a broader context, greater utilisation of problem-focussed coping can significantly contribute to life satisfaction, and overall well-being of homeless youth (Gauvin et al., 2020).

For participants in the current study, non-engagement in activities and services is frequently attributed to psychosocial barriers, owing to previous adversity or traumatic experiences (Bellis et al., 2018). Understanding and overcoming these associations in the context of the group-based PA component, could thus prove integral to initial and sustained engagement, and facilitate implementation of the intervention. Feelings of social isolation and loneliness are common amongst youth homeless populations, which can compound an existing lack of trust in others, and difficulty in establishing secure relationships (Kidd et al., 2018). In addition to reduced subjective well-being (Barczyk et al., 2014), this perceived lack social support may also compromise individual's willingness to engage in activities (such as PA), or—for those individuals who agree to participate—perpetuate *further* adversity through exposure to a potentially anxiety-provoking situation (Bruce et al., 2019). Developing strategies to overcome these barriers is therefore fundamental to initial and ongoing participation, and moreover ensuring that *at a minimum*, the outcome for participants is 'no harm' (Hopper et al., 2010).

Drawing on principles of trauma-informed programme design (see Bergholz et al., 2016), implementing the intervention in a socio-contextually relevant setting can promote a sense of familiarity and trust from the outset (i.e. recruitment phase), and by-proxy encourage sustained connectedness with supportive, and positive community provisions (Bellis et al., 2018). The design and content of the PA component should also incorporate activities to target interpersonal relationship development between participants (i.e. requiring teamwork,

communication, and mutual trust), given its role in mediating the effect of PA on: mental health (Easterlin et al., 2019); self-esteem (Lubans et al., 2016); and sustained engagement in PA (Kandola et al., 2019).

3.2.2 Theoretical Framework

As exemplified through findings from the systematic review (see Chapter Two), designing and delivering *psychologically-informed* PA-based interventions (i.e. aligned with evidence-based principles or psychological theory), may facilitate implementation, effectiveness, and adherence to the programme, irrespective of the selected format or 'dose' (frequency, intensity, time, type; see Thomas et al., 2020). When considering the theories on which to base intervention development and design, it may be prudent to revert to the study's origins- i.e. the initial 'problem', corresponding aims, and intended outcomes of the intervention; thus ensuring selection of relevant theory which can be applied from the development phase (O'Cathian et al., 2019).

The rationale underpinning this project constitutes two fundamental research priorities: firstly, to develop and evaluate the effectiveness of interventions to support the mental health and well-being of young people experiencing homelessness; and secondly, to implement strategies likely to enhance uptake and engagement in the interventions. While the intervention is not intended to increase levels of PA *per se*, applying an evidence-based approach which facilitates motivation and behaviour change could enhance effectiveness through multiple biopsychosocial pathways which mediate the relationship between PA and well-being (see Lubans et al., 2016; Kandola et al., 2019). Furthermore, given the numerous barriers which can impede this population's participation and engagement in PA (Quarmby & Pickering, 2016), incorporation of psychological principals which underpin initiation of behaviours into the intervention design (i.e. goal-setting, self-efficacy etc.), will assumably

optimise uptake of PA, and—as demonstrated from findings of the systematic review—augment positive effects on psychological outcomes, such as self-esteem and well-being (Thomas et al., 2020).

Self-Determination Theory (SDT; Deci & Ryan, 1985) offers a theoretical approach to understanding human motivation, self-regulation, personal growth, and psychological well-being (Ryan & Deci, 2000). Essentially, SDT postulates that self-motivation to engage in specific behaviours is a multi-dimensional and variable concept, subject to influence from the social environment, and individual factors such as aspirations and goals (Ryan & Deci, 2008). Through a motivation continuum, SDT differentiates between: *autonomous* motivation, whereby behaviours are enacted through enjoyment or alignment to values and interests; and *controlled* motivation, whereby behaviours are externally regulated through reward, punishment, or pressure to conform and comply (Deci & Ryan, 2008). In accordance with the SDT continuum, continued engagement over time facilitates *internalisation* of motivation-i.e. a natural 'shift' towards autonomous motivation and *self-determined* behaviours (Deci & Ryan, 2000). This process, however, is dependent on whether the social environment is conducive to satisfaction of the individual's innate 'psychological need' for autonomy (self-regulation), competence (self-efficacy), and relatedness (connectedness to others; Deci & Ryan, 2008).

Since conceptualisation, SDT-informed interventions have demonstrated efficacy for changing health behaviours of diverse populations, across multiple socio-contextual settings (Gillison et al., 2019). In the context of PA, psychological need satisfaction positively mediates the relationship between autonomous motivation and psychological well-being (Gunnell et al., 2014), which in turn predicts increased, long-term participation in moderate-vigorous PA (Teixeira et al., 2012). Taken together, this evidence insinuates that creating a need-supportive environment could instigate a positive feedback loop between needs

satisfaction and autonomous regulation, thereby facilitating positive well-being, *and* predicting engagement and adherence to PA behaviours (Teixiera et al., 2018). Applied to youth homeless populations, the basic psychological need theory (BPNT; Ryan & Deci, 2017) has demonstrated a relationship between use of *adaptive* coping techniques and psychological need satisfaction- thereby highlighting the potential for interventions which develop cognitive emotion regulation (i.e. through goal setting, problem-solving) as a means of enhancing psychological well-being (Altena et al., 2018). Further evidence derived from mediation analyses suggests that the relationship between need satisfaction and positive outcomes for homeless young people may benefit from incorporating strategies which specifically target mitigation of psychological distress, and promotion of perceived social support (Krabbenborg et al., 2017).

The evidence presented above exemplifies the flexibility afforded by the SDT-framework, and therefore scope for this project to develop a bespoke PA-based intervention underpinned by strategies to target mediators and determinants of this population's psychological needs. Through cultivating an autonomy-supportive PA environment, it is reasonable to assume that both aspects of the original 'problem' (i.e. well-being and engagement) may be addressed simultaneously, albeit via the direct, indirect, and reciprocal effects of satisfying participants' basic psychological needs (see Fortier et al., 2012).

3.2.3 Mechanisms of Action

The evidence and theory discussed thus far have presented plausible determinants and mediating factors relating to the research priorities, and correspondingly, aided identification of 'target constructs' most likely to effectuate change (self-esteem, emotion regulation, social connectedness). Utilising principles from an established framework of motivation and well-being (SDT) has also provided further clarity as to *how* this change may be achieved-

particularly in relation to socio-contextual characteristics of the intervention. Indeed, when developing PA-based interventions underpinned by strategies such as satisfying psychological needs, the theoretical assumptions may become somewhat irrelevant if considered in absence of how specific environmental (PA-related) and individual (youth homeless-related) influences can affect the SDT process model (Fortier et al., 2012).

The following sub-sections are intended to provide further detail concerning how the basic psychological needs will be integrated into the PA component. Evidence-informed strategies derived from relevant literature, theory and expert consensus methods will be described in the context of each distinct 'need', to demonstrate putative mechanisms of action in relation to outcomes of interest (i.e. well-being, self-esteem, PA engagement).

3.2.3.1 Satisfaction of Competence

Incorporation of competence-supportive techniques may be particularly relevant to the current intervention, given this need's direct association with homeless young peoples' quality of life (Krabbenborg et al., 2017), and consistently positive association with PA participation (Teixeira et al., 2012). Competence needs may also require specific focus in group-based settings, to avoid the experience of mastery and self-efficacy becoming overly-reliant on the presence of others (Gillison et al., 2019).

To promote competence through this intervention's PA component necessitates evidence-based content within the PA sessions, delivered in an appropriate (competence-supportive) manner. The inclusion of tasks to encourage and promote problem-solving skills, can instil self-efficacy beliefs and—consequently—predict persistence in overcoming future challenges and barriers (Bandura & Locke, 2003). Nonetheless, the effectiveness of this technique may be dependent on whether delivery style (via PA instructors) is perceived to be autonomy-supportive (i.e. collaborative, suggestive, relevant to the individual) or controlling (i.e.

instructional, prescriptive, based on extrinsic motives; Ryan & Deci, 2008), and accordant with participants' current quality of motivation (i.e. degree of autonomous motivation) to avoid perception of *external* pressure to perform (Ntoumanis et al., 2021).

A potential issue with delivering group-based PA, is the likelihood of variation in individual factors, such as ability, skill, fitness etc. This is particularly relevant to competence need satisfaction, for which an *optimal* level of challenge is required- i.e. setting achievable tasks which entail a degree of effort, to facilitate mastery and development of skills (Deci & Ryan, 2000). To overcome this issue, the current intervention will incorporate tasks for development of *individual* motor skill competencies, which may be collaboratively adapted according to participants' physical and psychological capabilities. This exemplifies how a need-supportive communication style (collective decision-making), delivered within autonomy-supportive activity conditions (perception of choice), can mediate the relationship between intervention content and competence-satisfaction, and—through mechanisms such as self-efficacy—engender positive effects on outcomes of interest (well-being, self-esteem; see Teixeira et al., 2020).

Encouragement of self-monitoring in relation to progress is a fundamental technique which can be employed to support participants' competence need satisfaction (Teixeira et al., 2020). This can be implemented in two distinct ways, through feedback provided by the PA instructors:

1. In relation to individual goals: Positive feedback conveys *effectance* (pleasure from successful mastery of the task), which in turn instils satisfaction of competence, and enhanced motivation for continuation in the behaviour (Deci & Ryan, 2000). Feedback should also be *constructive*- i.e. describe how and why an outcome was achieved (or not),

with reference to process (over performance), to scaffold learning and personal growth (Ntoumanis et al., 2018).

2. In relation to focus of attention: Providing externally-focussed feedback (i.e. attending to the movement *effect,* rather than the bodily movements) can enhance performance and learning of physical activities and skills (Wulf et al., 2002). For the current intervention, adopting this practice under autonomy-supportive conditions could facilitate participant's competence and self-efficacy, and thus mediate self-esteem, well-being, and continued motivation for learning PA-based skills (see Wulf et al., 2015).

3.2.3.2 Satisfaction of Autonomy

The need for autonomy is directly associated with psychological distress for young people experiencing homelessness (Krabbenborg et al., 2017). Therefore, it may be reasonable to assume that promoting autonomy via PA may better equip participants to self-regulate emotions and behaviours, and detract from adopting maladaptive coping strategies; thereby enhancing overall well-being via direct and indirect psychosocial pathways (Altena et al., 2018).

Integral to fulfilment of the need for autonomy are individual perceptions of choice and control, thus from the outset if the intervention it is crucial that participation in activities are self-endorsed (Deci & Ryan, 2000). By virtue of volunteering for the study, it can be assumed that participants will have experienced a sense of autonomy satisfaction (presuming absence of external pressure)- however, as variation between individuals' *intentions* for involvement (i.e. extrinsic reward, such as food / intrinsic goals, such as enjoyment) may affect the degree of *relative* autonomy (Ryan & Deci, 2000), PA-based strategies to promote autonomy will be incorporated throughout the PA-component, to maintain perception of volitional control and facilitate sustained engagement in the intervention (Fortier et al., 2012).

Although the PA sessions of the intervention will adhere to a pre-determined structure and format (see section 3.2.4), the tasks and activities provided by instructors will constitute an element of choice (i.e. selection of preferred weight etc.), and therefore contribute to satisfying the need for autonomy through affording participants some self-control (Ryan & Deci, 2000). Participants will also be encouraged to provide feedback during or between the sessions, to ensure they are *actively involved* in decision around specific activities and wider 'conditions' (i.e. choice of music etc.), which—through enhanced learning and performance—could contribute to the autonomy-supportive environment, and ultimately moderate intervention effects (Wulf & Lewthwaite, 2016).

To fully support participants' need for autonomy, it is important for the PA instructors to refrain from focussing on attainment of specific outcomes- yet alternatively, encourage participants to self-regulate their actions, and provide guidance towards achieving self-endorsed goals (Ryan & Deci, 2008). Providing process-oriented feedback (i.e. directly associated with the specific task / activity), rather than emphasising performance or referring to outcomes, is one example of how the PA instructors might convey a need-supportive communication style (Ntoumanis et al., 2018). Adopting techniques which encourage participants to attend to their breathing and bodily sensations, may also—through encouraging mindful awareness—increase capacity to self-regulate behaviours and emotions, and positively affect psychological wellbeing (Brown & Ryan, 2003). Moreover, emphasising this mind-body connection in the context of PA, could create a 'virtuous cycle' between participants' motivation, mindful awareness, and PA behaviour- mediated by autonomy need-supportive factors, such as self-regulation, and perceptions of control (Ruffault et al., 2016; Schneider et al., 2019).

Outwardly, this communication style may appear counterintuitive to guidance suggesting that the participants could benefit from adopting an external focus of attention while undertaking

activities or tasks (see 3.2.3.1). Conversely, through attending to the *process* rather than eventual outcomes, it is arguable that 'interference' to automaticity becomes somewhat irrelevant given the absence of any performance-related goals (Stephens & Hillier, 2020). Moreover, attending to *bodily sensations* could further support participant's self-regulation in response to PA-related pain or discomfort, and thereby predict further engagement in sustained PA behaviours (Schneider et al., 2019).

This paradox between internal and external focus of attention exemplifies the basis of utilising distinct evidence-informed strategies to target satisfaction of distinct needs (i.e. external foci = learning = self-efficacy = *competence*; internal foci = mindful awareness = self-regulation = *autonomy*), and highlights how multiple processes and mediators of effects may ultimately determine individual outcomes (see Teixeira et al., 2020; Ryan & Deci, 2008).

3.2.3.3 Satisfaction of Relatedness

To embed relatedness-need supportive techniques within the design of the intervention, it is important to consider potential influences both *directly*- via the PA instructor's communication style with participants, and *indirectly*- from the extent to which the session content supports relatedness between participants. This may be particularly relevant for homeless young people who often experience difficulty in establishing trusting relationships, and resultantly forego the benefits of social support for protecting subjective well-being (Barczyk et al., 2014), and overall quality of life (Krabbenborg et al., 2017). In addition to influence from the PA instructors and other intervention participants, effects on relatedness need satisfaction are also likely to be moderated by the socio-contextual relevance of the PA delivery setting (see 3.2.1). Specifically, implementing the intervention in a local, community-based centre may contribute to satisfaction of relatedness needs, and engender

positive effects on self-esteem, well-being, and sustained engagement through wider perceptions of social connectedness and integration (Ntoumanis et al., 2021).

From the outset, it is vital that the PA instructors employ techniques to develop rapport with the participants- such as encouraging collaboration and questions regarding key decisions concerning the group (Teixeira et al., 2020). In session one, for example, establishing a 'code of conduct' collectively with all participants could: immediately promote instructor-participant relatedness needs through conveying involvement and value in their input (Ntoumanis et al., 2021); and cultivate participant-participant relatedness needs through providing clarity around acceptable interpersonal behaviours throughout the intervention (Bergholz et al., 2016). To increase connectedness between participants, the intervention will incorporate group activities into each session, including problem-solving tasks as a *team*- thereby fostering relatedness need satisfaction through participant interactions and feelings of belonging (Gillison et al., 2019; Ryan & Deci, 2000). As with individual activities, instructors will be trained to provide process-oriented feedback to participants- such as group effort and teamwork employed during the task, thus allowing for unconditional positive support regardless of the eventual outcome (Teixeira et al., 2020).

A key challenge for the PA instructors to consider throughout the intervention concerns achieving an optimal balance between adequate challenge (see 3.2.3.1) and overall *enjoyment*, to develop participants' intrinsic motivation for further participation and engagement in PA (Ryan & Deci, 2008). The group-based component of the PA intervention could provide instructors with greater opportunity to incorporate an element of fun into the sessions, which might not be possible if delivering individual-based activities alone (Fortier et al., 2012). Conjointly, this would infer that ensuring the participants enjoy the group tasks is likely to culminate in positive intervention effects via two distinct, yet interrelated pathways as presented in Figure 3.1 (see Reis et al., 2000; Ryan & Deci, 2008).

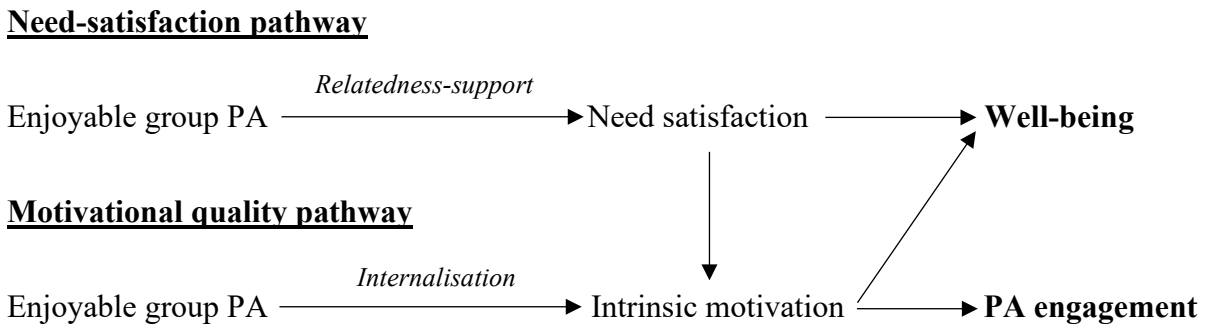

Figure 3.1. *Theoretical Pathways for Positive Outcomes Derived Through Group-based Physical Activity*

3.2.4 Materials and Design

The typical structure of each 60-minute PA session, theoretical principles, and corresponding delivery approach is presented in Table 3.1.

As evidenced throughout the Thesis thus far (extant literature, systematic review, theoretical detail presented in this chapter), effective PA-based exercise which target mental health and well-being of young people do not (and arguably *should* not) require a rigid, prescriptive protocol, or adhere to predefined 'FITT' principles (Thomas et al., 2020). Rather, through promoting and instilling perceptions of control, connectedness and competence in participants, *what* the coaches choose to deliver becomes somewhat irrelevant, when compared with *how* the principles are implemented throughout the sessions. Correspondingly, the "activities" column in Table 3.1 is intentionally blank; providing coaches with autonomy to select what is implemented, consult with participants on preferences or suggestions, and ensure activities are conducive to the needs and abilities of the group.

Table 3.1

Typical Structure of a 60-minute Physical Activity Session

	Principles	Activities	Delivery Approach
Warm-up (10 mins.)	+ Show genuine interest in YPs + Promote autonomy through involvement in decisions + Leadership communication + Provide choice, responsibility, and self-independence		+ Warm, caring, genuine manner + Encourage suggestions for adapting structure and content + Invite YPs to assist with delivery + Avoid controlling language i.e. "I want…" / "you should…"
Motor Skills (15 mins.)	+ Develop competence through mastery of skills + Promote problem-solving and self-improvement + Encourage self-directed goals		+ Positive reinforcement and encouragement + Encourage self-monitoring of progress / effort (not performance) + Highlight individual successes
Group Activities (25 mins.)	+ Shared decision-making of activity + Enhance relationships and strengthen bonds + Improve collaborative communication skills + Develop group-based confidence in all YPs + Build and maintain self-respect		+ Encourage feedback / suggestions of group-preferences + Team-based challenges which require communication + Monitor progression, maintain 'optimal challenge' + Encourage equal involvement, recognise challenges- adapt + Ensure all individuals have an equal voice / role
Cool-down (10 mins.)	+ Self-regulation and monitoring skills + Show interest and attention to all participants + Support interests of group and provide choice		+ Focus on bodily sensations and regulation of breathing rate + Positive feedback, reassurance, and empathy + Collaborate on preferred activities for following week

Notes: 'Principles' column colours = Relatedness, Competence, Autonomy

3.3 Development and Design of the Psychotherapy Component

3.3.1 Application of Evidence

As detailed in Chapter One of this Thesis, Dialectical Behavioural Therapy (DBT; Linehan, 1993) has demonstrated efficacy for improving the mental health and well-being in samples with similar characteristics to this study's population (i.e. young people experiencing homelessness, history of trauma and/or abuse, symptoms of depression / anxiety / PTSD, substance-use disorders; see Chapter One for relevant examples). Nonetheless, when

considering the rationale underpinning the purpose of the current project, treatment effects may be severely compromised by individual's reluctance to participate, or engage with the psychotherapy when offered. For young people experiencing homelessness, common barriers to engagement in therapies (i.e. poor health literacy, lack of trust, inconvenience, location and cost; see Brown et al., 2016) may be exacerbated by their complex and often chaotic circumstances, poor past experiences of care or support, and perceptions that their particular 'needs' will not be understood or met (Chaturvedi, 2016; Robards et al., 2018). Overall, this implies that while the PA component of this intervention may alleviate *some* concerns (i.e. unfamiliarity with the group / setting etc.) and thereby facilitate attendance to the adjunctive DBT, it would also be prudent to incorporate strategies which target factors conducive to engagement in psychological therapies, and support participants' motivation for DBT as a distinct component of the intervention.

Since young people experiencing homelessness present disproportionately low levels of cognitive functioning (Fry et al., 2017), participants' lack of knowledge and understanding around the fundamentals of DBT may undermine motivation to engage in the sessions from the outset of the intervention. To mitigate this potential challenge, it is important that the information provided to participants during the recruitment phase is jargon-free, and devoid of unnecessary scientific or technical details (Chaturvedi, 2016). This will also be accompanied by the opportunity for individuals to ask further questions in relation to the intervention- which will be answered verbally, using clear and simple language to ensure consenting participants are fully 'informed'. While explaining the potential benefits of DBT may promote individual's *intentions* to participate, it cannot be assumed that this will be reflected in the eventual attendance levels (Brown et al., 2016). To address this intention-behaviour 'gap', the intervention will be structured to incorporate 'pre-therapeutic' phase, in which—through attending initial PA sessions—participants can familiarise themselves with

the (non-therapeutic) setting of the DBT sessions (Chaturvedi, 2016). This PA-only 'embedding' period will also present an opportunity for the development of trust and respect between participants; thereby facilitating attendance, but moreover *engagement* in the DBT- such as willingness to discuss sensitive issues, and disclose personal information to the group (Robards et al., 2018).

3.3.2 Mechanisms of Action

From the evidence presented in Chapter One of this Thesis, DBT offers a transdiagnostic therapeutic approach; demonstrating efficacy and effectiveness for disorders most prevalent amongst youth homeless populations (i.e. anxiety, depression, PTSD, BPD, substance use; see Swales, 2019). While there is growing research to evidence the role of emotion regulation accounting for positive effects associated with DBT (Valentine et al., 2020), identifying which specific 'ingredients' contribute to this change, and *how* or *why* these effects occur (i.e. for whom, under what circumstances), requires a degree of speculation in this context, given the limited evidence-base.

As detailed in Chapter One, delivering 'stand-alone' DBT skills training (DBT-ST) as opposed to 'standard' DBT has been identified as a viable treatment option for numerous disorders, and across diverse populations (Valentine et al., 2020). The use of DBT skills specifically has also been identified as a principal mechanisms through which standard, multicomponent DBT elicits desirable outcomes and positive change (Rudge et al., 2020). For the current study—in which resources and funding are relatively limited—implementing a DBT-skills training intervention is therefore entirely justified, and consistent with the pragmatic approach adopted throughout the course of this research project (i.e. conducted under 'real-world' conditions). Furthermore, focussing on one treatment element compared with delivering multicomponent DBT, will consequently facilitate the identification and

explication of potential mechanisms of change in DBT-skills training, for this population (Chapman & Owens, 2020).

The following sub-sections will address how core strategies underpinning the four DBT skills modules may mediate the relationship between the intervention and psychological outcomes of interest. For each skills module, potential mechanisms of change for positive effects will also be discussed in context, to examine *why* and *how* the intervention may initiate positive change in this project's participants (Boritz et al., 2019).

3.3.2.1 General Strategies and the Therapeutic Alliance

The effectiveness of DBT-ST for participants involved in the current project may be compromised by initial difficulties in trusting the therapist (and therefore the therapy itself), owing to previous adverse and often traumatic experiences, such as physical and/or emotional abuse (Brown et al., 2016). As a frequently cited mechanism of change in both DBT (Bedics et al., 2015), and psychotherapies in general (Baier et al., 2020), it is therefore essential that the facilitators of the group employ strategies and techniques to foster a therapeutic alliance with participants from the outset of the intervention. Initially, establishing this alliance is likely to improve participants': engagement in the group; motivation to learn; and application of the skills, which—through enhanced interpersonal functioning—may further strengthen the therapeutic alliance throughout the duration of the intervention (Boritz et al., 2019; Rudge et al., 2020). The implications of this reciprocal effect for positive outcomes may be indisputable, however evidence pertaining to *how* the DBT facilitator can establish therapeutic alliance *in this context* is absent from current literature, and therefore strategies presented below provide some generalised, speculative methods which will be applied accordingly to the current project.

As with all aspects of DBT, the group facilitator should endeavour to balance the dialectic between: building a therapeutic alliance with participants through accepting and understanding the participant and their behaviours; and applying techniques which will enable the participant to actively identify and change maladaptive behaviours (see Linehan, 2018). While there may be occasions when it is necessary to apply greater emphasis of one approach over the other (i.e. acceptance and understanding may be more appropriate initially, if the participant is emotionally distressed), it is important that the corresponding approach is subsequently applied (i.e. identifying which specific skill might have helped problem-solve / cope with the distressing event), to maintain the 'therapeutic balance' (Linehan, 2015), and thereby facilitate positive outcomes (see above). Irrespective of the therapist's stance, their communication style should remain consistently warm, attentive, and non-judgemental, to minimise participants' emotional distress, and maximise the potential for teaching and learning (Boritz et al., 2019).

Participants' perceived acceptance from the therapist is directly related to the therapist's utilisation of DBT validation strategies (Fruzzetti & Ruork, 2018), which—without condoning problem behaviours—conveys understanding that maladaptive coping and / or dysregulated reactions are 'normal', appropriate responses in the context of their previous experiences and current situations (Linehan, 2015). Indeed, irrespective of participants' learning and use DBT skills *per se*, their perceptions of the therapist's understanding may directly translate to positive outcomes such as reduction in self-harming behaviours; reinforcing the importance of validations as a core aspect of DBT (Bedics et al., 2015). Within the current project, it is likely that complex, multifaceted disparities between participants' past and current situations could exacerbate perceptions that their unique experience will be neither understood, nor met (Brown et al., 2016). Accordingly, it may be prudent for the therapist to self-disclose *relevant* personal experiences and / or vulnerabilities

as a means of validating the participant through vicarious means- thereby evidencing that such feelings and behaviours are normative, and further strengthening the therapeutic alliance (Fruzzetti & Ruork, 2018). Moreover, coupled with genuine empathy from the therapist, this strategy may also instil feelings of equality and thereby alleviate the disempowerment often experienced by homeless youth when receiving support from adults (Chaturvedi, 2016).

The 'action-oriented' nature of DBT skills group training (i.e. involving strategies to promote behaviour change; see Chapman & Owens 2020) may be particularly suited to young people experiencing homelessness; for whom the effectiveness of cognitive-focussed and 'talking' therapies are often compromised through high rates of cognitive impairment and mental health conditions (Fry et al., 2017). From the therapist's perspective, 'change-skills' specifically (i.e. interpersonal effectiveness and emotion regulation) present greater opportunities to utilise *practical* teaching and learning techniques- which may account for their relationship with reduced depression and anxiety in adolescents, compared with skills necessitating conceptual application (i.e. distress tolerance and mindfulness; see Lenz et al., 2016). Evidently, the manner in which the therapist delivers skills training to the group is likely to predict participants' motivation, engagement, and overall attitude towards the utility of DBT skills (Rudge et al., 2020). For young people- particularly those who have experienced homelessness, it is crucial that examples provided by the therapist are appropriate and relevant to their 'real world' situations (i.e. self-care, goal-setting etc.), and delivered through interactive and stimulating teaching, learning, and practice methods (i.e. through role-play, games, music etc; Chapman & Owens 2020; Vitopoulos et al., 2017). While it is important for the therapist to convey consistent warmth and compassion towards participants, the use of 'irreverent' communication techniques (i.e. with humour, sarcasm, or confrontation) may be a particularly effective means of gaining participant's attention (Miller et al., 2007), and encourage openness and engagement through authenticating both the

environment, and overall therapeutic alliance (Fasulo et al., 2015; Linehan et al., 2015). Notwithstanding the importance of acceptance and validation to the therapeutic alliance (and engagement in the therapy; see above), this emphasises the importance of therapists' utilisation of change-based strategies in the intervention as a determinant of *participant-related* mechanisms of change, such as: learning and practice of DBT skills; application in response to 'real-world' problems; and improved regulation and self-control (Chapman & Owens, 2020; Rudge et al., 2020). Through this virtuous cycle, participants should *theoretically* increase capacity to reduce maladaptive, and increase adaptive coping strategies in response to challenging situations (Boritz et al., 2019), which may subsequently engender wider benefits (i.e. reduced substance use, increased socialisation), via increased perceptions of mastery and autonomy, and a general *behavioural activation* effect (Linehan, 2015; Mehlum 2020).

Collectively, the evidence suggests that the therapist may require some flexibility in their dialectical approach, depending on participants' attitude towards DBT and motivation to commit and engage with the skills training group. Due to the unfamiliarity between therapist and participants prior to the intervention, emphasis on validation techniques during the initial sessions may facilitate positive attitudes towards the therapy, and reduce early drop-out from the group (Rudge et. al., 2020). This initial investment in strengthening the therapeutic alliance is likely to facilitate acceptance of the therapist's subsequent application of change-related DBT strategies; given the resistance often initially displayed by this population to identifying and solving problem behaviours, and replacing maladaptive regulation methods with controlled, adaptive coping mechanisms (Baier et al., 2020; Vitopoulos et al., 2017). Furthermore, as a dysregulated response underpinned by feelings of uncertainty towards the intervention and group, the likelihood of participants displaying treatment-destroying / therapy-interfering behaviours (i.e. leaving the room, arguing and talking over each other) is

relatively high (see Rathus & Miller, 2015); thus reinforcing the hierarchical prioritisation of strategies conducive to establishing routine and safety (validation; i.e. reinforcement), to ultimately ensure a positive response when initiating the change-oriented (i.e. skill acquisition and maintenance) intervention phase (Fasulo et al., 2015; Linehan, 2015).

3.3.2.2 Emotion Regulation Skills

As a predictive 'pathway' into youth homelessness, it is highly likely that participants in this project will have experienced significant levels of childhood adversity, deprivation, and trauma (see Fitzpatrick et al., 2013). This combination of pre-disposed biological vulnerability (i.e. through genetic, in utero, or neurodevelopmental factors) in the context of an emotionally invalidating childhood environment (i.e. disregard of feelings, lack of modelling, overly punitive parenting style) constitutes DBT's theoretical underpinnings of how pervasive emotional dysregulation may develop over time (see 'biosocial theory'; Linehan, 2015)- with homelessness ensuing through the culmination of determinants (i.e. maladaptive coping mechanisms, impulsive behaviours, and social exclusion) as a consequence of the initial ER skill deficit (Kidd et al., 2018; Powell & Maguire, 2018).

These early impediments to the development of ER skills may also underpin the prevalence of psychiatric (88%), and comorbid (73%) disorders reported by this study's population (see Hodgson et al., 2014); indicating that the vicious cycle between poor mental health and youth homelessness may be preceded by insufficient ER skills consequential to previous adversity and trauma (Keats et al., 2012). Taken together, these findings highlight the importance of targeting ER skills in this project's population- firstly, given the growing support for its utility as an effective *transdiagnostic* treatment (i.e. account for heterogeneity of disorders, and concurrently target comorbidity; see Sloan et al., 2017); and secondly, to reduce those

maladaptive coping behaviours which perpetuate the 'cycle of homelessness' described above (Linehan, 2015; Powell & Maguire, 2018).

Example: Decreasing emotional vulnerability- Application of "ABC' skills

Session 6 of the DBT-ST component will specifically focus on how participants may **a**ccumulate positive experiences in their lives ("A"), and **b**uild mastery through engaging in challenging activities ("B"). For young people experiencing homelessness, it is important to encourage activities which are immediately available, and can be easily incorporated into their lives (i.e. listening to music, going for a walk, taking a bath etc.), to begin experiencing positive emotions as a 'normal' aspect of their daily routine (Vitopoulos et al., 2017). This may also present opportunities for participants to utilise these regular, short-term occurrences (i.e. going for a walk), as a means of facilitating competence and self-efficacy towards achieving more challenging long-term goals (i.e. improving overall health and fitness), and thereby improving well-being and self-esteem via an increased perception of mastery and control (Rathus & Miller, 2017).

3.3.2.3 Interpersonal Effectiveness Skills

For young people experiencing homelessness, the culminative impact of adverse experiences, family breakdown, and emotional dysregulation is likely to compromise capacity to formulate and maintain healthy relationships (see Kidd et al., 2018), therefore increasing risk of poor mental health through a perceived lack of available social support networks (Gasior et al., 2018). As a maladaptive response to 'deficient' interpersonal skills (Linehan, 2015), individuals may therefore become overly-defensive, or utilise aggression in order to achieve desired outcomes (Powell & Maguire, 2018), or—as a result of low self-worth—engage in unhealthy relationships which undermine self-respect, and perpetuate further reductions in self-confidence and esteem (Gasior et al., 2018).

As social interactions with similar young people can facilitate engagement and positive change for those experiencing homelessness (Brown et al., 2016), the group-based format of this project's intervention may constitute a mechanism of action which is extraneous to effects from the learning and application of IE skills *per se* (Chapman & Owens, 2020). Whilst this assumption is entirely plausible, it is also important to consider how the mechanisms associated with distinct IE skills (and corresponding goals), may be associated with desirable outcomes for this population, under these circumstances. For example, learning skills which prevent exploitation and thereby preserve or promote self-respect (i.e. "FAST"; see Linehan, 2015), may—through establishing healthier relationships and increasing self-efficacy—engender positive effects on both psychological distress and self-esteem, respectively (Begun et al., 2018; Rathus & Miller, 2015). Similarly, application of skills which increase the likelihood of achieving an objective or goal through assertive yet non-confrontational means (i.e. "DEAR MAN"; see Linehan, 2015), is likely to enhance participants' positive emotions, thus overall well-being, through increased perceptions of autonomy and self-efficacy for achieving desired outcomes throughout their lives (Begun et al., 2018; Lenz et al., 2016).

Example: Building relationships- Application of "GIVE" skills

Session four of the DBT-ST component will specifically focus on verbal and non-verbal communication skills for strengthening relationships and avoiding conflict. While the social exclusion and isolation of young people experiencing homelessness is frequently attributed to dysregulated emotions (Powell & Maguire, 2018), the mechanisms underpinning this association (and therefore target *mechanisms of change*) often derive from either: avoidance of interacting with others or adopting a cold and defensive manner, to alleviate anxieties associated with expectations of rejection and invalidation from others (Keats et al., 2012; Malivoire, 2020); or antisocial /verbally-aggressive outbursts, owing to the neurobiological

effects (i.e. hyperarousal) of childhood adversity and trauma (Leitch, 2017). Learning how to interact with others utilising a **g**entle, **i**nterested, **v**alidating and **e**asy manner therefore offers participants an opportunity to improve resilience and self-esteem through increased social connections and cohesion (McCay et al., 2011), and potentially reduce symptoms of anxiety and depression through balancing greater acceptance of relationship dynamics with mastery of effective interpersonal skills (Lenz et al., 2016; Rathus & Miller, 2015).

3.3.2.4 Distress Tolerance Skills

As a consequence of childhood adversity or previous traumatic experiences, young people experiencing homelessness frequently respond to their environment in a manner which omits prior consideration of potentially negative consequences of their actions (Edidin et al., 2012; Kidd et al., 2018). This disposition towards impulsive behaviours may partially explain the relationship between trauma, dysregulation, and risk of youth homelessness (Maguire, 2017), and thereby presents a viable mechanism of action in the current project, which may be targeted through incorporating skills which promote self-regulation and care to better manage distress, and increase ability to modulate (maladaptive) reactions during periods of short-term crisis (Leitch, 2017; Linehan, 2015).

As a mediating factor between exposure to trauma in childhood and the development of poor mental health in adulthood, acquiring skills which increase one's ability to tolerate distressing experiences through *acceptance* of negative emotions and pain, may be particularly applicable to effectuating long-term change for this study's population through eradicating an identified risk factor (i.e. distress intolerance) for the onset of subsequent depression and anxiety (Rathus & Miller, 2015; Yang et al., 2020). In the context of the current project, it is likely that the unfamiliar group-based format of the intervention will be anxiety-provoking—and thereby somewhat distressing—for the study participants from the outset of the study; yet

many will initially lack the necessary skills to regulate or accept these negative emotions (Powell & Maguire, 2018). It is therefore imperative that distress tolerance is incorporated as early as possible in the study period to:

1. Minimise any risk of harm to participants through teaching skills to cope through self-regulation of their emotion.

2. Promote effectiveness of the intervention through ensuring maladaptive coping responses to such distress (i.e. avoidance) does not impede the acquisition of subsequent skills (Linehan, 1993).

Example: Reducing emotional arousal – Application of "TIPP" skills

Session two of the DBT-ST component will include strategies which can be effectively utilised in crisis situations where extreme emotional distress impedes cognitive retrieval and execution of other acquired DBT skills. The practical application of each strategy comprising the TIPP skill (**T**emperature, **I**ntense Exercise, **P**aced Breathing, **P**aired Muscle Relaxation) may be particularly effective for this study's participants given the prevalence of poor literacy and cognitive functioning for YPEH (Fry et al., 2017). Furthermore, each of these skills can be quickly and easily applied with little or no preparation requirements, and implemented inconspicuously thereby avoiding fear of judgement or stigmatisation from others (Rathus & Miller, 2015). Learning how to self-regulate emotions through altering a physiological response (i.e. activating parasympathetic nervous system; see Linehan, 2015) is a highly effective, yet short-term method of distraction in times of acute crisis, which may facilitate participants' ability to practice and apply additional skills, and thereby reinforce their motivation and engagement with the intervention (Rudge et al., 2020). Crucially, teaching this skill **early** in the intervention (session 2) as a foundation for easing participants' initial distress may reduce over-focussing on distraction from emotions, which could compromise

progression to more cognitively demanding skills such as identifying and managing emotions (Dunkley, 2017).

3.3.2.5 Mindfulness Skills

At the core of effective DBT, principles of mindfulness are a consistent theme underpinning the learning of all other skills, predominantly through practicing skills which improve autonomic attentional control (Rathus & Miller, 2015), and regulate the dialectical tension between one's emotional and rational minds (Linehan, 2015). For YPEH, the deleterious impact of previous trauma on attentional control and self-regulation (Fry et al., 2017) may impair mindfulness abilities such as awareness of one's environment and cognitive control; thereby exacerbating the vulnerability of this at-risk group, through perpetuating the relationship between high-risk behaviours, poor mental health, and maladaptive coping strategies in response to perceived threat or stress (Bender et al., 2015). Indeed, there is a growing body of evidence which demonstrates inverse relationships between facets associated with mindfulness (i.e. awareness, acceptance, and attentional control) and behaviours which sustain psychological distress (substance use, self-harm and suicide ideation), for at-risk young people, including those currently experiencing homelessness (Coffey et al., 2008; Fortuna et al., 2018; Parto & Besharat, 2011).

Whilst mindfulness-based interventions are generally acceptable for youth homeless populations (e.g. Bender et al., 2018, Brown & Bender, 2018), implementation of this skill in the current context should be conducted in accordance with participants' capacity for self-regulation, and cognitive ability to understand abstract concepts (Linehan, 2015). For example, mindfulness exercises which are contextually irrelevant or require long periods of silence and concentration (such as traditional meditation practices), are likely to prove ineffective for this population, and may thereby compromise intervention outcomes (i.e. well-

being, self-esteem) through undermining the mechanisms which effectuate positive change (i.e. competence, autonomy; see Brown & Ryan, 2003; Parto & Besharat, 2011). Ensuring that participants engage with mindfulness skills from the outset of the intervention may also enhance the overall 'therapeutic impact' of DBT-ST (see Chapman & Owens, 2020)- through enhancing strategies conducive to emotion regulation (attentional control, emotional modulation) as putative mechanisms of positive change (Boritz et al., 2019).

Example: Observation of music

Incorporating practices which emphasise use of the senses has proven an effective means of engaging YPEH in DBT mindfulness exercises (Vitopoulos et al., 2017). Although most participants will presumably already listen to music outside of the group, it is unlikely that all would associate music with their present feelings and emotions, or utilise music as a strategy to cope with disruptive or negative thoughts or experiences. This relatively easy mindfulness practice may present the DBT facilitator with an opportunity to select music which may be typically appealing or unappealing to participants, and thereby facilitate mindfulness skills including observation, acceptance, and withholding judgement (Rathus & Miller, 2015). It is also likely that music will stimulate further discussions between the DBT facilitator and group members (e.g. Fasulo et al., 2015)- thereby reinforcing the therapeutic alliance and connectedness between intervention participants as mechanisms of positive outcomes for engagement, motivation and well-being effects (Linehan, 2015; McCay et al., 2015).

3.3.3 Materials and Design

A full breakdown of the content and related outcome goals for the 8-week DBT skills training programme is presented in Table 3.2.

While the optimal frequency and duration of effective DBT-ST interventions is somewhat unclear from the extant literature (i.e. single session: Ward-Ciesielski et al., 2017; 1 year:

Vitopoulos et al., 2017), the structure and intensity of this project's intervention is representative of the available resources, staffing, and time required for planning and implementation. To maximise effectiveness of the intervention, a qualified, experienced, and confident psychologist will be recruited to facilitate the DBT skills group, and provide continued input in relation to materials, content and necessary modifications (see Toms et al., 2019).

3.4 Conclusions

This Chapter has comprehensively described the development of a novel intervention encompassing a psychologically-informed physical activity component, and DBT skills training component. While similar interventions comprising either PA, or DBT-ST have previously been implemented with similar populations, the components presented within this Chapter are somewhat unique- given the research context, theoretical framework, and evidence-based treatment targets identified as putative 'mechanisms of change'. Moreover, while the effects of PA and DBT-ST as distinct, standalone approaches for well-being have been previously documented, this is the first study to consider whether combining these components can indeed improve adherence and engagement, and augment resultant intervention effects on psychological and behavioural outcomes.

While this Chapter has focussed on intervention development, Chapter Four will progress to the next phase of this research through piloting the intervention to establish whether it is feasible, acceptable, and appropriate for this population. The outcomes and evaluation of this pilot study will specifically address any challenges, enablers, and unintended consequences of implementation in this context, to inform decisions around refinements which may be necessary prior to commencing a full-scale trial (Skivington et al., 2021).

Table 3.2

Overview of the 8-week DBT Skills Training Intervention

Week	Content	Outcome Goals
1	**INTRODUCTION TO DBT SKILLS** - Group guidelines - Goals of DBT skills training - Biosocial model - Introduction to Mindfulness - Wise Mind	- Accountability and autonomy - Understanding of DBT skills - Self-regulation and attentional control within sessions
2	**DT: CRISIS SURVIVAL** - Mindfulness exercise - Introduction and goals of DT - STOP - TIPP - PROS and CONS - Homework tasks	- Reduce physiological arousal and initial distress experienced - Replace maladaptive coping behaviours with easily available and effective strategies
3	**IE: COMMUNICATION** - Homework review - Mindfulness exercise - Introduction and goals of IE - DEAR MAN - Homework tasks	- Increase assertiveness and positive outcomes - Reduce conflict and associated distress through building and maintaining positive relationships
4	**IE: HEALTHY RELATIONSHIPS** - Homework review - Mindfulness exercise - Introduction to session - GIVE - FAST - Homework tasks	- Increase social connectedness and self-esteem - Maintain self-respect in non-confrontational manner
5	**DT: SHORT-TERM RELIEF** - Homework review - Mindfulness exercise - Introduction to session - Distraction: ACCEPTS - SELF-SOOTHING - Homework tasks	- Replace maladaptive behaviours through positive distractions - Improve physical and psychological self-care
6	**ER: REDUCING NEGATIVE EMOTIONS** - Homework review - Mindfulness exercise - Introduction and goals of ER - ABC - PLEASE - Homework tasks	- Incorporate self-regulation into daily routine - Recognise mind-body connection for managing emotions
7	**ER: CHANGING YOUR RESPONSE** - Homework review - Mindfulness exercise - Introduction to session - CHECK THE FACTS - PROBLEM SOLVING - Homework tasks	- Increase awareness of emotional state and corresponding coping strategy - Promote autonomy and competence through problem-solving
8	**ER: CHANGING YOUR RESPONSE. CELEBRATIONS AND GOODBYE'S** - Homework review - Mindfulness exercise - OPPOSITE ACTION - Sustaining use of DBT skills - Celebrations and awards	- Increase control of thoughts, feelings, and behaviours in response to emotions - ensure positive ending to intervention and recognise individual successes

Notes: DBT = Dialectical Behavioural Therapy; DT = Distress Tolerance; IE = Interpersonal Effectiveness; ER = Emotion Regulation

Chapter Four:
Pilot Feasibility Study

4.1 Introduction

This Chapter will focus on the planning, implementation, and evaluation of an intervention incorporating a theoretically-informed PA component, and evidence-based psychotherapeutic component (DBT-ST) to ascertain 'proof of concept'; i.e. whether this approach is feasible, appropriate, and acceptable to stakeholders, and—accordingly—identify necessary adaptations to enable a scaled-up effectiveness trial. While pilot intervention studies are often conducted under optimal, highly controlled conditions, implementation in a 'real-world' setting may be integral to identifying contextual barriers which may adversely impact effectiveness of the scaled-up trial (McCrabb et al., 2019). This may be particularly relevant to behavioural-based interventions, given the multi-level contextual factors which can influence the efficacy (in theory), to effectiveness (in practice) 'gap' (see Koorts et al., 2018).

Many of the challenges encountered throughout the present study thereby served as a major strength of the research overall; with unforeseen and unpredictable barriers identified by virtue of delivering the interventions in a community-based setting, to participants recruited from the population of interest (youth experiencing homelessness). As discussed in the section below, it was possible to immediately mitigate some of the emerging issues *within* the pilot study duration (i.e. additional staff presence and support), whilst those related to feasibility of the design (i.e. recruitment) will be addressed *between* the pilot and scaled-up phases, thereby reflecting a balance between implementation and effectiveness research.

4.2 Aims and Objectives

The overall aim of this pilot feasibility study was to test the concept that PA may encourage this population to engage in psychological therapy (DBT-ST). Quantitative and qualitative methods were utilised to assess pre-determined study objectives (see below), which will ultimately inform the (re)design of a full-scale study.

4.2.1 Primary Objective

The primary objective was to identify barriers and facilitators to the intervention design, through assessment of the following implementation outcome variables (see Peters et al., 2013).

1. Feasibility (*The extent to which an intervention can be carried out in a particular setting or organisation),* including: -

   Recruitment processes, recruitment rates, group allocation, retention and attrition rates, use of incentives, adverse events, risk of harm.

2. Appropriateness (*The perceived fit or relevance of the intervention in a particular setting or for a particular target audience or issue),* including: -

   Outcome measures and administration method, DBT-ST workbook materials, types of activities delivered, length of intervention, frequency of sessions, duration of sessions, time of day, intervention setting.

3. Acceptability (*The perception among stakeholders that an intervention is agreeable),* including: -

   PA in a group-based setting, group-based DBT skills sessions, delivery style of intervention components, perceived disadvantages or barriers to engagement, perceived advantages or benefits of either / both intervention components.

4.2.2 Secondary Objectives

1. To establish whether there is a relationship between attendance / engagement in physical activity and skills training sessions.
2. To determine sample sizes required to power a larger scale, effectiveness study.
3. To measure the effects of the intervention on self-reported outcome variables.

4.3 Methods

4.3.1 Design

The study adopted a quasi-experimental design, with the intention to allocate participants to either the intervention group (PA + DBT-ST), or a group receiving DBT-ST only.

4.3.2 Setting and Participants

Through collaboration with the local authority, the study was conducted at a community-based sports centre, and included participants supported by the charity Llamau, currently residing within the Newport (South Wales) area.

4.3.3 Inclusion Criteria

1. Aged between 15 – 24 years at time of screening.
2. Capacity to provide written informed consent.
3. Capacity to understand the purpose of the study and procedures involved.
4. Able to partake in physical activities.
5. Current risk-assessment confirming low / no risk to self, others or property.

4.3.4 Exclusion Criteria

1. Inability to provide informed consent due to cognitive impairment or learning difficulties.
2. Substance dependence which could impair capacity to engage in physical activities or DBT.
3. A risk assessment indicating current high risk to self, others, or property.

4.3.5 Interventions

The study comprised of two separate groups ('Physical Activity' and 'DBT Skills Training'), with the intervention 'condition' being the combined PA + DBT-ST group. The design and

content of each component was informed by a combination of: research with Llamau's staff and young people to understand their needs, and identify potential barriers; evidence derived from previous PA or DBT-based interventions with similar populations; and theoretic principles relating to feedback, motivation, and subjective well-being (see Chapters 1-3). The theoretical framework presented in Table 4.1 exemplifies the principles underpinning the PA design, while the bespoke 8-week DBT-ST workbook can be found in Appendix 3.

The programme duration was 12-weeks in total- with PA sessions only in weeks one to four, and the DBT-ST group commencing in conjunction with PA at week five, for the remainder of the programme duration (eight-weeks). Both groups were delivered in suitable rooms at the Newport Centre (PA sessions: sports hall; DBT-ST: meeting room), with food provided after every PA session (thus in between groups as of week five).

4.3.5.1 Physical Activity Component

Twelve x one-hour sessions were delivered by a qualified coach from the local authority (KB), plus one experienced volunteer recruited from Cardiff Metropolitan University (JB). Both coaches received 2-hours training from a highly experienced sports psychologist (RM) in the week prior to the start of the programme, to ensure consistency and standardisation of delivery style and activities provided. Manualised information relating to the rationale and theory underpinning the sessions was provided to coaches during their training, which further explained the application of SDT and incorporation DBT skills into the PA sessions (see Table 4.1).

Each session followed a theoretically-informed structure, consisting of a 10-minute warm-up, 40-minites of structured activities, and a 10-minute cool-down period to finish. The underpinning principles derived from SDT (autonomy, competence, relatedness) were

promoted through the coaches' delivery approach, in conjunction with the activity type (individual motor skill competencies; group-based challenges).

Table 4.1
Rationale and Theoretical Philosophy: Trauma-Informed Physical Activity Programme

DBT Skills	Rationale	Application to PA	Session detail
Emotion Regulation	- Promote sense of *competence* through mastery of negative emotions and increased emotional resilience - Learn awareness of association between bodily sensations and thoughts/feelings/behaviours - Reduce vulnerability to "emotion mind"	- Incorporate problem-solving skills to improve control over situations, and regulate emotional reactions - Focus on progress (not performance) in relation to individual goals - Promote self-efficacy for PA through mastery of skills - Utilise physical capabilities and skills to enhance global self-esteem	- MSC: Encourage attention to external cues (movement effect) to promote autonomous motor control - MSC: Activity cards and progress charts for self-monitoring - MSC: Positive reinforcement and encouragement - MSC + GA: Highlight physical competencies as individuals / group
Interpersonal Effectiveness	- Promote sense of *relatedness* through enhanced relationship skills, and strengthening existing bonds - Learn how to obtain objectives while maintaining self-respect - Enhance interpersonal relationships to achieve personal goals	- Collaborate on behavioural code, rules, expectations etc. - Incorporate activities which promote team-building and communication - Reinforce actions which help progress towards group goals - Opportunities for peer leadership, and peer-peer coaching with support and praise	- "Code of conduct" in Session 1, reminder during each WU - GA: Set goals / challenges as a group, include team problem-solving - GA: Progress charts to monitor group development - MSC: Work in pairs to provide feedback / encourage - WU: Invite YPs to assist / adapt structure and content
Mindfulness	- Promote sense of *autonomy* through self-regulation of behaviour and a controlled state of mind - Learn awareness of the present moment to direct attention under psychological stress, and increase emotional well-being - Balance somatic sensations (being) with pursuing goals (doing), to achieve "wise mind"	- Incorporate activities which require present mind-body connection, rather than focus on outcomes - Encourage awareness of bodily sensations in relation to external activity - Direct attention to the current activity and self-regulate emotions to achieve goals - Reinforce association between relative discomfort (i.e. fatigue) and goal-achievement to bridge gap between emotion and reason	- MSC: Provide process-oriented feedback (not goal-oriented), to focus attention on present - MSC: Discuss balance between relative PA discomfort and individual progression - MSC + CD: Promote choice and emphasise fun to reinforce mindful attention - MSC: Discuss tolerance and acceptance of sensations in relation to progression. Emphasise the person is in secure and safe surroundings

Note: MSC = Motor skill competencies; GA = Group Activities; WU = Warm-up; CD = Cool-down

Based on the aims and objectives of the study, and evidence derived from the systematic review presented in Chapter Two (Thomas at al., 2020), fidelity to the underpinning principles of the intervention was prioritised over 'dose' of activities delivered / received

(frequency, intensity, time, type), and therein the content of each subsequent session was determined collaboratively between coaches' observations and participants' feedback. Progression throughout the duration of the programme encompassed process-oriented feedback and goals, rather than specific fitness targets or performance-related outcomes. Coaches were required to monitor and record their observations following each weekly session.

4.3.5.2 Dialectical Behavioural Therapy Component

Eight x one-hour sessions were facilitated by an experienced Clinical Psychologist (EM), alongside a co-facilitator trained in delivering DBT Skills (JT). The eight-week programme followed the bespoke DBT Skills Training (DBT-ST) workbook, primarily based on previous DBT research (McCay et al., 2015; Vitopoulos et al., 2017) and recommended guidelines (Linehan, 2015; Rathus & Miller, 2015), yet contextually adapted to ensure materials were relevant and interesting to the study population (see Chapter Three for further details on conceptualisation and content).

Each session commenced with a brief mindfulness exercise, followed by a group-based homework review. The remainder of the session focused on teaching and practicing selected DBT skills, associated with the module for that week (Emotion Regulation; Interpersonal Effectiveness; Distress Tolerance). Given the sensitive nature of discussions within the group, session one incorporated time for participants to establish their 'group rules', such as confidentiality in regards to information shared, and respecting other participants at all times throughout the intervention.

4.3.6 Outcome Measures

A full schedule of assessment measurements is outlined in Table 4.2.

Table 4.2

Schedule of Intervention Outcome Assessments

Assessment	Screening (Day -14 to -1)	Baseline (Week -1 to 1)	Post-Intervention (Week 12 to 13)	Follow-up (Week 13 to 14)
Informed Consent Form	X			
Demographics		X	X	
CORE-OM		X	X	
Rosenberg SES		X	X	
SWEMWBS		X	X	
Godin LTEQ		X	X	
Documentation Review		X	X	
Qualitative Data Collection				X
Adverse Events		X	X	X

Notes: CORE-OM = Core Outcome Measure; SES = Self-Esteem Status; SWEMWBS = Short Warwick-Edinburgh Mental Well-being Scale; LTEQ = Leisure Time Exercise Questionnaire

4.3.6.1 Primary Outcomes

4.3.6.1.1 Feasibility

A register was completed on a weekly basis for all participants enrolled in the programme, thereby providing attendance and attrition rates for both the PA and DBT-ST sessions. Any missed sessions or withdrawals from the study were followed-up with participants or staff, to (where provided) record reasons related to non-attendance.

Safety was monitored through recording of any solicited or unsolicited adverse events as defined by guidelines for Good Clinical Practice (ICH, 1996). All adverse events or general concerns were reported directly to the organisation, and followed-up to ascertain risk of the individual's continuation in the study.

4.3.6.1.2 Appropriateness

The suitability of intervention design, relevance of materials and content provided and perceptions of delivery style was obtained through qualitative methods. All participants initially enrolled in the study were invited to provide information and feedback, including those who opted to withdraw or drop-out from the programme. Semi-structured interviews were conducted face-to-face with participants during the study's follow-up phase (two-weeks post-intervention).

4.3.6.1.3 Acceptability

The credibility and relative advantage of the intervention was assessed through semi-structured interviews with key stakeholders involved in all aspect of implementation (participants, facilitators and Llamau support staff). Topics included acceptability of the structure of the intervention (i.e. group-based sessions), perceived benefits or disadvantages of each intervention component, and what barriers and facilitators to engagement in the programme those stakeholders may have experienced.

4.3.6.2 Secondary Outcomes

Pre-post intervention measures were quantitatively assessed using psychometrically valid and reliable tools, including:

4.3.6.2.1 Clinical Outcomes in Routine Evaluation Outcome Measure (CORE-OM; (Evans et al., 2002)

A self-report, pan-theoretical questionnaire consisting of 34-items designed to measure psychological distress and monitor psychological change. Each item relates to one of four domains: Subjective well-being (4); Problems / symptoms (12); Life functioning (12) and Risk / harm (6). To increase sensitivity and content validity, each domain includes low and

high intensity items and statements are positively and negatively framed (Barkham et al., 2015).

4.3.6.2.2 Rosenberg Self-Esteem Scale (SES; Rosenberg, 1965)

A brief 10-item measure of global self-esteem. Items are either positively or negatively framed, and assessed using a four point Likert scale from "strongly agree" to "strongly disagree".

4.3.6.2.3 Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS; Stewart-Brown et al., 2009)

This shortened version of the original 14-item scale (WEMWBS; Tennant et al., 2007), consists of seven positively worded statements, scored according to a five point Likert scale from "none of the time" to "all of the time". The responses are summed to provide an overall score (between 7-35) reflecting the individual's state of mental well-being over the previous two weeks.

4.3.6.2.4 Godin Leisure-Time Exercise Questionnaire (LTEQ; Godin & Shepherd, 1997)

A brief 4-item self-report questionnaire to measure individuals' physical activity habits during a typical seven-day period. The first three items relate to exercise *intensity* (strenuous, moderate, mild) and use a formula to provide an overall score of "total weekly leisure activity". The fourth item (question two) relates to *frequency* of weekly activities which are "long enough to work up a sweat", measured by a three point Likert scale (often, sometimes, never).

4.3.7 Study Timeline

The intervention was delivered over a 12-week period between July and September 2019. Recruitment, screening, and informed consent was conducted in the four-weeks preceding

this date, with baseline outcome measures obtained up to one week before the first session. Post-intervention measured were completed up to one week after the final intervention session, along with qualitative data collection occurring within the same period.

4.3.8 Sample Size

As the primary study objectives were implementation rather than outcome-focussed, it was deemed appropriate to recruit a modest sample of up to twenty young people from the target population. Analysing the feasibility of recruitment, attrition rates, and follow-up rates of participants in this study was used inform sample size required to adequately power a definitive main study focussed on effectiveness (Eldridge et al., 2016).

4.3.9 Recruitment Strategy

The researcher collaborated with Llamau's support staff and managers to provide written information about each intervention component, and explained overall aims and objectives of the study. Staff subsequently approached young people they support to disseminate this information, and invite them to participate in the study. Willing individuals were met face-to-face, and provided with participant information sheets by the researcher; this time was also an opportunity to explain the procedures in further detail and answer any other questions. Eligibility screening and obtaining informed consent was conducted on site thereafter. All participants enrolled in the study were provided with a starter pack, containing practical items to facilitate participation (toiletries, water bottle, wristwatch pedometer), and £35 voucher to purchase appropriate footwear.

4.3.10 Data Analysis

Raw data from the paper-based surveys was inputted into SPSS to generate descriptive statistics including: details of sample characteristics; pre-post differences in psychometric outcomes; and any changes in participants' PA levels. Missing or incomplete data was

analysed during this process, thereby informing the feasibility of this study's data collection methods.

Attendance data for both groups was inputted into SPSS, to track retention and attrition throughout the intervention, and analyse whether attendance to the PA sessions was related to engagement in the DBT skills group. The overall feasibility of implementation was measured by the proportion of participants who meet the adherence criteria, i.e.: attending 8/12 (67%) PA sessions, and 6/8 (75%) DBT-ST sessions. Where possible, outcome data was collected from withdrawals, dropouts, and participants who deviated from the adherence protocol. Qualitative data was obtained from participants, intervention facilitators, and support staff from the organisation, to identify multiple implementation-related barriers and facilitators in relation to the primary objectives and outcomes. Focus groups and interviews were transcribed verbatim and analysed using a thematic approach (Braun & Clarke, 2006).

4.4 Ethical Considerations

Ethical approval granted by the University's School of Health Sciences Ethics Committee (Ref: PGR-1198). Individuals were advised and reminded that participation was voluntary, and they were free to withdraw from the study at any point. Participants were required to sign an informed consent form, and a consent letter was obtained from the organisation's Deputy Chief Executive Officer (SA). During the qualitative phase participants were reminded that information provided was confidential, and they could redact any written or verbal statements within four weeks of participation.

4.5 Results

Twelve young people either self-selected or were referred to participate in the programme, constituting an overall recruitment rate of 60%. Individual preferences prevented allocation of participants to a DBT-only group, therefore all were enrolled to receive the intended

PA+DBT intervention. Demographic information and baseline clinical measures are presented in Table 4.3.

Table 4.3
Demographic Characteristics and Mean Baseline Measures

	Mean (SD) / *N* (%)
Age	
16-18	3 (25%)
19-21	3 (25%)
22-24	6 (50%)
Gender	
Male	6 (50%)
Female	5 (41.7%)
Other	1 (8.3%)
Psychological Distress (CORE-OM)	73.11 (21.91)
Self-Esteem (Rosenberg SES)	10.89 (4.14)
Well-being (SWEMWBS)	18.11 (4.01)
Weekly PA (LTEQ)	27.33 (31.90)

Notes: CORE-OM = Core Outcome Measure; SES = Self-Esteem Status; SWEMWBS = Short Warwick-Edinburgh Mental Well-being Scale; LTEQ = Leisure Time Exercise Questionnaire

Five participants contributed to the post-intervention focus group which lasted a duration of 51 minutes. In-depth interviews were also conducted with the intervention facilitators, and one key staff member enlisted to represent views and feedback from the organisation.

To comprehensively address the primary objectives, qualitative and quantitative data was converged to evaluate feasibility, appropriateness, and acceptability of the intervention (Creswell & Plano Clarke, 2011). Non-participant observational reports, and facilitator summaries of each session were also utilised (where relevant) to explain how and why any adaptations were made, and what effect this had on implementation (O'Cathian et al., 2015). Secondary objectives were evaluated through further quantitative analysis of overall recruitment and attrition rates, pre-post psychometric outcomes, and participant attendance records to both PA and DBT-ST sessions.

4.5.1 Primary Outcomes

4.5.1.1 Feasibility

4.5.1.1.2 Attendance and Attrition

A total of 71 attendances to the PA sessions, and 30 attendances to the DBT-ST group constituted an engagement rate of 50% and 31%, respectively. Two participants met the adherence criteria for PA attendance (> 8 sessions), and two for DBT-ST attendance (> 6 sessions), however it should be noted that two participants moved on from the service mid-way through implementation, and a further three were one attendance away from reaching the feasibility threshold. Engagement levels of those who attended DBT-ST *relative* to PA averaged 68% overall, with attendance levels for both groups peaking in week 6 of the programme (see Figure 4.1).

Non-participant observation reports and feedback obtained in the qualitative phase confirmed that predominant reasons for non-attendance included lack of transport and pre-booked holidays, while poor mental health and peer-influence accounted withdrawals or dropouts from the study (i.e. failing to engage beyond week 6; $N = 3$). Further scrutiny of the relatively poor attendance rates in weeks 3 and 10 of the programme indicated that annual events arranged by the organisation accounted for these figures, mainly due to their precedence over the intervention which was regarded as, "something else on top" to manage (SH: 81).

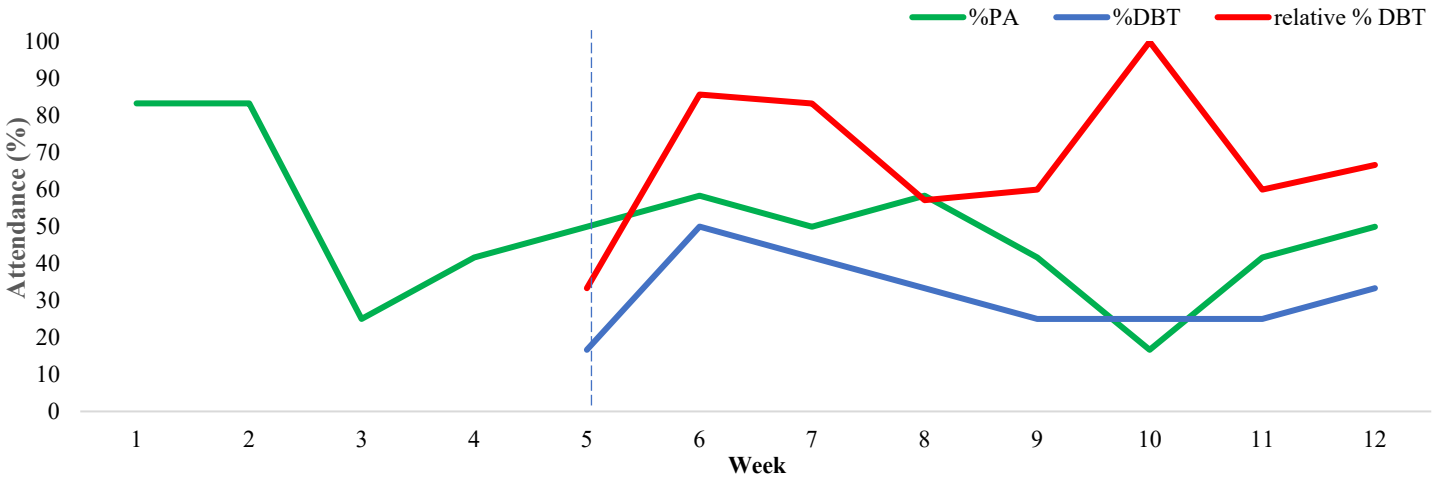

Figure 4.1. *Actual and relative attendance levels to physical activity and DBT sessions*

4.5.1.1.3 Recruitment Processes

It must be acknowledged that views expressed by focus group participants may not have been representative of the overall group, however all who contributed expressed their initial lack of understanding as to the aims, procedures and components of the study: "I didn't know it was actually doing exercise" (LS: 131); "I don't even know what DBT is" (JM: 233). This was corroborated by organisation staff (despite effort to ensure clarity and provide information), when recalling how some staff "felt like it wasn't explained, and their role in it wasn't explained in the best way that it could have been" (SH: 34). It is possible that this may have hindered recruitment rates and overall reach, given that these were determined by staff disseminating information to potential participants, and created an element of 'selection bias', through staff reverting to referring "those that they knew would engage anyway" (SH: 72).

The contentious issue of incentive use, particularly with this population (see Edidin et al., 2012), warranted further investigation in the context of the current study to ensure the sports vouchers offered during the recruitment process were regarded as a practical means to encourage participation, rather than considered coercive in any way. Participants expressed they "still would have done it anyway" (RB: 177) if the vouchers had not been offered, and

expressed their main motivations for enrolling in the study were "something to do" (RB: 139) or to "get me out" (JB: 153; LS: 152). Feedback from the organisation's perspective confirmed the appropriateness of incentive use, suggesting a "structured incentive programme" could encourage ongoing engagement, "rather than having a big incentive up-front" (SH: 91;98).

As mentioned above, it was not possible to allocate participants to groups as per protocol, as all expressed a strong preference to engage in the PA sessions from the outset of the study. While this may have compromised analyses of between-group intervention effects, it demonstrated 'proof-of-concept' that the young people were motivated initially to engage in PA, rather than DBT-ST. Further qualitative exploration highlighted participants' perceptions of group allocation, including that "people would stop attending" (RB: 284) or feel "left out" (LS: 291), or that the concept was "Pathetic; you might as well do it all at once and get it out the way" (JM: 282).

4.5.1.1.4 Data Collection Methods

Collaborative planning with the organisation indicated that paper-based surveys would be more appropriate for this population, and generate a higher response rate than those distributed via online software. The overall compliance for survey data collection was 75% pre-intervention, and 66% post-intervention. The predominant reasons provided for non-returned surveys included participants moving on from service, staff shortages, refusal by the participant, and in one case staff misplacing a completed survey. Informal feedback from support staff suggested that the overall surveys were too long, which was verified by the FG participants' perception as having to "do all these questionnaires and keep answering all these questions all the time" (JM: 720). The requirement for staff to assist participants when completing the surveys (due to low-literacy levels, and the emotionally sensitive nature of questions) may have presented a further barrier, due to low staffing levels and support

workers feeling they were having to "chase people down to get them to these things" (SH: 135). Despite efforts to adhere to the protocol timeline, some post-intervention surveys were returned up to three weeks after the final session, raising the possibility that immediate intervention effects may have attenuated during this time.

4.5.1.2 Appropriateness

4.5.1.2.1 Intervention Design

When discussion the intervention structure, participants and staff alike expressed strong beliefs that the DBT-ST group should have preceded the PA sessions. For participants, this opinion was based on the contrasting feelings which the respective sessions appeared to induce:

> *Cos the DBT is depressing, and we were going from the sports thing, like being all hyperactive and happy, to going to that and like straight away we was all like depressed. You could feel the tension in the room… (RB: 496-8)*

While this was somewhat reiterated by support staff, their main concern in regards to the structure related to safety and risk of adverse events:

> *Yeah, to end it on a high, rather than feeling like you just got into all these deep thoughts and feelings and bringing up previous experiences, so…I think some of them went home and didn't feel so great when they got home. (SH: 127-8).*

In addition to the structure of the intervention, the duration of the programme was questioned by the organisation staff; "I think with our young people that twelve weeks might be a bit too long. Possibly like eight to ten weeks may have been better." (SH: 153). While this corresponds with recorded attendance levels, which peaked in weeks 6-8, the views expressed by participants in the FG indicated their desire for an ongoing programme; "Really though they should like run, like all different kinds of sessions all the time, so you're doing something all the time" (LB: 1203), and highlights the importance of sustainability when designing and implementing 'real-world' interventions (Deenik et al., 2019).

4.5.1.2.2 Intervention Delivery

Weekly session plans and reports submitted by the coaches indicated that the 'dose' of PA delivered to participants had adhered to the predetermined framework, in terms of session structure, theoretical principles and intended delivery approach. From week one it was evident that activities in pairs (i.e. boxing) or as a group (team challenges) appealed to most participants, however an initial challenge from the coach's perspective was not knowing "what their fitness levels are, and what their engagement levels are gonna be" (KB: 49). This appeared to be rapidly overcome by the coaches through providing "variations in every exercise" to ensure "there was an easier and a harder option" (KB: 137-8), while levels of motivation were maintained through not allowing participants to "hang around too much, to keep a team morale going." (KB: 121). In accordance with recommendations published elsewhere (O'Cathian et al., 2015), this highlights the importance of allowing some flexibility for adaptations which will facilitate implementation in a given context.

Feedback from participant's corroborated coaches' observations, in that boxing and teambuilding were repeatedly expressed as favoured activities within the PA sessions. Participants provided varied reasons for these preferences, including (for boxing): "it was fun" (RB: 632); "relieves your tension" (JB: 634); and "safer to punch boxing gloves than walls" (JM: 637). While this reinforces the difficulty in identifying activities which will appeal to a group with diverse needs and motives, KB exemplified how it was possible to adopt a flexible approach- yet maintain fidelity to the intervention's underlying theoretical principles (in this example, autonomy):

> *I noticed the one week, they were like, "Oh we're not doing any boxing, this is rubbish". So I said, "Oh do you wanna do some boxing yeah?". And then three of four of them were like, "We're doing boxing today". And they were really fired up and ready to go for it. (KB: 156-58).*

Although fewer participants attended the DBT-ST group in comparison to PA sessions, feedback from the organisation's staff suggested that effort and engagement within the sessions reflected the facilitator's delivery style: "I thought [EM] was very good at getting them involved and to tell their stories, or the ways that they've handled different situations." (SH: 200). While the effectiveness of DBT is often attributed to the skills of the lead facilitator (see Toms et al., 2019), subsequent comments indicated how this may have been detrimental to the group and impacted on delivery of the intended content: "Sometimes people have got a longer story to tell, or sometimes the young people can go off on a tangent, or be disruptive" (SH: 360-1). Participants also described how others' willingness to contribute to the group deterred their own efforts to engage: "people was talking all over people" (LB: 807); "I ended up putting my head on the desk, or just like distracting myself with something else." (RB: 816). In this respect, it cannot be assumed that participants' attendance to the DBT sessions constituted receipt of the intended 'dose', which was further evidenced through non-adherence to the manualised practice and homework exercises: "I think the most like, that I done in those books was draw on them" (RB: 864).

In line with the 'core' DBT skills (Linehan, 2015), mindfulness-based exercises were included at the beginning of each group session. Although the selected activities were designed to promote understanding and engagement from participants, feedback suggested that some found this aspect of DBT particularly challenging: "It was more hard than I expected" (JB: 872), and resultantly mindfulness was omitted from the sessions midway through the DBT skills programme (week five). While tailoring the current intervention has been acknowledged as a facilitator to implementation (see PA example above), it is plausible that—for the DBT-ST component—this adaptation may have presented a threat to the overall treatment integrity (see McCay et al., 2016).

4.5.1.2.3 Equipment and Materials

When discussing motivation to engage in PA, "lots of different equipment" (KB: 122) was cited by the coach as an important factor to participants' interest levels, through allowing variation in activities provided and a setting that looked "more appealing" (KB: 123). Feedback from participants generally favoured the appropriateness of equipment used, however several commented that despite enjoying the boxing activities, the gloves were described as "rank" (LB: 1128), "bleurgh" (JM: 1138) and "minging" (RB: 1137). While this may outwardly appear relatively trivial in the context of PA in general, it is important to note that for this population, "Smells are a weird thing, you know, they can trigger people" (SH: 168). This is also valid in relation to the DBT-ST group, in which recognising and tolerating distressing stimuli, such as smells, was taught to overcome associated distressing emotions.

Participants' reluctance to utilise the DBT-ST workbooks and complete their weekly practice exercises and tasks (see above), may have reflected the varied cognitive abilities of the group (see Fry et al., 2017), as described by the organisation's staff: "The materials were good, but then again not always appropriate for some because of their literacy skills" (SH: 201). As described by one participant, this may have impeded their engagement in the sessions, despite their relatively high attendance (88%): "They was totally different to someone who can't read and write, so it was kind of like, "yeah alright" [gestures throwing away]" (LB: 849). Further discussions indicated that participants may have benefitted from more structured DBT-ST sessions which balanced talking with writing, in addition to one-to-one assistance with completing the tasks:

> *Say like, the first half an hour, they do, talk to us, and then like the other half an hour, they help us write what's in the books, so then we can answer that in our own writings and we can actually look at what we, we've written. (LS: 858-60)*

As described elsewhere, the design of the DBT-ST materials was based on core principles and theory, previous research, and contextual relevance for this population (see protocol). Nonetheless, staff described that some participants had commented, "well sometimes that's not realistic to do that in real life" (SH: 195), suggesting that some the skills taught may not be fully compatible with these young people's 'real-world' situations.

4.5.1.3 Acceptability

4.5.1.3.1 Relative Advantage of Physical Activity and DBT-Skills Training

At various points during the focus group, every participant used the word "fun" to describe their experience of the PA sessions. When probed further about motivations to attend, one participants described how on occasions they "didn't wanna come, but made myself go" (JB: 998), because afterwards they "felt a lot better" (JB: 1007). While others suggested the sessions had made them feel "more healthy" (LS: 419), fitness in general was not related to participants' initial or ongoing engagement, whereas aspects such as: having "a laugh" (RB: 423; LB: 1009) were depicted as the perceived benefits attained through attending the PA sessions. For another participant, this association seemed to become apparent only *during* the FG discussions: "It takes a lot for me to wanna go and do something, and so for me to *want* to go to these sessions meant that I must have really enjoyed it" (JM: 565-7).

From the coach's perspective, the transition from 'fitness to fun' was also attributed to social factors, which consequently impacted on their delivery approach and may have contributed to participants' engagement:

> *I think I went in a little bit, maybe a little bit harsh at first. Um, more of a fitness instructor, and then as the second, third weeks progressed, when those relationships started blossoming you tend to have a bit more fun element. (KB: 145-7)*

Positive attitudes towards the PA sessions somewhat contrasted with participants' experiences in regards to the DBT skills group training. It was evident that most had learned to avoid

situations which may evoke difficult emotions, and therefore lacked the confidence to contribute to such discussions: "That's one thing I'm not good at is talking about my damn feelings" (JB: 891). Staff who accompanied participants also described this challenging environment may have generated an even greater contrast, in terms of relative perceptions of the DBT and PA sessions: "I think they all found the DBT quite hard…but I think overall they all enjoyed the physical side of the programme, definitely" (SH: 269-70). Somewhat ironically, one participant recalled how poor mental health could be a barrier to attending the DBT-ST group, while physical restrictions were solely attributed to the single PA session missed: "I was in pain and then couldn't anyway so then I just sat at the side and then I ended up going home…It was only that one day, it was mostly the DBT that I didn't feel up to" (RB: 992-4). The inclination for participants to associate PA, rather than DBT, with improved psychological symptoms was repeatedly discussed during the FG, with one recommending that future DBT-ST programmes should always "have the sports…because you're feeling down, and with sports it brings you up" (LB: 199-201). While this initially suggests that PA is necessary to 'counteract' the "mood drop" (RB: 506) associated with DBT, when asked whether they would attend "exactly the same" (R: 1191) programme again (i.e. with DBT-ST), the overwhelming response was positive, for example: "100% yes!" (JB: 1196). While participants had expressed ambivalence towards the DBT-ST component of the intervention, this suggests that some benefits had been experienced, and may have attributed to longer-term impact of the overall programme: "Just to start going to like, my appointments… Counselling, so I'm sorting that out" (LB: 1045-8); "It's basically boosted my confidence in talking to other people" (LS: 1022); "It's kind of helped me to be myself, you know being around other people" (RB: 1059).

4.5.1.3.2 Engagement and Participation

When describing first impressions of the group setting, participants recalled how they found it "scary" (LS: 380); felt "anxious" (RB: 396); and expected to be "judged" (JM: 373), which

provoked some to questions their initial involvement in the programme: "I thought, what the hell have you signed me up for?" (JB: 404). Despite these initial reservations, social aspects were subsequently ascribed to sustained participation and engagement, with the group format facilitating positive experiences such as: "teambuilding" (LB: 664), "seeing friends" (LS: 935), "interacting with each other" (JM: 555) and "socialising" (JB: 936). From the coach's perspective, implementing team games was also related to participants' engagement, possibly through reducing their initial fears and anxieties (as described above):

> *The team effort, we tried to keep them in teams. 'Cos I noticed that when we did it singularly, the girls especially 'flaked off', and didn't want to do it anymore 'cos "people are watching me"... they were quite self-conscious. (KB: 165-7)*

Observational field notes, session reports, and qualitatively feedback cited "competition" in particular, as important to participants' continued social engagement. When recalling their experiences, it was clear that introducing competitive challenges to the sessions had contributed to 'camaraderie' between participants, which may have promoted sustained motivation through increased sense of enjoyment and fun: "There's people like [JB] like sprinting across the thing, and then there's me with my little legs [gestures] trying to catch up (laughs)… I had no chance! (group laughter)" (RB: 703; 711). It should be noted that this slight adaptation to the intended delivery approach was implemented in week four of the programme, once the coach had ascertained that—in this context—"healthy competition" (KB: 94) would benefit, rather than harm members of the group: "I learned over the 12-weeks that they actually didn't mind that competitive edge. They engaged a lot better with that competitive edge" (KB: 87-8). As described above, an important distinction in coaches' delivery approach was to praise *effort,* rather than focussing on the teams' win / loss outcomes, thereby ensuring adherence to the theoretical framework, rather than undermining participants' sense of competence.

Music appeared to facilitate motivation in both the PA and DBT-ST group settings. As with competition, this was perceived by facilitators to increase participants' effort and engagement: "Excellent participation, music worked really well – continue with this!" (week 3 PA session report); while for participants, music had fostered enjoyment, fun, and a greater sense of social connectedness: "I connect better through music… I'm more relaxed…it's easier 'cos you've got something in common" (JM: 579); "It was quite fun as well cos we was all dancing!" (LB: 593). As previously discussed, mindfulness was discontinued mid-way through the DBT-ST programme. Nonetheless, participants acknowledged the positive effects experienced during one exercise involving 'mindful listening' to a song: "Music calms my feelings" (JB: 876); It takes your mind off things" (LS: 587); "It's therapeutic" (JM: 882), indicating that this approach may be a more acceptable means of incorporating mindfulness skills into future DBT skills programmes.

Relationships and trust between participants staff may have posed a benefit *and* barrier to motivation and engagement across both the PA and DBT-ST intervention components. As with initially negative expectations towards the unfamiliar group-based setting (see above), participants explained how meeting facilitators prior to the intervention may have alleviated these reservations as they could, "see how we feel with them" (LS: 359), and equally, "see what they feel like with us" (LS: 357). This seemed more important in relation to the DBT-ST sessions, with one participant suggesting that the lead facilitator should have "come to the sports as well" (LB: 1155), while another elaborated how this may have improved participation in DBT-ST from the outset:

> *It would have been nice if we'd met her before we started the DBT, 'cos I remember walking in the first DBT session…and I was like (frowns). Like I just felt myself freeze up sort of thing, cos I didn't know her. (RB: 1168-70)*

Facilitators mirrored these recommendations when describing the main challenge they had experienced: "I think in the early days it was initially building that relationship with the

young people" (KB: 101), however subsequently described how "as the weeks went on you could see the relationships building, and the engagement got a lot better" (KB: 107). It was apparent that from the coach's perspective, "success" was clearly associated with getting to know the young people on "a personal basis, and not just as a participant" (KB: 284), which resulted in participants "opening up" (KB: 222) and disclosing personal information during the PA sessions. Through creating a safe and trusting environment, it is evident that participants experienced *unintended* psychosocial effects as a consequence of attending the PA sessions; which warrants consideration in the planning of future programmes, to minimise the risk of potential harms (O'Cathian et al., 2015):

> *People would naturally come up and tell us things, and from my background I knew to pass it on. But I think it's important for maybe, in the future, if the fitness people haven't had the background that I have, or work in the area that I do, they would need to know when to report things. (KB: 219-22)*

Similar concerns were expressed several times during the interview with the organisation's staff, who emphasised the importance of understanding participants' "risks and needs" SH: 37; 203; 210; 376) in relation to safety, appropriateness, and overall engagement of individuals throughout the intervention: "One of the things we noticed in the sessions is that people got triggered and then had to leave the session for whatever reason. And I think those things could have been addressed beforehand if there had been more involvement" (SH: 40-2). While staff involvement from the staff perspective was associated with addressing safety aspects in the planning phase, participants' views indicated they would have liked greater staff involvement *during* the sessions; "There was no other support workers doing it. There was at least three or four support workers there, and they just, were either siting talking or not joining in with the activity" (LS: 206-7). Correspondingly, staff did acknowledge how "the young people seeing *us* be active" (SH: 331) could positively impact a participant's

experience through increased "fun" (SH: 334) and "bonding" (SH: 336) in the sessions, and thereby contribute to overall levels of attendance and engagement.

4.5.1.3.3 Implementation Barriers and Facilitators

When considering factors relating to participants' attendance, attrition and engagement to the intervention, it is important to consider how wider influences on implementation may have had beneficial or detrimental effects (Peters et al., 2013). Multi-level barriers and facilitators to implementing the intervention **as intended**, were identified through pooling data obtained during the delivery and evaluation phases (see Table 4.4). The resultant adaptations to the programme, effects on what was delivered and received, and implications for future designs will be discussed hereafter, on the basis of these converged findings.

Table 4.4
Multi-level barriers and facilitators to intervention implementation

System Level	Barriers	Facilitators
Individual (Participant)	- Unfamiliar setting and group - Lack of relationship with coach and clinician - Lack of understanding of study aims - Negative perceptions of DBT - Competing interests / holidays - Lack of transportation	- Familiarity and trust with coach and clinician - Healthy competition - Group interaction and camaraderie - Applicability of skills to real life - Local and accessible venue
Implementer (Coach/Clinician)	- No relationship with participants - Limited information about risks and needs - Unpredictable group numbers - Distractions can impede time management	- Fun and personal approach - Training and understanding of study aims - Autonomy to tailor content when required - 2 x coach's / DBT clinicians
Organisational (Staff)	- Limited understanding of study aims - Staff shortages / holidays / attrition - Competing interests and priorities - Restricted time to integrate into service - Poor 'buy-in' as to relative advantage	- Active involvement in planning phase - Allocated resources / time from management level - 'Champion' from within organisation - Participating in PA *and* DBT sessions - Positive impact / benefit to participants

Notes: DBT = Dialectical Behavioural Therapy; PA = Physical Activity

4.5.2 Secondary Outcomes

Of the twelve participants enrolled in the study, seven complete datasets (i.e. both pre and post intervention measures) were included in the paired samples *t*-test analyses.

4.5.2.1 Pre-post Intervention Effects

Figure 4.2 represents the mean pre-post scores reported by participants for the main variables of interest. Positive intervention effects were observed across all four outcome measures, with moderate and large effect sizes calculated for psychological distress and well-being, respectively: Psychological distress (CORE-OM), (MD = -13.43, SD = 15.61), $t(6) = -2.28$, $p = .06$, $d = .66$; Self-esteem (SES), (MD = .86, SD = 4.49), $t(6) = .51$, $p = .63$, $d = .17$; Well-being (SWEMWBS), (MD = 4.14, SD = 3.93), $t(6) = 2.79$, $p < .05$, $d = 1.00$; Weekly PA (LTEQ), (MD = 3.29, SD = 27.75), $t(6) = .31$, $p = .77$, $d = .15$.

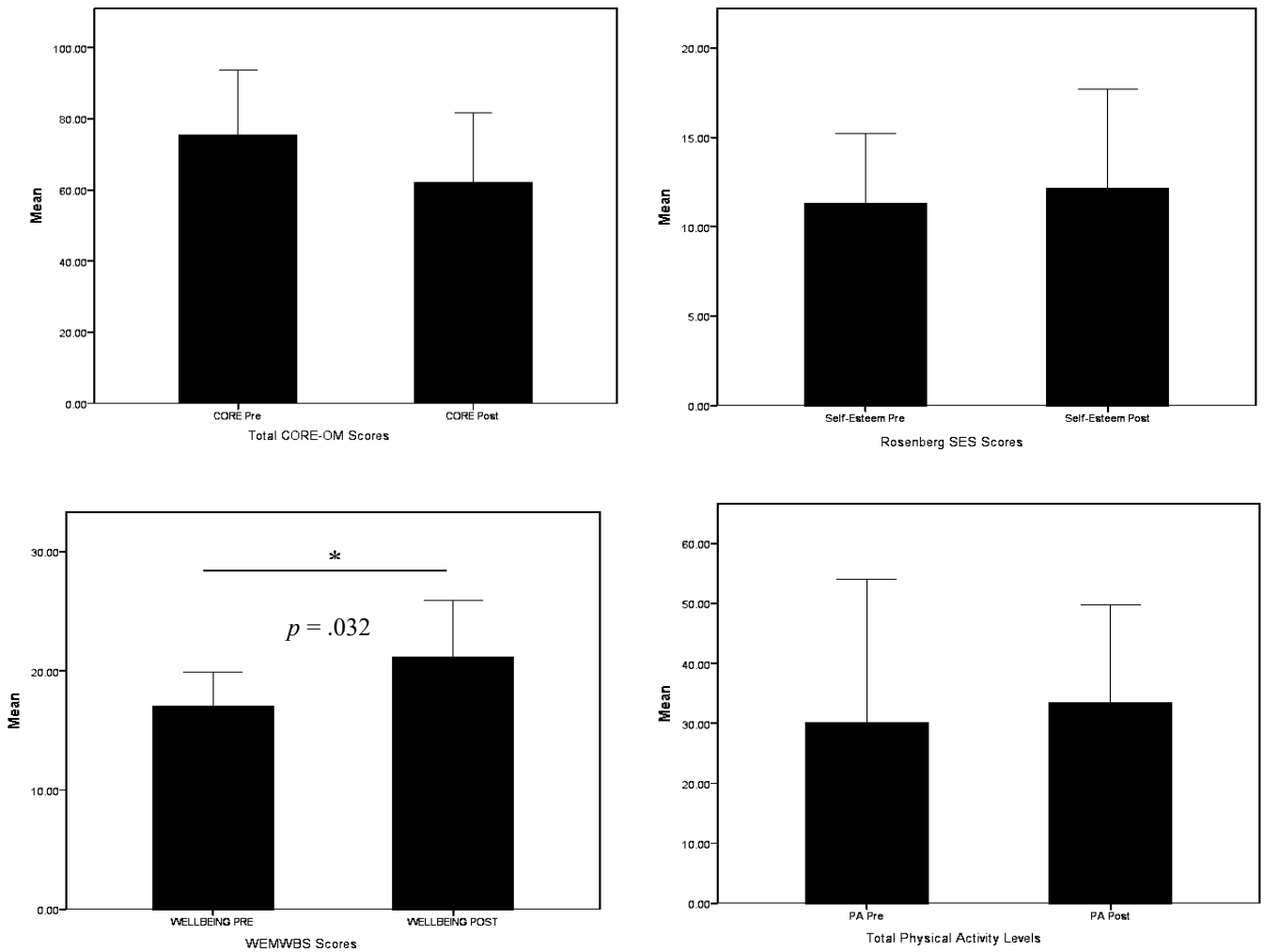

***Figure 4.2**. Pre-post mean scores for quantitative outcome measures of interest*

Using data derived from population norms, clinical / non-clinical averages, and recommended activity levels, Table 4.5 demonstrates the number of participants reporting *clinically relevant* changes in the pre-post intervention measures.

Table 4.5
Proportion of participants reporting clinically meaningful pre-post intervention change

	Pre (*N* = 9)	**Post (*N* = 8)**	**Change**
Psychological Distress (CORE-OM)[1]	78%	37%	**+ 41%**
> Clinical population norm	22%	63%	
< Clinical population norm			
Self-Esteem (SES)[2]	89%	63%	**+ 26%**
Low	11%	37%	
Normal			
Well-being (SWEMWBS)[3]	89%	50%	**+ 39%**
< Population norm	11%	50%	
> Population norm			
PA levels (LTEQ)[4]	22%	12.5%	**+ 19%**
Inactive	22%	12.5%	
Moderate	56%	75%	
Active			

Notes: [1]Clinical population normative score = 63.24 (Core Systems Group, 1998); [2] < 15 = Low, 15-25 = Normal, > 25 = High (Rosenberg, 1965); [3]Population normative score = 23.6 (Health Survey for England, 2011); [4] < 14 = Inactive, 14-23 = Moderately Active, > 24 = Active (Godin & Shephard, 1997).

4.5.2.2 Relationship between Physical Activity and DBT Skills Training Engagement

Pearson's correlation analysis confirmed there was a moderate positive correlation between PA and DBT-ST attendance levels ($r = .60$, $N = 12$, $p < .05$, two-tailed). As presented in Figure 4.3, there is reasonable distribution of data points along the regression line, which demonstrates that 36.4% of variance in DBT-ST attendance can be attributed to attendance of the PA sessions.

4.5.2.3 Sample Size and Power Calculations

Based on data from this study, a priori power analysis was conducted to determine the sample size required to detect significant pre-post intervention differences in a full-scale trial.

Adopting a conservative effect size of 0.5 (Cohen, 1988), alpha level of 0.05, and with power = 0.80, projected sample size (estimated using G*Power 3.1.9.4 analysis software) is estimated at approximately $N = 27$. Considering the rates of attrition and missing data recorded in this feasibility study, a sample of > 50 participants would be required to adequately power an effectiveness trial.

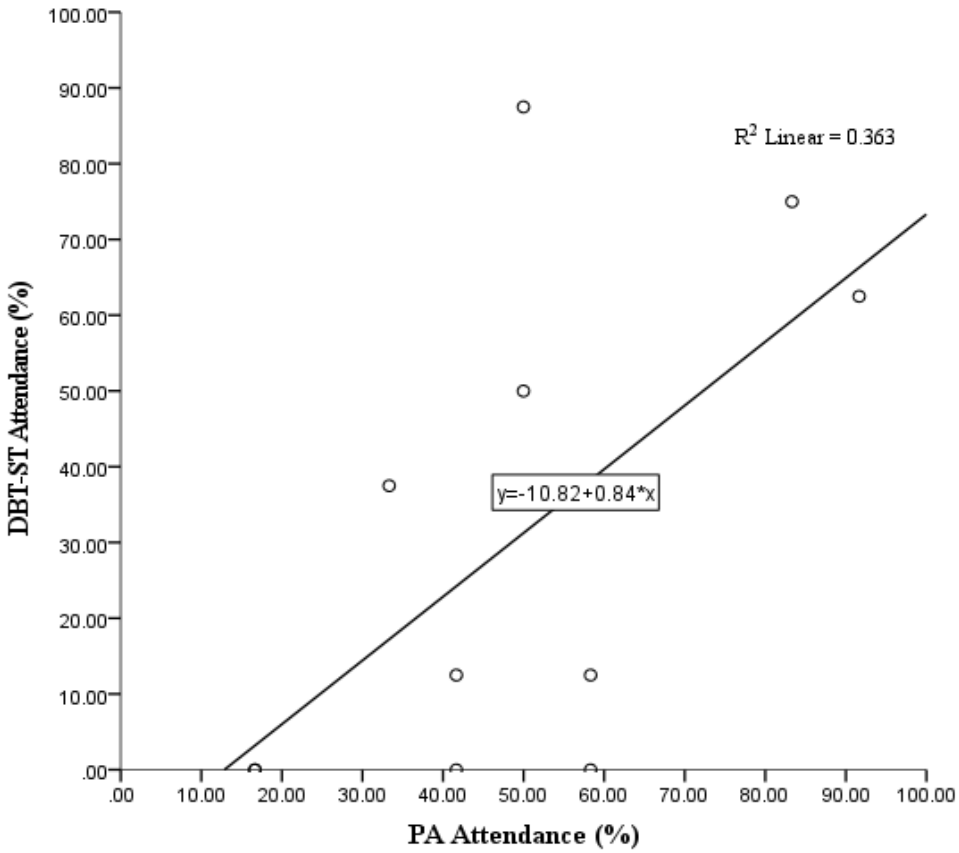

Figure 4.3. *Correlation between PA and DBT-ST attendance levels*

4.6 Discussion

The overall aim of this pilot study was to demonstrate proof of concept- that a group-based PA programme can be an effective means of encouraging young people experiencing homelessness to attend DBT skills group therapy sessions. Despite efforts to recruit a 'DBT-ST only' group as described in the study protocol (see Appendix 4), it was evident that the

participants' motivation for involvement in the study derived from the opportunity to engage in PA, with DBT-ST viewed as an optional adjunct. Notwithstanding this ambivalence towards the group therapy component, and relatively low attendance overall (31%), the moderate correlation observed between weekly participation in PA *and* DBT-ST sessions (0.6), reinforces the concept that PA is an effective vehicle to achieve broader outcomes which (arguably) may not otherwise be attained. The single occasion on which DBT skills group attendance occurred in *absence* of the preceding PA session (due to injury), highlights the motivational influence of a combined PA+DBT-ST intervention on DBT-ST attendance, and supports the notion that these young people would be unlikely to participate in DBT skills group therapy alone.

The pre-post intervention changes reported across psychological and behavioural outcome measures indicate a positive intervention effect, and—crucially—minimal risk or adverse effects as a consequence of participation. It is noteworthy to mention the lack of association between changes in self-reported PA and significant well-being improvement, with regard to establishing dose-response and mechanisms of action; findings from this study indicate the (re)design and scale-up of the intervention warrants greater focus on psychosocial factors, such as fostering social connectedness and promoting trust.

In planning for the intervention delivery, extensive theoretical and practical research enabled identification and consideration of multi-level factors with potential to influence implementation. Despite efforts to balance 'real-world' characteristics (i.e. study setting) with an intervention grounded in evidence and theory (see Deenik et al., 2017), numerous contextual barriers comprising feasibility, acceptability, and appropriateness of the overall study design, emerged throughout the intervention delivery phase. In this respect, the study addressed the primary objective (see section 4.2.1), from which further understanding and knowledge of necessary adaptations for scale-up the intervention was obtained.

4.6.1 Challenges to Scale-up

While the iterative nature of this pilot study allowed further exploration, and modification of some barriers and facilitators *during* the delivery phase (i.e. allowing music during PA sessions; discontinuation of mindfulness exercises during DBT skills sessions), how to adapt implementation outcome variables related to the study design, remains an area of challenge and uncertainty for the (re)design of an effective scaled-up study. Key findings—and corresponding challenges—identified through this pilot study include:-

1. Group-based PA is an effective means to encourage group-therapy (DBT-ST) attendance.

   Challenge: Attendance ≠ engagement, involvement, or participation- how to ascertain 'dose' received?

2. Lack of interest for participation in a 'DBT-ST alone' condition.

   Challenge: Require 'treatment as usual' baseline comparison- how to establish intervention effects; is 'wait-list control' group an ethical option?

3. No dose-response relationship between increased well-being and self-reported PA.

   Challenge: Evidencing mechanisms of action attributed to positive effects- how to identify 'active ingredients' of the intervention?

4. > 50 participants required to power scaled-up effectiveness study.

   Challenge: How to reduce attrition, missing data, and loss to follow-up?

5. Possible selection bias, i.e. most engaged / least isolated young people referred into study.

   Challenge: Increase reach and recruitment- how to engage the 'disengaged', or individuals most at-risk?

6. Understanding of study procedures and aims was relatively poor.

   Challenge: Ensuring information is disseminated at an optimal time (< 4 weeks prior to delivery)- how to balance with an adequate recruitment phase?

7. Lack of engagement, understanding, and positive perceptions of DBT overall.

Challenge: Redesign content and delivery with more practical / less manualised emphasis- how to maintain fidelity to DBT skills training model?

8. Sense of disappointment, loss, and boredom post-intervention.

Challenge: Create clear pathways and opportunities for continuation in PA and/or psychotherapy- how to ensure sustainability, and embed a long-term programme into the existing service?

4.7 Conclusions

This pilot study aimed to investigate the feasibility of implementing a combined PA + DBT-ST intervention under 'real world' conditions, with the population of interest (young people experiencing homelessness). This pragmatic design afforded identification of several unforeseen multi-level barriers- some of which were addressed during the delivery period in response to the new information, while others will require modifications to the study protocol for future scale-up. Another strength of this study was the mixed-methods approach, from which qualitative feedback provided further insight into key stakeholders' experiences of involvement in the study, and recommendations for improving acceptability and appropriateness at scale-up. The diversity of information obtained from multiple perspectives (participants, facilitators, staff) elucidated *how* to improve design and implementation on scale-up, and consolidated the decision to proceed- notwithstanding equivocal quantitative results (O'Cathian et al. 2015).

Although challenging at times, implementing this pilot feasibility study in a community-based setting, with the population of interest, and with limited resources or additional support, yielded knowledge and findings which will prove integral to the development of a refined intervention. It is hoped the research to practice 'gap'—often observed between feasibility and scale-up trials—may instead be replaced with an intervention which offers ecological validity, sustainability, and effectiveness under 'real world' conditions.

Chapter Five:
Impact of the COVID-19 Pandemic

5.1 Introduction

Exactly mid-way through the planned duration of this project, the global outbreak of COVID-19 and ensuing consequences of this pandemic threatened to severely compromise the undertaking of research which would enable fulfilment of overall 'aims and objectives' (see Chapter One). The unprecedented nature of this unforeseen event presented both a challenge—with respect to impeding any planning of interventions, or how restrictions may affect the implementation—and also a unique *opportunity* to explore how the interplay between PA and well-being influences the impact of adversity on this study's population.

Following the outcomes, evaluation, and conclusions explicated through the Pilot Feasibility Study (Chapter Four), it was intended that data would be collected from a group of young people receiving 'treatment as usual' over an eight-week period (pre-post); thereby providing a baseline comparison (or control condition) to establish intervention effects. While the data collection at time one (February 2020) was relatively successful in terms of recruitment and completion rates (n = 65), exactly four weeks later the study period coincided with mandatory government restrictions and lockdown measures which were enforced in response to the pandemic. This precluded use of the data as originally intended- given the potentially deleterious social, physical, and psychological consequences of this extraordinary and unpredictable crisis. Restrictions on leaving home, meeting others, and travel presented additional challenges which, in addition to the utility of data collected during a period which was anything but 'usual', questioned whether this would even be *possible* under such adverse circumstances.

As YPEH are amongst the most difficult groups to reach and engage under *usual* circumstances, the comparatively large sample recruited at time one presented a unique opportunity to further understanding of the potential for PA as a protective factor against

adversity and risks associated with the ensuing environment (i.e. stress, anxiety, social isolation). While data collection at time two was particularly challenging, time-intensive, and arduous for the researcher, the novel insights afforded through persevering with the study provided a valuable contribution to the current project, and the wider evidence-base for this underrepresented population.

Given the unique findings and outcomes, this important study was disseminated by means of publication in a high-impact journal to inform future research and practice with this, and other at-risk groups[2]. Following the paper presented below, this Chapter will outline the implications of these findings on subsequent methodological decisions, and describe how the impact of the COVID-19 pandemic affected the trajectory of this research project.

[2] Thomas, J., Bowes, N., Meyers, R., & Thirlaway, K. (2021). Mental well-being and physical activity of young people experiencing homelessness before and during COVID-19 lockdown: A longitudinal study. *Mental Health and Physical Activity*, 100407.

5.2 Impact of COVID-19 Paper

Mental well-being and physical activity of young experiencing homelessness before and during COVID-19 lockdown: A longitudinal study

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Funders were not involved in study design; in the collection, analysis, and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication. The lead author (JT) had full access to all the data in the study, and final responsibility for the decision to submit for publication

Declaration of Interest
All authors declare no competing interests.

Contributors
JT conceived and designed the study under supervision of NB, RM, and KT. JT collected and analysed all data, and produced all figures. JT, NB, RM, and KT interpreted the data in the context of existing literature. JT composed the original manuscript, and all authors contributed to and approved the final version.

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Abstract

Background: While lockdown restrictions in response to COVID-19 indisputably mitigated virus transmission, the aim of this longitudinal study was to establish indirect effects on vulnerable young people's mental well-being and physical activity (PA) levels.

Methods: Surveys conducted at time 1 (February 2020), and time 2 (April 2020) comprised of the short Warwick Edinburgh Mental Well-Being Scale, the Rosenberg Self-Esteem Scale, and self-reported moderate and vigorous PA levels. Repeated measures analyses established changes pre-post lockdown restrictions, and differences between sub-groups. Associations between changes in well-being, self-esteem and PA over time were explored through further regression analyses.

Results: 65 respondents completed the survey at time 1, and 50 respondent at time 2. Wellbeing increased significantly over time, yet remained significantly lower than the population average. Self-esteem increased significantly post-lockdown, however remained significantly lower for females, compared with males. Overall, PA levels increased- whereby 'inactive' participants at time 1 reported significant increases in moderate and total activity levels at time 2. Increased PA levels significantly predicted increased well-being: $F(1, 48) = 4.15$, $p < .05$; while participants who had become *less* active accounted for 69.2% with low self-esteem at time 2.

Conclusions: Findings indicate that increased PA accounted for improved mental well-being, while decreased PA was associated with reduced levels of self-esteem. PA may represent a modifiable means of mitigating risk, and promoting resilience for vulnerable young people experiencing adverse conditions.

Keywords: Coronavirus; Youth Homeless; Self-esteem; Resilience; Sedentary behaviour.

Introduction

March 23rd 2020 signified the UK government's introduction and enforcement of strict measures and guidance in response to the prevailing COVID-19 pandemic. While the direct effectiveness of these measures on reducing COVID-19 transmission may be indisputable, the *indirect* impact of factors known to initiate or exacerbate poor mental health and well-being (i.e. isolation, sedentary behaviour)—particularly in the most vulnerable groups—remains largely unknown, and therefore constitutes an urgent research priority (Holmes et al., 2020).

Recent cross-sectional studies indicate that younger people (particularly females) of low socioeconomic status (SES), have reported significantly higher rates of poor mental health since the COVID-19 pandemic (Smith et al., 2020), with health-related behaviours (i.e. physical inactivity, poor sleep quality) significantly contributing to increases in psychological distress (Faulkner et al., 2021). Preliminary findings from longitudinal research conducted over 2 weeks of 'lockdown' specifically identified physical activity (PA) as a predictive factor of physical health, whereas increased sedentary behaviour (SB) was associated with poorer physical and mental health (Cheval et al., 2020). Interestingly, there is further evidence to suggests that positive effects associated with increased PA may be amplified in individuals who—prior to lockdown—were classified as 'inactive' (Lesser et al., 2020). Taken together, this evidence reinforces the notion that modifiable factors (such as PA), may promote resilience to sustain psychological well-being, despite stressful and adverse socio-ecological conditions (Ungar & Theron, 2020).

Young people (aged 16-24) frequently fail to meet current recommended levels of PA for their age (Department of Health and Social Care, 2019), with lowest levels often reported amongst the most disadvantaged groups (Bruce et al., 2019). For those experiencing

homelessness, the interplay between PA levels, physical health, and psychological well-being (see Kandola et al., 2019) may be exacerbated by a disproportionately high prevalence of mental illness compared with population 'norms' (Hodgson et al., 2014). Conversely, engagement in PA has been reported to extenuate the relationship between traumatic or adverse experiences in childhood, and subsequent onset of poor mental health (Hughes et al., 2018)- suggesting that PA could moderate the impact of COVID-19 restrictions on these individuals' mental health and well-being. Indeed, amid the pandemic 'social isolation' has been recently cited as the major concern for people with lived experience of mental illness, whereas 'connectedness' and 'outdoor PA' offered effective coping strategies to maintain mental health and well-being (Cowan, 2020).

While the present study was originally intended to determine changes in well-being and PA levels of young people experiencing homelessness (YPEH) over 8-weeks of 'usual care', its coincidence with the COVID-19 pandemic presented a unique opportunity to obtain data prior to, and during government-imposed restrictions. Unlike previous research designs outlined above, this longitudinal study aims to explore how social restrictions and isolation have impacted on the mental health and well-being of YPEH, analyse pre-post 'lockdown' changes in symptoms, and discuss findings within the context of identified risk (i.e. gender) and protective (i.e. physical activity) factors.

Methods

Design and participants

This longitudinal study was designed to assess changes in well-being, self-esteem and physical activity levels occurring over an 8-weeks period (4 weeks before, and 4 weeks after introduction of lockdown restrictions). Ethical approval was granted by Cardiff Metropolitan University School of Health Sciences Ethics Committee (Ref: PGR-2477).

Purposive sampling was used to recruit participants through the charity Llamau (www.llamau.org.uk), which provides supported accommodation and alternative education to YPEH. Eligibility criteria required participants to be aged between 16 – 24 years, with capacity to understand the study aims and procedures, and to provide written consent. Data collection of survey one was completed over one week, from 21st February 2020 (T1), and for survey two over one week, from Friday 17th April 2020 (T2).

Procedures

Participants were asked to complete paper-based surveys at T1, either under the supervision of the lead researcher (JT), organisation staff, or both. As lockdown measures were imposed mid-way through the data collection period (March 23rd 2020), follow-up surveys (T2) were all completed remotely, either via phone calls between the lead researcher and participant, or through posting and e-mailing via staff. Participants who completed surveys at both T1 and T2 were sent a £10 voucher for their time.

Outcome measures

Demographic data included age (16-18; 19-21; 22-24), gender (male; female; other; prefer not to say), level of education (primary; secondary; college / sixth form; university) and employment status (full-time employed; part-time employed; full-time education; part-time education; training / apprenticeship; none of the above).

Mental well-being was measured using the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS; Stewart-Brown et al., 2009), consisting of seven positively worded statements, which are summed to provide an overall score (between 7-35). Established national norms (23.6) provided a benchmark for comparison of sample scores with general population data (Fat et al., 2017).

Self-esteem was measured using the Rosenberg Self-Esteem Scale (SES; Rosenberg, 1965), comprising 10 positively or negatively framed items. Overall scores were used to indicate low (<15), medium (15-25), or high (>25) self-esteem.

Participants were asked to self-report the number of days, and minutes per day they had engaged in physical activity "over the past 7 days" for moderate, and vigorous types of activities. Composite levels of activity were calculated to ascertain whether recommended levels for age categories were met (16-18 = >60 minutes moderate-vigorous per day; 19-24 = >150 minutes moderate per week, or >75 minutes vigorous per week; Department of Health and Social Care, 2019).

Statistical analysis

Data was analysed using SPSS Version 24.0 (IBM Corp., 2016). Descriptive statistics included frequencies and percentages of categorical variables, while mean scores and standard deviations (SD) were generated for continuous data. Outcome variables were computed into sub-groups (low / medium / high self-esteem; above / below average well-being; meet / don't meet PA levels for age) to allow chi-squared analysis between demographic groups, and independent *t*-tests were conducted to establish group differences at both T1 and T2. Paired-samples *t*-tests (two-tailed) were used to determine any significant differences ($p < .05$) and effect sizes (Cohen's *d*) of outcome variables between T1 and T2, and mixed-factorial ANOVA's to compare pre-post lockdown differences on outcomes between various groups (i.e. gender, meet PA).

Linear and multiple linear regression tests were conducted to investigate associations between overall change in outcome variables over time, and whether adding categorical variables to the model (i.e. gender, meet PA) improved the overall fit. Pearson's correlation coefficient (*r*) was utilised to denote strength of associations, and adjusted R-squared

reported for the proportion variance in outcome variables attributable to the predictor variables.

Results

65 respondents completed the survey at T1, constituting a 70% participation rate. Lack of availability and unwillingness to complete the survey were cited as principal barriers to participation. T2 data was obtained from 50/65 participants (77%), with reasons for loss to follow-up including: moved on from service (n = 7) unable to contact (n = 4); refusal to complete survey 2 (n = 3); and incarceration (n = 1). Participants' demographic information at each timepoint is presented in Table 5.1.

Pre-lockdown baseline data (Time 1)

81.5% of participants reported below-average levels of mental well-being, compared with the general population mean (23.6), and this difference was statistically significant (t = -7.48, df = 64, $p < .001$, d = 0.93). Independent samples t-tests confirmed no further significant differences when comparing groups by gender or age.

35.4% of participants reported low self-esteem levels (< 15), with independent samples t-tests showing that females reported significantly lower scores compared to males (MD = 2.87, t = 2.19, df = 62, $p < .05$). An exact significance test for Pearson's chi-square found a relationship between low self-esteem and participants aged 16-18 years: $\chi^2(2) = 6.61$, exact p = .033).

70.8% of participants were 'inactive'; i.e. did not meet recommended levels for their age, while males represented 73.7% of all 'active' participants.

Table 5.1

Participant Characteristics at Time 1 and Time 2

	Time 1 (*N* = 65) *N* (%)	Time 2 (*N* = 50) *N* (%)
Gender		
Male	34 (52.3)	24 (48)
Female	30 (46.2)	25 (50)
Other	1 (1.5)	1 (2)
Age		
16 – 18	46 (70.8)	33 (66)
19 – 21	19 (29.2)	17 (34)
Education		
Primary School	10 (15.4)	9 (18)
Secondary School	37 (56.9)	27 (54)
College / Sixth Form	18 (27.7)	14 (28)
Employment		
Part-time Employed	1 (1.5)	1 (2)
Full-time Education	15 (23.1)	14 (28)
Part-time Education	3 (4.6)	3 (6)
Training / Apprenticeship	21 (32.3)	16 (32)
None	25 (38.5)	16 (32)

Post-lockdown follow-up data (Time 2)

Table 5.2 details well-being, self-esteem, and PA levels between T1 and T2.

Table 5.2

Well-being, Self-esteem, and Physical Activity Levels reported at Time 1 and Time 2

Variable	Time 1 (*N* = 65)	Time 2 (*N* = 50)	*MD*
Well-being			
Mean (SD)	**20.20 (3.66)**	**21.55 (4.19)**	**+1.35***
Below Average (%)	81.5%	72%	-9.5%
Above Average (%)	18.5%	28%	+9.5%
Self-Esteem			
Mean (SD)	**15.83 (5.37)**	**17.58 (5.49)**	**+1.75***
Low (%)	35.4%	26%	-9.4%
Medium (%)	61.5%	66%	+4.5%
High (%)	3.1%	8%	+4.9%
Meet PA Levels			
Yes (%)	29.2%	32%	+2.8%
No (%)	70.8%	68%	-2.8%

Note: $*p < .05$

Well-being levels significantly increased between T1 and T2 ($t = 2.26$, df = 49, $p < .05$, $d = 0.36$), however average scores remained significantly lower than the general population mean ($t = -3.46$, df = 49, $p = .001$). Positive effects were observed regardless of gender or age, and there were no further significant differences within or between these groups.

Self-esteem levels had improved since T1 (M = 17.58, SD = 5.49), with paired samples t-tests showing that this change was significant (t = 2.16, df = 49, $p < .05$, d = .28). There was no longer an association between younger participants and low self-esteem, with those aged 16-18 years reporting a significant increase since T1 (MD = 1.94, t = -2.09, df = 32 , $p < .05$), however levels remained significantly lower for females compared to males at T2 (MD = 3.33, t = 2.19, df = 47, $p < .05$).

Increases were observed across moderate (MD = 85.91 minutes), vigorous (MD = 10.24 minutes) and total (MD = 96.15 minutes) PA levels, with a slight increase (+2.8%) in the number of participants meeting guidelines for their age. There was less variation between genders than that observed at T1, with females representing 43.8% of this group.

Compared to T1, 'inactive' participants significantly increased levels of moderate PA (MD = 149.36, 95% CI [233.64, 65.07], $t(37)$ = 3.59, p = .001, d = 0.58), and total PA (MD = 172.72, 95% CI [272.30, 73.15], $t(37)$ = 3.56, p = .001, d = 0.57) , whereas the opposite was observed for initially 'active' participants who reported decreased levels in PA over time. The change in PA between initially 'active' and 'inactive' participants was significantly different for both moderate (MD = 264.36, 95% CI [470.46, 58.25], $t(48)$ = 2.58, p = .013, d = 0.73) and total (MD = 319.06, 95% CI [533.92, 104.19], $t(48)$ = 2.99, p = .004, d = 0.93) minutes per week, and increased PA over time was significantly greater in participants considered 'inactive' at T1, compared to the 'active' group: $F(1,37)$ = 12.35, p = .001, ηp^2 = 0.25 (Figure 5.1).

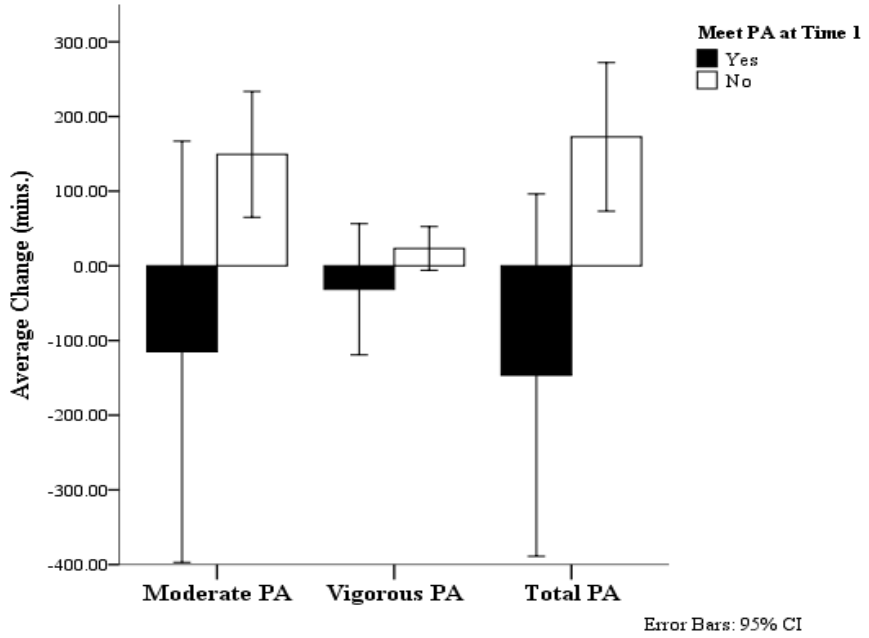

Figure 5.1. *Physical Activity change over time based on level of activity at time.*

Associations between Physical Activity and Well-being

Changes in well-being were positively associated with changes in moderate PA: r (48) = .24, $p < .05$, and total PA: r (48) = .28, $p < .05$ between T1 and T2. The association between well-being change and vigorous PA change was not statistically significant. Participants who had increased their PA levels since T1 accounted for 71.4% of those with above average well-being levels at T2.

Further analysis established that increased total PA levels over time significantly predicted increased well-being: $F(1, 48) = 4.15$, $p < .05$, accounting for 6% of the variance in well-being scores from T1 to T2 ($R^2 = 0.79$, adj. $R^2 = 0.60$) (Figure 5.2).

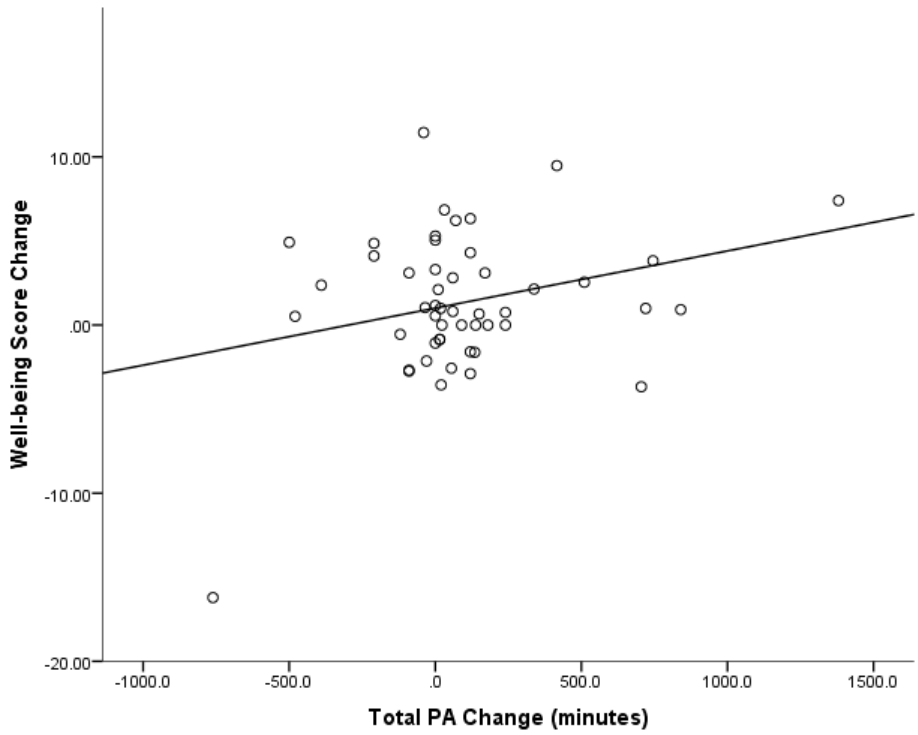

Figure 5.2. *Linear regression between change in physical activity levels and change in well-being scores.*

Associations between PA and Self-Esteem

There were no statistically significant associations between changes in overall PA levels and self-esteem scores: $F(1, 48) = .015$, $p = .90$, or changes in moderate and vigorous PA levels and self-esteem scores: $F(2,47) = .015$, $p = .99$, adj. $R^2 = -.042$.

Chi-square analyses showed a significant association between self-esteem levels at T2 and change in PA levels over time $\chi^2(2) = 8.28$, exact $p = .012$, with participants who had become less active accounting for 69.2% of those with low self-esteem.

Discussion

This longitudinal study provided an insight into how the COVID-19 pandemic has affected YPEH from pre-post enforced lockdown restrictions. Findings presented are somewhat unique, compared with studies which have relied on retrospective recall, cross-sectional associations, or longitudinal analysis *after* lockdown (i.e. no 'usual' baseline comparison).

Contrary to expected findings, participants in the current study reported *improvements* across all outcome measures, 4-week after the introduction of lockdown restrictions in response to COVID-19. Despite multiple aspects contributing to the potential vulnerability of this group (i.e. young people, existing mental health issues, socially excluded, low SES; see Holmes et al., 2020), these findings indicate a presence of resilience factors as moderators of positive outcomes, despite the potential challenges and risk. As a frequently marginalised and excluded group, it is plausible that the enforcement of restrictions across *all* populations may have promoted a sense of connectedness and belonging, thus mitigating the impact of social isolation (Loades et al., 2020). As an outcome related to resilience, this may also explain the significant improvement in self-esteem levels amongst younger participants (Ungar, 2019); for whom reduced social contact may present the greatest threat to mental well-being under lockdown conditions (Smith et al., 2020).

Although evidence-based, the above explanations are purely speculative in the context of the present study. Conversely, the inclusion of PA as a primary outcome measure offers insight into the impact of lockdown restrictions on overall pre-post levels of PA, as well as how changes in these levels are associated with participants' mental well-being. Findings presented strongly indicate that the enforced restrictions introduced mid-study contributed to the increase in PA levels observed over time. While the proportion of participants meeting PA guidelines remained relatively low (32%), these findings are encouraging when considering the psychosocial barriers to PA engagement often experienced by these individuals (Bruce et al., 2019). Of particular importance is the reduced gender disparity observed at T1- with females increasing PA levels more than males over time, hence contributing to their proportional representation of 'active' participants at T2. This would imply that lockdown presented an *opportunity* for females specifically to engage in PA- possibly through the subsequent surge in 'acceptable' activities such as walking or cycling, and substantiates recent cross-sectional

research evidencing a similar trend (Faulkner et al., 2021). The implications of these findings should not be underestimated in the context of informing effective policies to support 'high-risk' groups (i.e. young females) through this, and potentially future crises (Sallis et al., 2020).

The significant increase in PA levels over time reported by initially 'inactive' individuals may appear counterintuitive to the relatively marginal increase in the proportion of participants meeting PA guidelines (2.8%). Although not measured as an outcome in this study, it may be more accurate and informative to interpret these findings as a decrease in sedentary behaviour over time, rather than regarding these participants as 'active'. Similarly, the overall decrease in PA over time reported by initially 'active' individuals insinuates that despite restrictions around their usual habits (i.e. closure of gyms) impacting on their 'exercise' regime, most were willing to adapt, and find alternative means to remain 'active' (albeit to a lesser degree). From a public health perspective, this raises the importance of tailoring PA promotion during lockdown according to population sub-groups (Sallis et al., 2020), and avoiding conflation or interchangeable use of PA-related terminology.

The association between increased PA and mental well-being demonstrated in the present study is concurrent with a wide body of previous literature (e.g. Kandola et al., 2019), and findings in the context of COVID-19 (Lesser et al., 2020; Faulkner et al., 2021). In contrast to previous findings, the longitudinal design of this study allowed examination of changes in outcome measures from pre-post lockdown restrictions, and therefore establish that increased PA positively contributed to participants' mental well-being. It can also be inferred that PA represents a *modifiable* means of mitigating risk, and protecting well-being through promoting resilience under adverse conditions (Ungar, 2019). The lack of association between PA and self-esteem was somewhat surprising, yet supportive of previous reviews (Biddle et al., 2019), and ostensibly suggests that factors unrelated to PA may have accounted for observed improvement over time. Nonetheless, the relationship between decreased levels of PA and low

self-esteem at T2, reinforces the importance of regarding sedentary behaviour as a discrete variable which may effectuate change through distinct pathways to PA (see Vancampfort et al., 2017).

Despite the positive aspects of the present study, it is not without limitations. Although increased PA levels were causally associated with improved mental well-being over time, effect sizes and proportion of variance were relatively small, indicating that numerous other (unmeasured) factors contributed to the observed effects. This study adds to the limited base of longitudinal research assessing the impact of COVID-19, however the relatively short period post-lockdown (4-weeks) may not reflect the effect of prolonged social isolation on outcome trajectories over time (Loades et al., 2020). While sample size and loss to follow-up may compromise generalisability of this study's findings, participants recruited were entirely representative of the target population (i.e. young people experiencing homelessness), who are often considered as 'hard-to-reach' under *usual* circumstances (Kidd et al., 2018). Moreover, he accrual of longitudinal data during this period is conducive to calls for prioritising research which addresses the impact of COVID-19 on vulnerable groups (Holmes et al., 2020), and offers additional potential for translation into effective PA interventions to mitigate future adversity and negative effects (Sallis et al., 2020).

5.3 Implications of Study Findings

The evidence derived from this unanticipated study has raised important questions which must be addressed in relation to the overall project aims. As discussed throughout the Thesis thus far, findings reinforce the relationship between PA and mental well-being, and provide additional evidence pertaining to *causal* (rather than correlational effects)- i.e. increased PA accounting for improvements in well-being over time. Notwithstanding, the relatively small proportion of variance explained by changes in PA (6%), indicates the presence of potentially

numerous additional factors which exist beyond those constrained to quantitative scales, and therefore promotes the utility of additional (i.e. qualitative) methods to interpret and enhance the overall data (see Feilzer, 2010).

Possibly the most important finding from this study (in relation to the overall project) is the recognition that positive associations between PA levels and psychological well-being can occur *irrespective* of whether those individuals are meeting the recommended guidelines, and endorses recent calls to convey that *some* PA is better than none (Bull et al., 2020). Conversely, it is possible that individuals regarded as 'active' (i.e. meeting PA guidelines) can be highly sedentary overall, which—as evidenced in the study above—suggests that outcomes of interest in the current project (self-esteem; well-being) may be influenced by mechanisms of action encompassing both physiological and psychosocial pathways. For the nuanced differences between 'PA⟷well-being' and 'SB⟷ self-esteem' relationships identified through this study, it is likely that wider context-specific mechanisms such as how participants *experience* these behaviours (e.g. social / individual; positive / negative) may determine direction and magnitude of effects beyond a linear dose-response associations (see Biddle, 2019).

Overall, evidence derived from this novel study has illuminated the importance of considering PA as distinct and often unrelated to sedentariness, which is reinforced through findings which suggest that these behaviours are differentially associated with well-being and self-esteem. Although not originally specified as an outcome in this project, evaluating changes in SB over time in relation to participants' well-being and self-esteem could potentially re-frame the implementation of PA-based interventions with this population, and / or offer a more tailored approach for individuals through targeting the behaviour most likely to generate the desired outcome (i.e. increasing PA for well-being, reducing SB for self-esteem). Furthermore, subsequent qualitative exploration could be integral to determining

aspects of the participant's experience which mediate reported intervention effects, thereby informing future research and practice in accordance with identified 'active ingredients' (Quirk et al., 2020).

5.4 Implications of the COVID-19 Pandemic for the Project's Main Study

As detailed in the Introduction to this Chapter, this eight-week study was designed to obtain data from a group receiving TAU (i.e. standard care and support), from which pre-post outcomes could be compared with those obtained from the intervention groups. Findings from this, and the preceding research thus far (systematic review of literature and pilot feasibility study) were intended to inform the design and evaluation of this project's 'main study', from which evidence-based recommendations could be provided in relation to the overarching aims.

The global outbreak of COVID-19, and extraordinary circumstances which ensued (closure of all shops and community provisions, requirement to stay at home, ban on mixing with other households, requirement to physically distance from others), threatened to severely compromise the likelihood of this project continuing, or completing within the funded period (3 years). Despite the novel insights afforded by the coincidence of this study period with the pandemic (see above), inability to utilise the data 'as intended' and uncertainties associated with the prevailing situation, required a major reconsideration of how this project could (or indeed whether it *would*) proceed. While 6-month funded extension period helped to mitigate detrimental effects on the project, it was necessary to revise the timeline and therefore consider alternative methods for addressing the project aims, and—crucially—the degree to which these were feasible and safe during this unprecedented situation.

<u>Option One</u> Deliver a virtual / digital intervention:

What: 8-week PA based intervention, delivered remotely to young people (via Teams or Zoom). This would be accompanied by a manual comprising information handouts

and worksheets, based on principles of 'behavioural activation' (i.e. goal-setting, self-monitoring, healthy living etc.).

When: Planning and recruitment: June – September 2021

Implementation: September – November 2021

Evaluation: November 2021 onwards

Where: In the projects – either living area / bedrooms

CONCERNS:

1. YPEH often encounter 'digital poverty', and therefore lack access to a computer or smartphone.
2. Difficulty to engage and motivate participants - based on research and findings from the previous studies (i.e. facilitators = social connections, getting out of the house, developing independence etc.)
3. Lack of space in the projects could compromise fidelity to the intervention (limit certain activities, or effort / intensity)
4. No inclusion of any psychological component (i.e. DBT skills) deviates from overarching project aims (i.e. engagement / effectiveness of group-PA combined with group-based therapy).
5. Reduces intervention focus to individual PA only, and availability of similar resources online is likely to increase selection bias (i.e. appeal to those already physically active.

Option Two Develop a 'toolkit' of resources:

What: Development of a 'toolkit' to assist with planning (based on implementation / engagement), and delivering (based on psychological principles, i.e. DBT skills, 'psychologically-informed environments') interventions which promote young people's well-being and social connectedness.

When: June 2021 – December 2021

How: Content would be evidence and theory-based, and utilise findings from pilot feasibility study to identify and overcome potential challenges. Development would also entail additional consultation with stakeholders (i.e. resource would be co-produced with young people, support workers, and the psychological therapy team).

CONCERNS:

1. Will be based on minimal contextual evidence (e.g. feasibility study with a small group in one setting)
2. Previous research with other organisations (St Basil's, England) has contributed comprehensive resources for this sector- is there a need to replicate this. or try to 'reinvent the wheel'?
3. Would we get sufficient 'buy-in' from Llamau, i.e. staff may view this as an extra task for them in a busy service with limited resources and time.
4. How would the toolkit be evaluated? It would be difficult to control fidelity to content, or the actual 'dose' of intervention each participant had

received. Timescales would also limit the option of initially analysing feasibility and acceptability.

<u>Option Three</u> Conduct a face-to-face two-arm study:

What: 8-week psychologically-informed group PA programme + DBT skills training
8-week psychologically-informed group PA programme alone

When: Recruitment and planning: July – September 2021
Delivery: September – November 2021
Evaluation and write-up: November 2021 – February 2022

Where: In community-based sports centres situated in the selected localities.

<u>CONCERNS</u>:

1. Risk of participants and intervention facilitators potentially contracting COVID-19.
2. Uncertainty around timescales of government restrictions, including re-opening of sport centres and distancing requirements for indoor group-based activities.
3. Maintaining fidelity to the interventions (i.e. challenges of delivering group-based PA with minimal / no sports equipment).
4. Quality of the research – The non-randomised design, absence of control group, and restrictions on sample size for each arm would compromise statistical power to detect between-group effects, and limit external validity and reliability of results.

5.5 Conclusions

Following an extensive consultation period with the supervisory team, funders, and key representatives from the partner organisation, the researcher opted to pursue 'Option Three' (despite the magnification of logistical challenges owing to the COVID-19 pandemic). Given the reduced sample size from the originally intended design (2 x 2 arm study with control; approximate n = 100), a mixed-methods approach was considered appropriate for evaluating pre-post effectiveness, exploring mechanisms of effect, and establishing implementation-related barriers or enablers for each intervention condition. The following Chapters of this Thesis (Six and Seven) will present in detail the proposed methodology for implementing and evaluating this two-arm study, before exploring quantitative and qualitative results and discussing in the context of this project's overarching aims.

Chapter Six:

Methodology for a Two-Arm Study Comprising Physical Activity Combined with Dialectical Behavioural Therapy, and Physical Activity Alone

6.1 Introduction

As detailed in Chapter Five of this Thesis, the COVID-19 pandemic severely compromised the plausibility that a complex, multi-site intervention could be implemented amid continuing adverse and unpredictable conditions. Restrictions specific to group-based activity and physical distancing necessitated evaluation of whether the findings accrued thus far (systematic review, pilot study, impact of COVID-19) could be applied to implementing an evidence-based intervention which was relatively low-risk in this context, and adhered to revised timeframes for completion. Throughout this Thesis, each new finding has shaped and evolved the overall aims and research questions, and consequently informed the design and methodology of subsequent research processes. For example, while the initial intention of this project was to explore whether PA could be a viable means of encouraging YPEH to engage in psychotherapy, accumulative evidence from the systematic review and pilot study strongly suggest that a well-designed and psychologically-informed PA programme alone could engender positive effects, at least equal to those observed following a programme incorporating both PA and psychotherapy. Given the disproportionate prevalence of poor mental health in this population—compounded by lack of access and general resistance towards therapeutic support (Hodgson et al., 2014)—these preliminary findings for the potential of standalone PA interventions warrant further empirical investigation; albeit modified in accordance with mitigating risk, and adhering to COVID-19 policies as required (i.e. group size etc.).

This Chapter will provide an outline of the methodology for implementing a non-randomised parallel group study comprising two intervention arms (PA or PA + DBT skills). Where possible (within the limitations of extraneous circumstances) the proposed methods reflect compiled evidence and findings presented previously within this Thesis, with any

divergences from preceding recommendations justified in the context of applying research to practice under 'real world' conditions.

As demonstrated through quantitative and qualitative data from the pilot study (see Chapter Four), participant attendance peaked between weeks six and eight; indicating that an eight-week intervention period would be optimal for this population. While the order of 'conditions' was considered inconsequential prior to the pilot study, participants' attribution of mood and affect changes to the PA (generally positive) and DBT skills (generally negative) sessions, necessitated a revision to the order in which each component would be delivered, and reinforces the utility of qualitative methods for revealing 'hidden aspects' which could influence outcomes (O'Cathain et al., 2015). Further modifications derived from evaluation of the pilot study include incorporation of a staggered, ongoing incentive scheme- whereby participants receive vouchers each week rather than one large incentive 'up front' as an antecedent to engagement (see Chapter Four). In terms of intervention 'success', this could serve to improve YPEH's continued adherence to interventions (see Luchenski et al., 2018), while also ensuring that participants have the means to adequately refuel after each session (as COVID-19 restrictions may preclude the provision of food on-site). Although sedentary behaviour (SB) was initially excepted as an outcome of interest for this project, novel insights into the differential relationships between behavioural (PA, SB) and psychometric outcomes (self-esteem, well-being) afforded by the preceding study (Chapter Five), warrant further consideration in the current study; firstly, to establish whether these relationships were context-specific (i.e. a product of the unique conditions owing to COVID-19 restrictions), and also to qualitatively explore mechanisms of action which may account for variability between individual participants.

Given the prerequisite to design the current study for a restricted sample size (see 6.4.4), a mixed-methods approach will be employed to: establish and compare overall effectiveness of

each intervention (quantitative); evaluate and explore potential mechanisms of effect (qualitative and quantitative); and identify potential barriers and facilitators to implementing each intervention in 'real world' conditions (qualitative). The remainder of this Chapter will detail the proposed methodology for implementing and evaluating a 2-arm intervention study, with evidence-based decisions consolidated via reference to findings presented throughout the Thesis thus far.

6.2 Rationale

The evidence derived through research undertaken and presented in the preceding Chapters of this Thesis (systematic review, intervention development, pilot feasibility study, longitudinal evaluation of the effects of COVID-related restrictions) collectively indicate that engaging in PA can engender positive effects, irrespective of: adjunctive psychological therapy; the 'dose' of PA received; and whether the individual is 'active', according to current recommendations (Thomas et al., 2020, 2021).

Rather than viewing PA as simply a 'vehicle' for encouraging YPEH to engage in psychological therapy, the evidence suggests that a well-designed PA intervention, delivered in a psychologically-informed manner could engender psychosocial (and potentially physical) benefits for this population, and encourage sustained engagement in positive activities and behaviours.

Research directly comparing the effects of 'PA-alone' with 'PA + psychotherapy' interventions is therefore required to further explore these suppositions, elucidate differential mechanisms of action, and identify contextual barriers and enablers experienced by participants within each condition.

6.3 Aims

The overall aim of this mixed-methods study is to compare the effects, mechanisms and implementation of an intervention comprising psychologically-informed PA alone, with an intervention comprising both psychologically-informed PA and DBT skills group training (DBT-ST).

6.4 Methods

6.4.1 Design

This pragmatic 2-arm multi-site study will adopt a quasi-experimental design, comparing pre-post test outcomes for non-equivalent groups receiving either PA-alone, or PA combined with DBT-ST. Mixed-methods will be utilised to quantitatively evaluate within and between-group effects, and qualitatively explore possible mechanisms or change and pertinent challenges or enablers to implementation.

6.4.2 Participants and Setting

This study will be conducted across two community-based sports centres located in separate regions within South Wales (Cardiff and Barry). Young people aged 16-24 years who are currently supported by the charity Llamau will be eligible to participate in the study provided they have capacity to provide informed consent, and subject to a satisfactory risk-assessment undertaken by the organisation.

6.4.3 Recruitment

Up to four weeks preceding intervention start dates, senior management staff for each region will be consulted in the first instance on appropriate strategies for recruiting participants from their respective areas. Key staff identified through this process will be contacted by the researcher to discuss the overall purpose of the study, and what the intervention in that area

would entail. Further details such as participant information sheets and recruitment flyers will be disseminated for staff to promote involvement in the study to young people who they support, and subsequently refer potential participant for eligibility screening by the researcher. Informed consent will be obtained from individuals meeting the inclusion criteria, and one week prior to the intervention start date participants will be asked to complete baseline surveys. Throughout the duration of the recruitment period, the researcher will be available to answer any questions which may arise, or discuss other pertinent information with either support staff or potential participants.

6.4.4 Sample Size[3]

To adhere to pandemic-related guidelines and restrictions, up to 14 participants per intervention arm can be recruited for the study. As participant's support workers will be encouraged to accompany them to PA / DBT skills sessions, this modest sample allows for a maximum of 30 people to meet indoors (14 participants, 14 support staff, 2 intervention facilitators) as per government COVID-19 policy. Although lower than originally intended, findings from the pilot study (see Chapter Four) indicate that a sample size of 14 participants per treatment arm with expected attrition of 25%, will provide 80% power to detect a large (> 0.7) effect size for pre-post change in well-being scores (Whitehead et al., 2016).

All participants who initially enrol in the study (i.e. provide consent and complete baseline survey) will be invited to contribute to follow-up focus group discussions, to enable a comprehensive understanding of diverse factors which might have contributed to variations in attendance or engagement (O'Cathain et al., 2019).

[3] For reasons provided at the start of this chapter, the sample size and power calculations generated through the previous pilot study (>50 participants for an effectiveness trial; see ***4.5.2.3***) could not be adhered to under current pandemic conditions.

6.4.5 Interventions

6.4.5.1 Psychologically-Informed Physical Activity

This eight-week intervention comprises group-based PA session delivered within a psychologically-informed framework conducive to promoting and supporting participants' basic psychological needs (i.e. competence, relatedness and autonomy; Deci & Ryan, 2000), through application of contextually-relevant behaviour change techniques (see Chapter Three). All session will be delivered by three experienced and qualified facilitators from the organisation 'World at Play', whose philosophy is to enrich the lives of marginalised individuals through the provision of sport and play (worldatplay.org). All coaches will be provided with training prior to the study which will include: a two-hour session delivered by the researcher to explain the rationale, theoretical underpinnings, and overall aims of the intervention (including a PowerPoint presentation, group 'Q & A', and examples of appropriate activities to include); a site visit to the intervention venue to assess facilities, equipment and health and safety policies; and a training 'pack' containing additional information such as examples of how theoretical principles could be applied in a typical 60-minute session (see Appendix 5).

The initial session will incorporate activities and techniques intended to overcome anticipated barriers for participants such as social anxiety, low perceived competence, or externally-driven motives for enrolling in the study. Coaches will be given autonomy to decide what and how they deliver to the group in session one, provided this adherences to the theoretical framework; an activity which enables participants and coaches to learn each other's names, requires minimal levels of fitness or skill, and involves some positive reinforcement would be appropriate. In accordance with psychological principles underpinning the intervention, discussions between the coaches and participants at the end of each session will inform

content of subsequent sessions throughout the course of the intervention, while weekly monitoring sheets completed by the coaches will ensure group progression and individual successes are recognised and highlighted through positive feedback (see Appendix 6). Following outcomes and recommendations from the pilot study (see Chapter Four), participants will be provided with a £5 supermarket voucher for attending each week, to encourage continued attendance throughout the intervention, and offer a practical means to ensure individuals have the means to refuel after each PA session.

6.4.5.2 Dialectical Behavioural Therapy Skills + Psychologically-Informed Physical Activity

This eight-week intervention comprises group-based DBT-ST, followed by group-based PA session as described above. The eight x 1.5 hours of DBT-ST will be delivered by a qualified and highly experienced psychologist (PV) from the organisation (Llamau), utilising a bespoke manual designed by the researcher (Appendix 3). The manual content is evidence-based (McCay et al., 2015; Vitopoulos et al., 2017), follows recommended guidelines for DBT skills training (Linehan, 2015; Rathus & Miller, 2015), and has been contextually adapted accordant to the study population, and findings from the pilot feasibility study (see Chapter Four).

The sessions will follow a standardised format to support adherence to treatment integrity, enable replicability of the programme, and identify components (or lack thereof) which may have affected overall effectiveness of the intervention (see McCay et al., 2016). Each session will begin with a brief mindfulness exercise, followed by a group-based homework review. The remainder of the session will then focus on teaching and practicing the DBT skills associated with the module for that week (Emotion Regulation; Interpersonal Effectiveness; Distress Tolerance), through providing relevant and appropriate examples of how and when the skills may be used, and encouraging participants to consider situations and experiences in

which DBT skills could be successfully applied. A full outline of the 8-week DBT-ST programme is presented in Table 6.1.

Following each DBT skills training sessions, participants will have a 15 minute break in which refreshments will be provided, before beginning the 60-minute PA session, which will be delivered as described above (see *6.4.5.1*).

Table 6.1

Outline of the 8-week DBT Skills Training Programme

Session	Module	Content
1	Introduction to DBT	Group guidelines Goals of DBT Biosocial Model of Emotions Wise Mind
2	Distress Tolerance (Crisis Survival)	STOP Skills TIPP Skills Pro's and Con's Skills
3	Interpersonal Effectiveness (Communication Skills)	DEAR MAN Skills
4	Interpersonal Effectiveness (Healthy Relationships)	GIVE Skills FAST Skills
5	Distress Tolerance (Short-term Relief)	ACCEPTS Skills Self-Care Skills
6	Emotion Regulation (Protection)	ABC Skills PLEASE Skills
7	Emotion Regulation (Changing Response)	Problem Solving Skills
8	Emotion Regulation (Changing Response)	Opposite Action Skills Recognising achievements Celebration and goodbye's

Note: DBT = Dialectical Behavioural Therapy

6.4.6 Outcome Measures

Quantitative data will be collected at both baseline and post-intervention (up to one week before / after intervention period) by means of self-report measures detailed below.

6.4.6.1 Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS; Stewart-Brown et al., 2009)

A shortened version of the original 14-item scale (WEMWBS; Tennant et al., 2007), comprising seven positively worded statements which are scored according to a five point Likert scale ("none of the time" = 1, "all of the time" = 5). Responses are summed to provide an overall score which reflects the individual's state of mental well-being over the previous two weeks (< 23.6 = below national norms, > 23.6 = above national norms; see Fat et al., 2017).

6.4.6.2 Rosenberg Self-Esteem Scale (SES; Rosenberg, 1965)

A brief 10-item measure comprising positively or negatively framed statements which are assessed using a four-point Likert scale ("strongly agree" = 0 or 3, "strongly disagree" = 0 or 3). Responses are summed to provide an overall score which reflects the individual's levels of global self-esteem (< 15 = low, 15 – 25 = normal, > 25 = high).

6.4.6.3 Physical Activity and Sedentary Behaviour

A bespoke measure comprising 3 questions about the number of days, and minutes per day engaging in "exercise, leisure and physical activities over the past 7 days" for: moderate activities (e.g. brisk walking, cycling); vigorous activities (e.g. high intensity interval training, sprinting); and sedentary behaviour (e.g. sitting or lying down but not sleeping). Composite levels of activity indicate whether individual's meet recommended levels for their age (16-18 = >60 minutes moderate-vigorous per day; 19-24 = >150 minutes moderate per week, or >75 minutes vigorous per week; Department of Health and Social Care, 2019).

6.4.7 Statistical Analysis

Complete case, intention-to-treat analysis will be performed using SPSS Version 24.0 (IBM Corp., 2016), with a 'minimum dose' of intervention received defined as attendance to at least

five sessions (see 4.5.1). Descriptive statistics including mean scores and standard deviations (SD) will be generated for continuous data at baseline (T1) and follow-up (T2) for both groups. Outcome variables will be computed into sub-groups for self-esteem ('low', 'normal', 'high'), well-being ('above population norm', 'below population norm'), and PA ('meet recommended levels', 'don't meet recommended levels') for both timepoints, and standardised change scores from T1-T2 will also be calculated for all variables (self-esteem, well-being, moderate PA, vigorous PA, total PA, sedentary time).

Within-subject changes will be evaluated using the paired samples t-test, to determine whether the difference between baseline-post intervention outcomes is significant for each group, while a two-way mixed ANOVA will be used to determine whether baseline-post intervention changes over time significantly differ between the two groups. Between-group differences in categorical variable change from baseline to post-intervention (i.e. participants meeting recommended PA levels) will be further explored using a series of chi-squared (χ^2) tests.

Associations between change scores from T1 to T2 will be evaluated using Pearson's bivariate correlation analysis to establish the strength and direction (r) of relationships, with further linear regression analysis applied to determine the proportion of variance (adjusted R-squared) in outcome variables (i.e. change in well-being, self-esteem etc.) attributable to the predictor variables (i.e. change in PA levels, sedentary time etc.).

All tests will assume a statistical significance level $p < .05$, with 95% confidence interval levels reported to illustrate variability of significant mean differences. Effect sizes *(d* and ηp^2) will be interpreted according to Cohen's (1988) recommendations.

6.4.8 Qualitative Data Collection

Up to one week after each intervention, focus group interviews will be conducted with self-selected participants who initially enrolled into each arm of the study. To ensure a detailed understanding of these individuals' experiences, reflections, and longer-term impact of attending the sessions, group sizes will be limited to a maximum of five participants (Kreuger & Casey, 2015).

Utilising a semi-structured questioning route, participants who attended the 'PA alone' group will be asked to describe their experience of the intervention, from the point of recruitment to the final session. To facilitate analyses of potential mechanisms in accordance with the theoretical framework, questions will be worded such that the concepts of relatedness, competence, and autonomy are explored to potentially inform 'what works' in practice, according to the articulated nature and direction of perceived effects. Where appropriate, participants will be further probed to elaborate on whether such effects may also be attributable to wider behavioural changes (i.e. PA or SB) by virtue of attending a PA-based intervention (Appendix 7).

For participants of the combined (PA + DBT-ST) intervention, a similar format will be adopted to guide the FG discussions, with the inclusion of additional questions pertaining to retention, appropriateness, and perceived utility (in 'real world' settings) of the taught DBT skills. Such questions will help elucidate nuanced differences in potential mechanisms of effect between the intervention arms (i.e. PA or DBT skills), support estimations of 'dose' received, and assist with the evaluation of treatment integrity in this context (McCay et al., 2016). In accordance with the overarching aims of this project, participant will also be asked whether incorporating both PA and DBT skills in the intervention potentially impacted on their initial motivations for enrolling in study, ongoing engagement in both components, and

likelihood of attending similar group-based therapies and / or activities in the future (Appendix 8).

To ascertain fidelity to the theoretical framework and delivery protocol of the PA component, a separate FG will also be conducted with the coaches involved in both interventions. Questions alluding to the coaches' experience of incorporating psychological principles into PA sessions will inform estimations of 'dose delivered' and overall adherence to the intended intervention, while further probing around which specific strategies were perceived to be most effective will help identify 'what works' in this context, and potentially substantiate 'how' and 'why' (Appendix 9).

All FG discussions will be conducted by the researcher in a quiet and private space which is both convenient and accessible for the participants. Each discussion will be audio recorded and transcribed verbatim using a numeric identification system (i.e. P1, P2 etc.) to protect participants' anonymity. All participants attending the FG's will receive a £10 gift voucher for their time.

6.4.9 Qualitative Data Analysis

All transcribing will be completed by the researcher, and read several times before coding to consolidate familiarity with the dataset. A thematic analysis will be performed utilising a mixed inductive and deductive approach to ensure a balance between theoretical relevance, and inclusion of novel or contextually-specific concepts which may emerge through participant discussions (Joffe, 2012). Initially, an open-coding system will be applied through generating line-by-line codes for salient patterns and ideas within the data. A subsequent deductive coding frame will be used to guide interpretation of both manifest and latent content pertaining to the satisfaction or frustration of participants' basic psychological needs (e.g. Vansteenkiste et al., 2020). Codes will be scrutinised and grouped into potential themes

and sub-themes (if appropriate) which reflect the main research questions in relation to the theoretical framework (i.e. effective techniques for supporting participants' BPNs, potential moderators between subjective experiences and direction / magnitude of outcomes) and those associated with implementation (i.e. perceived barriers / facilitators to participation and engagement).

Secondary comparisons between themes and the dataset will be performed via an iterative process- with themes reviewed and refined accordingly to ensure completeness and validity of the final analysis (Braun & Clarke, 2006). Themes will be labelled accordingly, and the most relevant examples for across the dataset selected to exemplify why and how each theme corresponds to the overall research aims. Results will be discussed in relation to previous research, theoretic concepts, and contextually-specific aspects which may account for distinct or novel findings.

6.4.10 Ethical Considerations

Ethical approval was granted by Cardiff Metropolitan University School of Health Sciences Ethics Committee (Ref: PGR-4219). Individuals were advised and reminded that participation was voluntary, and they were free to withdraw from the study at any point. Participants were required to sign an informed consent form, and a consent letter was obtained from the organisation's Deputy CEO (SA). During the qualitative phase participants were reminded that information provided was confidential, and they could redact any written or verbal statements within four weeks of participation.

6.5 Conclusions

Despite the necessity to revise and scale-down the original design of this project's main trial, the 2-arm study described throughout this Chapter presents an opportunity to contribute to a sparsity of research examining the effectiveness of interventions which combine PA and

psychotherapy, compared with those which provide PA as a standalone approach to supporting well-being. This is further compounded through conducting a mixed-methods evaluation of *how* such programmes could help support the well-being of YPEH- thereby expanding the somewhat limited evidence-base from which decision-making and policies relating to this at-risk population are currently informed (Morton et al., 2020).

Given the lack of evidence supporting a 'dose-response' effect in the context of PA-based interventions for psychological well-being of vulnerable groups (Biddle et al., 2018; Thomas et al., 2020), the transition from quantitatively-focussed data analyses to a mixed-methods evaluation of the current study could prove advantageous for translating findings from this research into practice. Specifically, exploring factors which may support / threaten participants' basic psychological needs, and, consequently, how these may determine the *quality* of individual experiences, will help ensure that these 'active ingredients' (i.e. needs-supporting techniques) are embedded within the design and delivery of future interventions / programmes targeting well-being for this population (Deci & Ryan, 2000). Further comparisons between the quantitative effects and subjective experiences (qualitative) reported in relation to each intervention's (PA-alone, PA+DBT-ST) relative cost, could further provide invaluable recommendations for the optimal usage of the organisation's (often limited) resources to implement future programmes.

Chapter Seven:

Results

Evaluation of Interventions Comprising either Physical Activity Alone, or Physical Activity Combined with Dialectical Behavioural Therapy

7.1 Introduction

As detailed in the methodological protocol presented within Chapter Six, the primary aim of this 2-arm study was to compare the psychological and behavioural effects of an intervention comprising psychologically-informed physical activity (PA) alone, with those observed following psychologically-informed PA delivered in conjunction with DBT skills training (DBT-ST) for YPEH.

The design, implementation and planned evaluation of this study was informed by the existing evidence-base as presented throughout this Thesis, and grounded in theoretical principles of well-being, motivation and behaviour change in the context of: PA-based interventions; psychotherapeutically-based interventions; and interventions specific to young people with experiences of homelessness. Despite the careful consideration of principles aligned to intervention development, and those which mitigate implementation 'failures' when transposing evidence to practice (i.e. collaboration with stakeholders; adhering to available resources and funding; understanding and adapting to local contextual nuances; see Murray et al., 2010; O'Cathian et al., 2019), differences between the relative 'success' of each intervention in this study (see below) necessitated deviation from the planned analyses and evaluation (as presented in Chapter Six). To enable meaningful interpretation of all relevant findings from the interventions, this chapter will not only consider 'what works', but also 'what happened' in reality, and explain how this evidence could inform decision-making processes regarding future research and practice (Petticrew, 2015).

Principally, the most obvious disparity between the interventions was the number of participants recruited and retained throughout the study period; with the PA-only intervention arm involving a total of 16 young people (10 consistently), compared to 6 (3 consistently) who engaged with the programme comprising both PA and DBT-ST. Although small sample

sizes and low retention rates often compromise study quality with this population (Altena et al., 2010), the standardised recruitment strategies, information dissemination, and incentives offered for involvement in the current interventions exemplify how contextual nuances can determine implementation 'success' or 'failure', despite adherence and fidelity to the planned preparation and delivery phases of the intervention (Damschroder et al., 2009). Whilst the overall sample and unequal group sizes precluded statistical comparisons between the effectiveness of each intervention on outcomes of interest, it presented an opportunity to expand this study's contribution to the sparse evidence-base through the undertaking of two separate evaluations intended to inform both research and practice with this population. As demonstrated below, the evaluations consider: general challenges and enablers for planning and implementing complex interventions; what works, why, and how when delivering PA-based programmes; how 'active ingredients' across the interventions constitute mechanisms of observed effects, and what factors may influence the magnitude and direction of either psychological (well-being, self-esteem) or behavioural (PA, SB) outcomes.

The remaining sections of this chapter will be presented in two parts, with any deviations from the intended methodological protocol (see Chapter Six) justified and explained accordingly:

1. A mixed-methods evaluation of the effectiveness, mechanisms, and utility of a PA-based intervention for well-being and positive behavioural change of young people experiencing homelessness.

2. A process evaluation of the barriers and enablers to implementation, mechanisms, and utility of an intervention which combines PA and DBT skills training for well-being and positive behavioural change of young people experiencing homelessness.

The findings presented in this penultimate chapter will precede a detailed analysis and evaluation of the collated quantitative and qualitative results, presented in Chapter Eight.

7.2 Intervention One: Mixed-Methods Evaluation of the Effectiveness of a Psychologically-Informed Physical Activity Programme

7.2.1 Introduction

Following a four-week recruitment period between May – June 2021, the eight-week programme was implemented as intended in a local community-based sports centre. Four coaches (who had received prior training from the researcher) consistently delivered the PA sessions which encompassed team-based activities, and basic motor skills conducive to sports such as badminton and basketball. Exemplar monitoring sheets detailing activities delivered, group goals, and reflections from the coaches' perspective can be found in Appendix 10.

7.2.2 Participant Characteristics and Attendance

A total of sixteen participants from the organisation engaged with the PA intervention. This included young people recruited through the specified procedure (see Chapter Six) who thereby started from week one (n = 10), and those who attended later in the programme following unanticipated snowball sampling (i.e. word of mouth from participants or staff). As three of these participants attended after week four of the intervention, they were excluded from further analysis as per the predefined 'minimum dose' criteria (see 6.4.7). Overall engagement throughout the intervention was relatively high, with ten participants attending > 75% of the sessions. Of the participants who initially attended the intervention, two withdrew from the study due to poor mental health, and social anxiety.

A full breakdown of participants characteristics and corresponding attendance to the intervention sessions is presented in Table 7.1.

Table 7.1

Participant Characteristics and Attendance Information for Intervention One

Participant	Age	Gender	Education	Employment	First Attendance	Total Sessions
1	16-18	M	Secondary	None	W1	1
2	16-18	F	College/Sixth	None	W2	7
3	16-18	F	College/Sixth	None	W1	7
4	16-18	F	Secondary	None	W2	1
5	16-18	F	Secondary	Training/App.	W1	6
6	19-21	M	Secondary	Training/App.	W1	8
7	16-18	F	College/Sixth	FT Education	W1	8
8	16-18	F	College/Sixth	PT Education	W1	8
9	16-18	M	College/Sixth	Training/App.	W1	8
10	16-18	M	Secondary	None	W1	4
11	16-18	F	College/Sixth	None	W1	7
12	16-18	M	Secondary	PT Education	W1	7
13	16-18	F	Secondary	None	W2	6
14[a]	16-18	F	College/Sixth	None	W5	2
15	19-21	M	College/Sixth	None	W6	1
16	16-18	M	Secondary	None	W7	1

Notes: W = Week; F = Female; M = Male; PT = Part-time; FT = Full-time; App. = Apprenticeship; PA = Physical activity component; DBT-ST = Dialectical Behavioural Therapy Skills Training component. [a]Participants 14,15,16 excluded from further analysis as did not receive minimum dose.

7.2.3 Quantitative Findings

Although thirteen young people received the PA intervention, complete case data (i.e. both pre and post surveys) was attained and analysed for 11/13 participants, due to: drop-out (n = 1); and non-return of the questionnaire (n = 1).

7.2.3.1 Pre-Post Intervention Effects

A series of paired-samples t-test were performed to determine significant pre-post intervention change for all outcome measures. Visual inspection of boxplots detected 3 outliers which were > 3 box length from the edge of the box, however as these were neither data entry nor measurement errors they were not removed from the dataset. Shapiro-Wilk's test confirmed normal distribution of pre-post change scores ($p > .05$) There was a

significant reduction in participants' weekly sedentary behaviour time: *M* = 902.73 minutes, 95% CI [283.73, 1521.73], *t*(10) = 3.249, *p* = .009, *d* = 0.98, with non-significant increases in mean PA levels also reported for moderate (193.18 minutes, 95% CI [-550.90, 164.53]) and vigorous (125.45 minutes, 95% CI [-270.62, 19.71]) intensities. Well-being and self-esteem levels decreased slightly pre-post intervention, although this change was marginal and neither statistically nor clinically significant. A summary of pre-post outcome measures including mean change over time, significance, and effect sizes is presented in Table 7.2.

Table 7.2

Pre-post Intervention Change Across Outcome Measures

Variable	Pre-Intervention	Post-Intervention	Paired Differences			
	M	*M*	*MD (SD)*	95%CI (LL, UL)	*p*	*d*
Well-being	19.43	18.51	-0.92 (3.83)	-1.65, 3.50	.44	0.24
Self-Esteem	14.32	14.09	-0.23 (2.88)	-1.70, 2.16	.80	0.08
PA (mod.)	193.64	386.82	193.18 (532.47)	-550.90, 164.53	.26	0.36
PA (vig.)	77.27	202.73	125.45 (216.08)	-270.62, 19.71	.08	0.58
PA (total)	270.91	589.55	318.64 (586.90)	-712.92, 75.65	.10	0.54
SB	2751.82	1849.10	-902.73 (921.39)	283.73, 1521.73	.01*	0.98

Note: PA = Physical Activity; mod. = Moderate; vig. = Vigorous; SB = Sedentary Behaviour; *M* = Mean; *MD* = Mean Difference; CI = Confidence Interval, LL and UL = Lower and Upper limits of CI, *d* = Effect size (Cohen, 1988); *$p < .01$

7.2.3.2 Associations Between Changes in Well-being, Self-Esteem, Physical Activity and Sedentary Behaviour

A series of scatterplots were produced which confirmed linearity between all variables of interest. Independence of residuals was established with a Durbin-Watson statistic of 1.61, and no cases were found to have standardised residuals > ±3 standard deviations. Homoscedasticity and normality of residuals were assessed by visual inspection of plots (standardised residual v predicted variables, and normal probability plot).

Pearson's product moment correlations were run to establish the strength and direction of relationships between pre-post change scores for all variables. A correlation matrix of findings is presented in Table 7.3.

Table 7.3

Bivariate Correlations Between Pre-post Intervention Change Scores for All Variables

	1	2	3	4	5	6	7
1. Well-being	-	.77**	-.21	-.11	-.23	-.13	-.62*
2. Self-Esteem		-	-.64*	-.01	-.57	.28	-.75**
3. Moderate PA			-	.06	.93***	-.77**	.40
4. Vigorous PA				-	.42	.09	.20
5. Total PA					-	-.67*	.44
6. Sedentary Behaviour						-	-.11
7. PA Attendance							-

Notes: PA = Physical activity; *$p < .05$; **$p < .01$; ***$p < .001$

To further explore the inverse relationships between attendance and psychological outcome change, follow-up Pearson's partial correlations were performed. Controlling for change in self-esteem, the strength of the relationship between attendance and change in well-being scores decreased to $r_{\text{partial}} =$ -.097 and was no longer significant ($p = .79$). Controlling for change in well-being, the strength of the relationship between attendance and change in self-esteem scores decreased to $r_{\text{partial}} =$ -.54 and was no longer significant ($p = .11$)

A series of individual linear regression tests were performed to explore the significant pre-post intervention decrease in reported weekly sedentary behaviour levels. Using pre-post change scores as the predictor variables established that increases in moderate PA levels significantly predicted a decrease in SB, $F(1, 9) = 13.31$, $p = .005$, accounting for 55.2% of variance in SB change. The regression equation was: SB change = -644.54 + (1.34 x minutes of Moderate PA), meaning that increasing moderate PA by 30 minutes per day would predict a decrease in SB by 15.43 hours per week overall (Figure 7.1).

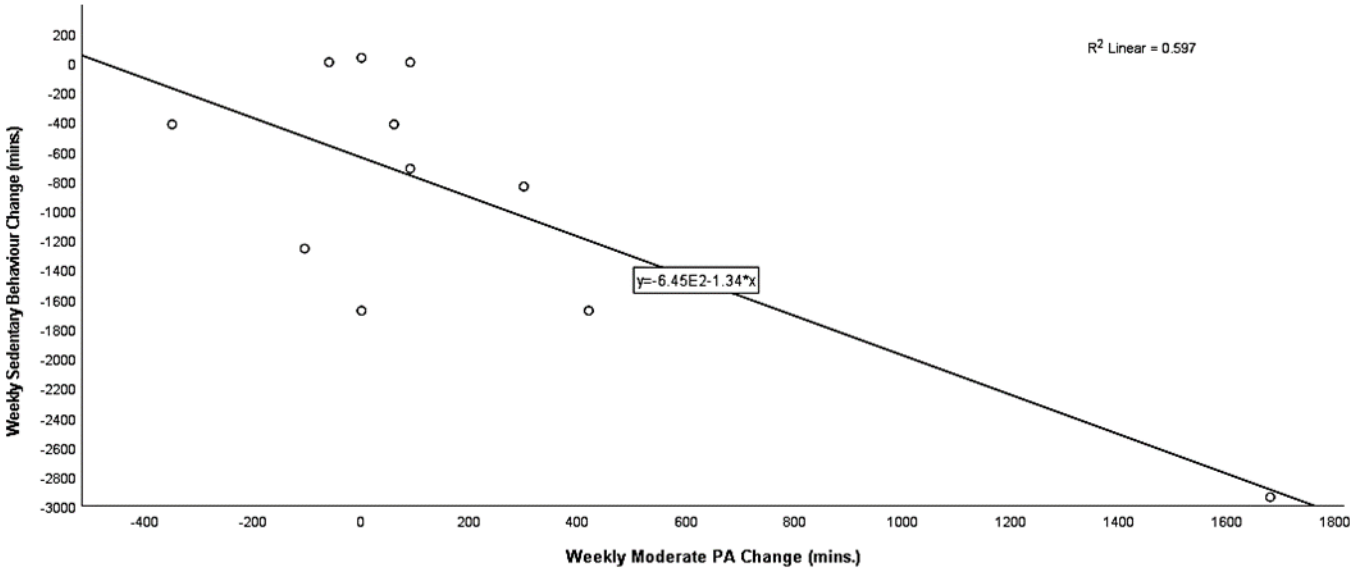

Figure 7.1. *Linear regression between changes in weekly moderate physical activity and changes in weekly sedentary behaviour levels*

7.2.4 Qualitative Findings

Two post-intervention focus groups were conducted, which lasted for a duration of 36 and 42 minutes, and involved five and four participants, respectively.

Throughout the analysis of the combined data, common topics were discussed which illustrated evidence of psychological needs support. While it was clear that the intervention represented an *opportunity* for participants to accumulate positive experiences, the degree to which this determined outcomes was related to both strategies and techniques imparted through the coaches, and participants' experiences and perceptions of the intervention in general. Although eight key themes emerged, they encompassed four pairs of discordant factors which evidently required optimal balance to effectively support participants' psychological needs, and promote positive experiences both during, and outside of the intervention. To facilitate interpretation of mechanism-outcome interactions, themes have thereby been organised and presented as four interrelated continua which will be discussed in relation to the theoretical framework, and processes of change within this context.

7.2.4.1 Encouragement ⟷ Pressure

When asked to recall their experiences of the first session, it was evident that attending a new programme in an unfamiliar group setting was a source of anxiety and stress for most participants:

> "*Oh nervous I was, I'm not gonna lie. New people!" (P9)*
>
> *"You can just tell we're all riddled with anxiety" (P7)*
>
> *"Anxiety, anxious. Cos I'm not really that much of a people person. So like meeting new people is not really my thing sometimes" (P6)*

For P14, this was clearly the main barrier when discussing their reasons for not participating in the programme from the start:

> *"Social anxiety…and just didn't wanna socialise with people and talk to people "because it made me nervous and anxious, and not a very sociable person" (P14)*

While such anxieties are often cited as the main reason YPEH fail to engage (Kidd et al., 2018), it emerged that—for this intervention—relatedness-supportive strategies employed by the coaches from the initial session helped to cultivate a friendly, inclusive and safe environment for participants, which thereby promoted their engagement and enjoyment:

> *"They didn't seem like staff, they just felt like some people that were there to have fun with you, like part of the crowd" (P14)*
>
> *"They held it together quite well, like us all together- they got us all up and going" (P2)*

In addition to alleviating anxieties, the positive atmosphere cultivated through the coaches' communication style also supported growth in participants' sense of competence, self-esteem, and well-being over time, as demonstrated through the following extract:

> *P11: Yeah they'd fist pump you or high-five you or whatever wouldn't they?*
> *P7: Yeah that confidence would just grow*
> *P11: Confidence yeah.*
> *R: So how did you feel when they did those little things?*
> *P9: Amazing*

P7: Yeah like just, I dunno, it's stupid but those things help don't they, little things like that?
P11: Yeah but that little boost man it's just…
P14: It just makes your day like better as well when they're like…you've done something and they're proud, they're happy that you've done it and it just, I dunno, just makes your day, makes you feel all better.

Overall, there was evidence to suggest that coaches' employment of techniques such as enthusiasm and positive feedback helped to support participants' sense of relatedness and competence during the sessions, which—through growth in confidence and self-esteem—improved engagement and enjoyment of the PA intervention over time.

There was some variability, however, in how participants perceived the coaches' encouragement on occasions when they opted to passively observe the session, or sit out from particular activities. For some, these strategies were positively received, and an effective source of motivation:

P7: *"If one of us was gonna walk off they'd be like, "no, come on, come on, come on"*
P8: "They motivated us, yeah"
P11: "It's infectious then- you've gotta play"

Conversely, other participants viewed this approach as too directive and pressurised, which subsequently compounded the antecedents to this behaviour, such as heightened social anxiety and low perceived competence. As articulated by another participant, this was attributed to P4's non-engagement beyond week two:

"*I know she felt like uncomfortable with people trying to push her too much to have a go, and that made her kind of think, "I don't wanna do that again". But if she'd just been left to sit there and come out in her own time, then she might have felt like coming again. And I don't know, we'll never know but I do know that was an issue for her" (P2)*

In contrast to the techniques which promoted engagement and positive outcomes for the participants as a group (see above), it was apparent that "pushing people too much" (P6) could become "overwhelming" (P2) for some, despite their acknowledgement of coaches' good intentions:

"I felt worse about saying "no" but it was nice that they were asking" (P3)

These extracts highlight the difficulties in achieving an optimal balance between encouraging participants in a need-supportive manner (i.e. showing genuine interest and enthusiasm, providing positive reinforcement), and utilising strategies which may impede well-being and intrinsic motivation through undermining perceptions of autonomy and control. Although participants were consistently positive when recalling their interactions with the coaches, this encouragement-pressure 'continuum' exemplifies how the *social context* in which such techniques are operationalised (i.e. group / individual) can influence ensuing processes and mechanisms (i.e. satisfaction / frustration of needs), and thereby determine outcomes such as motivation, engagement, and sense of well-being.

7.2.4.2 Variety ⟷ Structure

In line with the theoretical framework of the intervention (see Chapter Three), participants provided several examples of how coaches had adopted a shared decision-making approach, and promoted their sense of responsibility. This included incorporating new activities into the sessions as requested by participants, in addition to repeating any activities which they had particularly enjoyed:

> *"Yeah cos I told one of them about this game that I'd like done in school, 'Keith ball' and then we done that for like the last 3 weeks then" (P7)*
>
> *P11: "Badminton is like the best sport we did, that was my absolute favourite"*
> *R: "Did you ask the coaches for more badminton then?"*
> *P 11: "Yeah- that's why we did it twice"*

While this shared, collaborative approach is integral to a need-supportive environment through encouraging self-endorsed behaviour (autonomy) and promoting trust (relatedness) (Teixeira et al., 2020), there was further evidence for participants associating positive outcomes with the *variety* of activities as provided and delivered by the coaches:

"I learned how to catch a ball" (P8)

"So, I was like going back cos we were doing something like different each week you know?.. And so I could find different stuff I was good at, and it was like, yeah!" (P2)

Providing the opportunity to learn and master new games and skills was evidently an effective competence-supportive technique, which also maintained interest and engagement throughout the duration of the intervention:

"I'd say it was fun, and there was loads of activities they were doing, and you go with a group of people and they keep it interesting every week" (P6)

Despite the positive outcome and engagement associated with variety and choice, several participants also described how they had benefitted from the 'structured' nature of the programme (i.e. the same time, duration, setting, group etc.), through providing them with a routine, and generally something positive to do each week:

"I felt, I liked a routine. Because I'd go to Learning 4 Life, then go do sport, then go home. Just more routine. It was more a thing to do that night, than me going home and getting bored" (P8)

"It made my week, it's something to do, gets us out the house innit?" (P11)

For these participants, it was also apparent that the 'predictability' of the programme provided them with a sense of relief from chaotic and often unstable life experiences- which may have been compounded through recent events associated with the global pandemic:

"It was so predictable, and like, do you know everything's changing and jumbled up and everything, but that – that was there" (P11)

Aside from the need-supportive techniques imparted through the coaches' delivery style, the familiarity afforded through an organised programme supported participants' feelings of safety and stability, reduced their initial anxieties and fears, and—as later described by P11—contributed to intrinsically-motivated continuation and engagement in the programme:

"First time going to Barry I was like, "I don't know if I can be bothered"...and then as soon as it came to the last session; "I can't wait, we have to go, it's coming to an end"" (P11)

It appeared that for some participants, the cumulative effect of establishing a new routine and attending the PA sessions positively impacted on their wider day-to-day behaviours, and beyond the intervention period:

> *"I felt a bit more like, energetic and wanting to do stuff. Like wanting to get out more… Like after I'd done the sessions I'd become more happy, pushing my mood a lot more up … I guess like going and doing the sports and meeting the other people made me a lot more happier, and a lot more comfortable in myself" (P2)*

> *"Made me feel happier, made me feel like more energetic, seemed to do more things…In general really outside the activities. It made me wanna not stay in my room all day, and actually do something" (P6)*

These quotes exemplify the 'positive reinforcement' effect of attendance to regular, structured group PA sessions, increased autonomous *self -regulated* behaviours, and positive long-term effects (Deci & Ryan, 2000); with need-satisfaction (i.e. relatedness-support) mediating participants' psychosocial adjustment, positive functioning, and general well-being post-intervention (Vansteenkiste et al., 2020).

7.2.4.3 Group ⟷ Self

As described in section 7.4.2.1, most participants described their initial experience of the group-based programme as highly anxiety-provoking- mainly due unfamiliarity with participants and coaches, and a general fear of the "unknown" (P9). While this is common for YPEH and often a barrier to engagement in PA (Bruce et al., 2009), participants in the current study described how—conversely—the activities helped to *alleviate* these anxieties through providing a source of distraction from perceived stressors:

> *"At first I wanted to turn around and run in the other direction. Soon as the activity started you forget about everything, you have the fun.. it's just the waiting for things to start" (P11)*

> *"I got out feeling travel sick, I went in, did an activity and I was fine. It was like the anxiety just went and it was gone then once I started" (P14)*

Over the course of the eight-week programme, it was evident that the types of activities delivered by the coaches facilitated positive interactions and friendships within the group, and cultivated an environment which contributed to participants' need for relatedness, intrinsic motivation, and overall well-being :

> *P5: "It helps you get involved with people, talk to people more, talk about their problems"*
> *R: "Yeah, and do you think that you need to do that with activities?"*
> *P5: "Yeah. Because you kind of bond when you're doing the activities"*
>
> *"I guess there was just like a really positive atmosphere which encouraged me – the fact that it was positive" (P2)*

For some participants, the recognition that a group-setting could prove beneficial was clearly unexpected, based on their previous experiences- suggesting the strategies underpinning the intervention had successfully fostered a new sense of belongingness and relatedness for these individuals:

> *"In a group of people I'm…usually I just like to do things by myself, like activities by myself. So enjoying it with a group of people surprised me" (P6)*
>
> "*The realisation that I can in fact talk to other people, and not be completely awkward about it. I feel like that was an achievement" (P2)*

While the group-based format for the PA sessions was evidently promotive of positive outcomes, participants also discussed how their engagement with the programme had encouraged social interaction outside of the intervention setting:

> *I know it's stupid but you know when you walk past strangers yeah, you give them a smile or whatever yeah… you don't know the people, they were strangers technically. And now you walk around the streets saying hi to everyone (P11)*

This account exemplifies the wider effects of needs-support on participant's behaviours, which—in this example of prosocial interaction—could provide further satisfaction of psychological needs and thereby enhance self-esteem and psychological well-being (Weinstein & Ryan, 2010).

Participants provided further examples of how their experiences with the group had instilled a more general sense of confidence in social settings:

> *"Now I like meeting new people, getting in a group, being able to actually do it. Being confident to talk to people" (P8)*
>
> *"We have more confidence now I think, and we're more relaxed now. Yeah, I think all of us, all of us. Not just as our group, outside the group as well" (P9)*

Given the mediating role of social competence in protective processes for YPEH, this could help mitigate risk of negative experiences, and improve psychological and social outcomes for participants (see Kidd et al., 2018).

7.2.4.4 Challenge ⟷ Fun

As discussed throughout the themes, participants experienced a range of contextual challenges while attending the sessions- largely owing to their social anxieties compounded by an unfamiliar group setting. While this presented a potential barrier to engagement, it became evident that challenging participants *through the activities* provided some with a sense of reward through supporting perceived competence for PA:

> *"The biggest reward for me was actually being able to do the sports" (P8)*

Other participants also described how the competitive element of some activities had promoted their motivation and autonomous engagement in further PA outside of the intervention setting:

> "*Her competitive side came out a lot as well, like loads of it came out you could just tell she loved it (P14 describing P7)"*
>
> *"It's given me kind of more encouragement for me – remember we were talking about me taking up a new sport?... doing the sports therapy got me more into it… kind of made me realise that I actually did enjoy it, and I was good at it" (P2)*

These extracts demonstrate that competition and challenge were generally associated with positive effects for participants; suggesting that the coaches established an optimal

environment for supporting autonomy (i.e. non-controlling or comparative competitiveness), promoting competence satisfaction (i.e. challenging yet attainable tasks and goals), and thereby facilitating intrinsic motivation, self-esteem, and further PA behaviour (Deci & Ryan, 2000; Gunnell et al., 2014).

Notwithstanding the contextual and activity-related challenges encountered by the participants, descriptions of the fun and enjoyment they had experienced during sessions were prevalent throughout the discussions, and appeared to be the primary source of initial engagement and continued motivation:

> *"I'd say that I was surprised at how fun it was from the start" (P2)*
> *"I'm glad I did actually do it because it was good, like, I dunno, it was fun" (P7)*

In contrast to the benefits accrued through accomplishment of optimally challenging activities (see above), positive outcomes did not appear to be associated with attaining exercise or fitness-based goals *per se*, but with opportunities which enabled playfulness for the participants as a group:

> *"I like the fun with the childish fun thing on the side- not like the exercise thing, I like the fun bit" (P11)*
> *P5: "The only other exercise thing I'll do like this is Ninja Warrior, cos that's more fun!"*
> *P3: "Yeah, or Total Wipeout, make a fool of yourself you know" (laughs)*

Given the complex interplay between engagement in behaviours for enjoyment, psychological needs-satisfaction, and internalisation of (initially extrinsic) motivations (Ryan & Deci, 2000), it is evident that—through ensuring activities consistently supported fun and laughter during the sessions—the programme promoted connectedness and social well-being for participants, mediated through support and satisfaction of relatedness-needs (Vansteenkiste et al., 2020):

"*We all came for the vouchers you know at first (laughs)… It was a reward but then with everything, we would have come without it obviously" (P11)*

"This brought my happiness back. 'World at Play' brought my happiness back…new people, new everything" (P9)

7.2.5 Summary of Findings

The findings presented throughout this mixed-methods evaluation provide a comprehensive insight into the challenges and enablers associated with engaging YPEH in group-based PA. While the potential mechanisms of change and 'active ingredients' will be discussed further in Chapter Eight, a visual summary of findings is presented in Figure 7.2.

It was evident that most participants' involvement derived from the *opportunity* to do something different to usual, although *how* this translated into positive experiences and outcomes involved complex, multi-factorial processes as illustrated throughout the dichotomised themes. For example, participants' affective responses to the sessions appeared to be determined by individual (e.g. anxiety, self-efficacy), contextual (e.g. delivery style, type of activities), and structural (e.g. group format, routine) aspects of the intervention, and thereby associated with continued participation and engagement in the group-based PA. Overall, most participants depicted their involvement as a positive, fun experience; with further evidence indicating that enjoyment of the sessions may have increased *over time*, possibly reflecting increased perceptions of competence for PA, autonomous involvement, and relatedness to coaches and other participants (see above for specific examples).

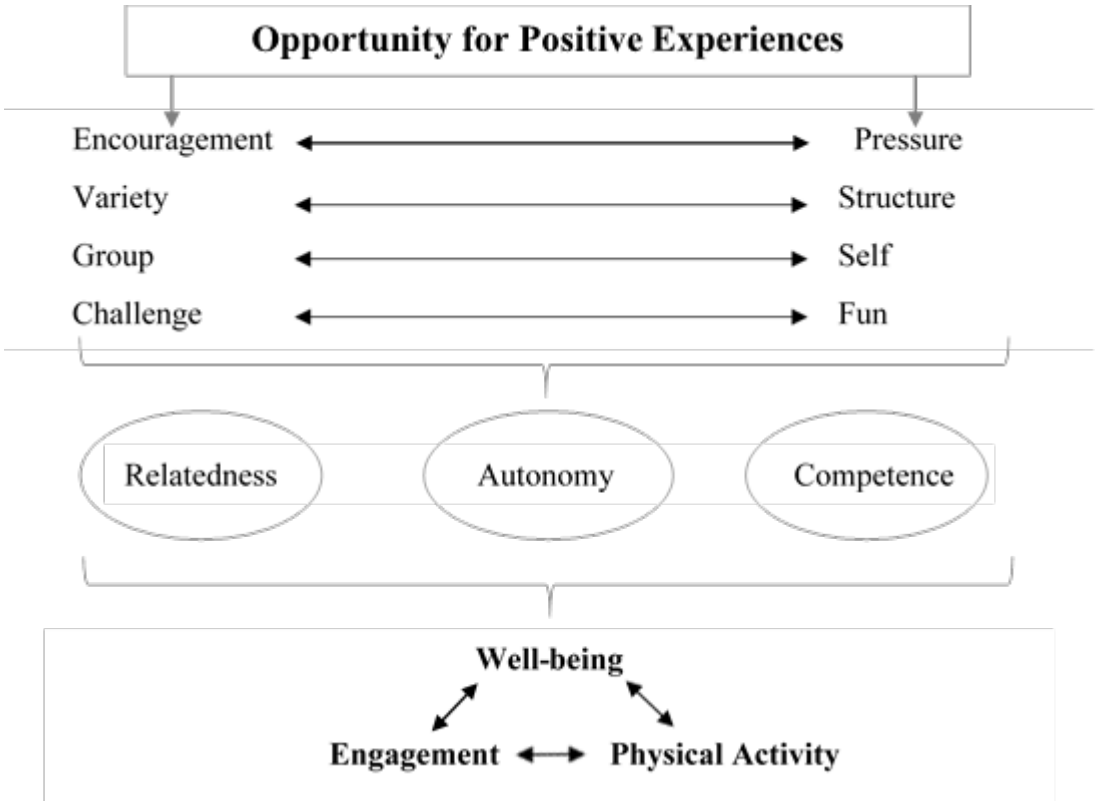

Figure 7.2. *Thematic Map of Findings from the Focus Group Evaluation*

7.2.5 Intervention Cost

A breakdown of the total cost of implementation is provided in Table 7.4.

Table 7.4

Total Costs for Implementation of the Physical Activity Intervention

Category	PA Component	PA + DBT-ST Component
Intervention Facilitators		
Coaches	£0 (voluntary)	£0 (voluntary)
Psychologists	n/a	£1360
Facilities		
Meeting Room	n/a	£288.86
Sports Hall	£450	£372.15
Equipment and Materials	£425.18	£320.32
Incentive Scheme	£410	£115
TOTAL	**£1285.18**	**£2456.33**

Notes: PA = Physical Activity; DBT-ST = Dialectical Behavioural Therapy Skills Training; 'Incentive Scheme' calculation = Total attendances x £5

A total of 16 participants attended the intervention during the implementation period, resulting in a fundamental cost per head of £80.32. However, participants considered to have engaged with the intervention (i.e. attended > 5 weeks) reflect a more realistic and 'true' cost of £128.52 per head.[4]

7.3 Intervention Two: Process Evaluation of a Programme Combining Physical Activity with Dialectical Behavioural Therapy Skills

7.3.1 Introduction

Four weeks preceding the intervention start date (September 2021), the procedures applied prior to intervention one were replicated to recruit eligible participants from the locality of intervention two. Despite adopting an appropriate range of strategies which are evidenced to maximise recruitment with this population (e.g. utilising key contacts within the organisation, providing clear study objectives, promoting incentives for participation- see Axén et al., 2021), initial interest and uptake in the programme was poor in comparison to intervention one- resulting in the decision to repeat the first week and allow additional time for a more active outreach approach (e.g. Strehlau et al., 2017). The challenges, corresponding actions, and contextual hindrances associated with recruitment difficulties will be discussed further in Section 7.3.3.1.

Given the small final sample size, and thus insufficient data for pre-specified statistical analyses (see 6.4.7), it was appropriate conduct an unplanned *post-hoc* evaluation to further examine and explore the unintended issues which arose during implementation (Grant et al., 2013). This transition from largely outcome-focussed aims (i.e. what works, how, and why) to an exploration of how contextual factors might have determined outcomes, arguably *necessitated* a mixed-methods evaluation to enable: a comprehensive analysis of quantifiable

[4] Incremental costs and effects between the interventions are presented in section 7.4

influences (i.e. recruitment, reach, dose received); identification of contextual barriers and facilitators in relation to implementation and effectiveness; and integration of complementary data to further understand processes which may affect optimal delivery and external validity of similar interventions (Grant et al., 2013; Moore et al., 2015).

7.3.2 Participant Characteristics and Attendance

A total of six participants from the organisation engaged with the PA+DBT-ST intervention, however it must be noted that two participants attended only a single session, and > 75% attendance across the eight-weeks observed for just three participants. Despite promotion and full explanation that the programme comprised two distinct sessions each week (DBT skills training and PA), participants demonstrated a clear preference for attending the DBT-ST component, compared to the group PA.

A full breakdown of participants characteristics and corresponding attendance to the intervention sessions is presented in Table 7.5.

Table 7.5

Participant Characteristics and Attendance Information for Intervention Two

Participant	Age	Gender	Education	Employment	First Attendance	Total Attendance		
						Sessions	PA	DBT-ST
1	16-18	F	Secondary	None	W0[1]	1	0	1
2	16-18	F	College/Sixth	PT Education	W1	1	0	1
3	16-18	M	College/Sixth	None	W2	7	7	7
4	16-18	M	Secondary	None	W7	2	2	2
5	16-18	F	Secondary	None	W0	7	1	7
6	19-21	M	Primary	None	W2	5	3	5

Notes: W = Week; F = Female; M = Male; PT = Part-time; PA = Physical activity component; DBT-ST = Dialectical Behavioural Therapy Skills Training component [1]Week 0 = Initial session repeated in 'Week 1'

7.3.3 Implementation

7.3.3.1 Recruitment and Reach

Throughout the recruitment period, intervention duration, and follow-up correspondence and debriefing, the organisation staff provided a range of potential barriers to reaching and recruiting study participants. These included multiple level factors reflecting aspects of: the intervention design, the organisational setting, characteristics of the population, and the process of implementing the intervention (see Damschroder et al., 2009). From the perspective of the organisation's staff, it was evident that a general lack of resources and time—compounded by staff shortages and sickness—impacted on their capacity to disseminate information, and further explain the purposes and benefits of the intervention to potential participants. It is likely that this would have limited 'reach' to the target population (Axen et al., 2021), and reinforces recommendations from one participant who engaged in the follow-up FG discussion:

> *"You'll find though that maybe like, if you really wanna attract an audience you've gotta get on social media. Like for the younger audience and that, get the social media on the go" (P6)*

As a product of staff shortages within the organisation, a lack of transport options for the young people was also cited as a barrier to their participation in the intervention, with correspondence from staff indicating this encompassed issues from the staffing perspective (i.e. no access to transport; unable to transport due to COVID-19 restrictions), and those more generally related to the anxiogenic effects of utilising public transport for many of the young people. In addition to these barriers directly provided by the organisation's staff, existing literature and research presented throughout this thesis indicates two wider implications of the limited resources on the recruitment and engagement of potential participants:- Firstly, this may have accounted for the absence of an identified 'Champion' for driving recruitment and interest from within the organisation, and ensuring sceptical or resistant colleagues

understand the potential benefits of the intervention (Damschroder et al., 2009; Durlak & DuPre 2008); and secondly, insufficient staffing ratios might have precluded the option for staff to accompany young people to the intervention sessions, which, for this population, is a key determinant of initial and continued engagement in such programmes (Curry et al., 2021).

Despite efforts to ascertain the specific reasons for the poor uptake and engagement in the intervention, correspondence with the organisation's staff suggested a general 'lack of interest' in what was involved, and potential participants expressing a dislike of either PA and/or psychotherapy. While this may have reflected the limited information and understanding of the intervention conveyed to young people from the staff (see above), it is also likely that participants' motivation to engage necessitated a more personal, face-to-face approach to recruitment from the researcher / facilitators (Axen et al., 2021), as evidenced through the improved response following the 'active outreach' campaign (i.e. visiting projects). To compliment this direct recruitment approach, a more appropriate and appealing recruitment flyer was designed and disseminated to potential participants, which framed the intervention as a 'well-being group', rather than focussing on the PA or psychotherapy (see Appendix 11). In conjunction with staff and participant feedback, this method may have also contributed to interest from initially dismissive or resistant young people:

> *"I think people might get put off thinking they're going to be psychoanalysed as well, so I think it might be good to downplay the psychology bit. Because when you hear 'Dialectical Behavioural Therapy Skills' it's a bit scary" (Support Worker)*
>
> *"Then call it something else then, it doesn't have to be "therapy". Like the title, the name, make it sound fun" (P5)*

The collective evidence derived from correspondence with staff, follow-up FG discussions, and anecdotal feedback from key stakeholders indicated that the predominant barrier to

recruitment of participants was the timing of the intervention, which coincided with prior commitments such as education, training, or work:

> *"This started just in early September when a lot of young people were going back to college" (Support Worker)*

Despite the intentions to target and recruit those young people considered the least engaged, there was further evidence of selection bias (as described in Chapter Four) towards those who were *most likely* to attend, over those who were *available* to attend and would potentially benefit the most. It is also plausible that (in comparison to intervention one) the perceived 'burden' of participating in this multi-component intervention, may have accounted for fewer young people willing to commit to a three-hour session each week (Axen et al., 2021), or dedicate additional time to DBT skills practice outside of the intervention setting (Toms et al., 2019).

7.3.3.2 Fidelity and Dose

A comprehensive analysis of monitoring data, observations, and follow-up interviews with participants and facilitators was utilised to assess overall quality of the intervention, and evaluate whether the components were implemented and delivered as intended (i.e. *fidelity*; see Moore et al., 2015). For clarity and transparency in reporting, fidelity to the PA and DBT-ST components will be discussed independently, and guided by appropriate evaluation frameworks (Koorts et al., 2018; McCay et al., 2016; Moore et al., 2015).

As described in the protocol (see Chapter Six), the eight x 1.5-hour sessions of DBT-ST were delivered at the specified time each week. While the manual was utilised to teach the selected skills as intended, there were occasions when the therapist amended the specified mindfulness exercise to better suit the group size and dynamic (e.g. 'positive memories' in week seven was changed to a mindful music exercise due to one participant having received bad news). Contrary to standard DBT protocol (Linehan, 2015), the practice tasks provided

throughout the manual were conveyed by the therapist as participants' opportunity to revisit and reinforce what they had learned each week, rather than framed as mandatory 'homework' which needed to be completed by the following session. While omission of homework assignment is common when delivering DBT skills to this population (McCay et al., 2016), providing this element of flexibility may also be integral to continued engagement in such programmes (Curry et al., 2021). There was further evidence throughout the FG discussions that participants had volitionally attempted to practice skills outside of the sessions, such as this participant's account of changing thoughts and behaviours by 'checking the facts' (Rathus & Miller, 2015):

> *"You've gotta evaluate every situation, like before jumping from A to Z… Yeah, unless you actually know all the facts you can't just say, "oh well, I'm not gonna do it" (P5)*

In conjunction with the therapist's adherence to structure and content of DBT-ST (besides *necessary* adaptations for implementation), participants' perceptions of their professionalism and expertise were also positive overall:

> *"My impression was when I sat down in the room, that it seemed professional and (the psychologist) seemed like a professional lady with what she was teaching" (P6)*
>
> *"They were professional, they knew what they were doing, and they knew how to handle the time they had with us" (P5)*

While an experienced, qualified psychologist delivered the DBT-ST group sessions as per protocol (see Chapter Six), participants evidently perceived them as competent to facilitate the sessions, thereby supporting the integrity of this component, and overall quality and fidelity of implementation (McCay et al., 2016; Moore et al., 2015).

Due to the difficulties in initially recruiting and engaging participants (see 7.3.3.1), the PA component of the intervention was not implemented until the third week of the study period ('week 2'), and involved just one participant (P3) for 3/7 sessions delivered. Despite the disparity of group size and engagement compared with intervention one (see 7.2), it was

evident from the follow-up FG discussion that the coaches had adapted their approach, without compromising or deviating from the theoretical framework:

> *"I felt like the young people in Cardiff were more focused on the skills that they could get out of sport, as opposed to the enjoyment. I think they were enjoying that, but it felt more focused on like you know, "I want to focus on this area". It was more individualistic I guess" (Coach 3)*

While the psychological principles embedded within the PA framework were conducive to positive psychosocial, rather than fitness-oriented outcomes (i.e. well-being, self-esteem), session three of the intervention comprised P3 requesting and undertaking the 'bleep' test of aerobic endurance (Leger et al., 1988), which outwardly deviated from the overall purpose and arguably compromised fidelity of the intervention (see Dane & Schneider, 1998). Alternatively, it is highly plausible that—in conjunction with supporting psychological needs—this adaptation contributed to the continued engagement and progression of P3, through incorporating a shared-decision making approach (autonomy), and instilling mutual trust and respect between coaches and participants (relatedness):

> *"With P3 you saw a real development and because we were focused on them you know? Obviously there were other young people that came too, but like P3 was there every session so it was really nice to see the progress" (Coach 3)*

The extent to which interventions may be modified has been debated extensively throughout the extant literature (see Moore et al., 2015), however this example highlights the importance of not only allowing, but *endorsing* intervention facilitators' decisions to deviate from protocol in accordance with contextual nuances- provided such adaptations are reported with reference to the theoretical framework and effect on outcomes (Durlak & DuPre, 2008):

> *"The difference with P3 between the beginning and the end. Like visually you can see he was a lot more relaxed, he looked like he kind of had a weight lifted off of him, and he looked a bit like more, I don't know, more positive, maybe" (Coach 2)*

From observations and feedback provided by coaches during the follow-up FG, it was also evident that fidelity to the content and delivery of the PA component was associated with co-

facilitation of sessions as a group, rather than individually. Firstly, this enabled the coaches to *collaboratively* decide on necessary adaptations each week, to best 'fit' the context and participant preferences:

> *"We'd sit in the car and we'd bounce ideas off of each other on the way there. And we'd be like, "right, if it's slow this week, let's introduce this rule"" (Coach 1)*

Secondly, utilising multiple coaches promoted adherence to the theoretic framework and psychological principles underpinning the intervention:

> *"I had a bit of knowledge about what was happening, but I didn't have any in depth knowledge about the research. It was kind of after that when I spoke to the others about it I was kind of like, "OK so I missed that, that's what actually is going to happen"" (Coach 2)*

Thirdly, as a predictor of intervention fidelity and dose (Durlak and DuPre, 2008), facilitating PA sessions as a group, promoted the coaches' self-efficacy and confidence to deliver the intervention as intended:

> *"I think if I was on my own, firstly I wouldn't be able to do it like, at all and secondly I wouldn't have enjoyed it" (Coach 1)*
>
> *"There's like a unified approach and I think that's what we're trying to say is like, we're working together- we're creating these games, these ideas for the group, together" (Coach 3)*

To comprehensively evaluate the *quantity* of the intervention implemented in actuality, both the dose delivered (i.e. sessions available and attended) and dose received (i.e. participants' engagement in sessions) were explored via the mixed-methods analysis (Moore et el., 2015). As described above, both the DBT-ST and PA components were available each week at the specified times, however quantitative monitoring of participant attendance demonstrated that the dose delivered and received was inconsistent and variable throughout the duration of the intervention (see Table 7.6). For those sessions which were attended, the duration of both the DBT-ST and PA components were as intended (90 minutes and 60 minutes), however during

weeks 5-8 participants utilised the 15-minute break as an opportunity to continue group discussions in the DBT-ST setting.

Although quantifiable measured of 'dose' represent what was available and delivered to participants, assessment of dose *received* requires more subjective interpretation of how participants interacted and engaged with the intervention- predominantly through qualitative follow-up investigation of how they perceived their own involvement, and what factors might have affected overall satisfaction (Saunders et al., 2005). From the FG discussions, it was evident that participants' perceptions of the DBT-ST group were mixed, and the quantity of sessions attended was not indicative of their enjoyment or perceived utility of DBT skills, as expressed by P3 following attendance to 7/8 sessions:

> *"The DBT itself was quite boring to be fair. I found it boring as fuck" (P3)*
>
> *"Nah I wouldn't do the 'DEAR MAN' [DBT skill], I wouldn't repeat myself"(P3)*

In contrast, other participants described a more positive experience of the DBT-ST group, and indicated that they had actively engaged with the materials and information delivered both within and outside of the intervention setting:

> *"Everyone got to say what they wanted, and everyone learned something from it as well" (P5)*
>
> *"I reckon I learned from the DBT thing. Cos like, if I didn't come here, if I'd had a problem with someone I would fight it. But now I feel I have a better set of ways to go about it. So I feel like that's what I've come away learning" (P6)*

Based on the quantitative monitoring data, P4 was present for the PA component of both intervention sessions attended, however this did not translate into their involvement or engagement, as reflected in their response to the intervention:

> *"I hate sport…I hate moving…Everything about it. It's exercise, simple. It's unhelpful" (P4)*

Conversely, attendance and engagement (therefore dose delivered and received) of other participants varied according to the intervention component, suggesting that high dosage in one is not indicative of high dosage of the intervention overall:

> *" The sports part of it, I was just like, I really didn't wanna do it. But I did try and do one session but I felt it's just not for me, so, no, I felt I got more out of the DBT and like now, I think I'm a better person for it in a sense" (P5 – high 'dose' of DBT-ST)*
>
> *"I was more like into the sports which is why I came. most of the DBT shit I actually didn't agree with anyway. Like I just found it boring, I don't like classroom work, I'm more into physical activity" (P3 – high 'dose' of PA)*

While such extracts (and more generally qualitative content) cannot unequivocally determine 'dose received', and affirm the difficulties associated with evaluating the *extent* to which participants were engaged (Moore et al., 2015), they highlight the necessity for considering the *quality* of participant's experiences to contextualise the (often misleading) quantifiable indicators of intervention dose received.

Table 7.6

Participant Attendance to Intervention Components

Week	DBT-ST Attendance (*n*)	PA Attendance (*n*)
0	2	0
1	1	0
2	3	2
3	3	1
4	2	2
5	3	1
6	2	1
7	3	3
8	4	3
Total	**23**	**13**

Notes: DBT-ST = Dialectical Behavioural Therapy Skills Training component; PA = Physical Activity component

7.3.4 Mechanisms of Impact

7.3.4.1 Intervention Effectiveness

Although six participants engaged with the intervention, complete case pre-post data was obtained and analysed for 4/6, due to two dropping out after weeks 'zero' and one of the

intervention.[5] The pre-post intervention analysis revealed positive mean changes across all outcome measures- with reported increases in 'self-esteem' and 'total PA' indicating *clinical and practical significance* (Thompson, 2002) based on arbitrary thresholds and recommended guidelines (i.e. mean self-esteem change from low-normal; mean PA change from below-above recommended levels). Despite these positive pre-post intervention effects, none were found to be statistically significant- assumedly due to the sample size, wide confidence intervals, and therefore insufficient power to detect significant effects (see Morgan, 2017). A summary of pre-post intervention changes is presented in Table 7.7.

Table 7.7

Pre-post Intervention Change Across Outcome Measures

Variable	Pre-Intervention	Post-Intervention	Paired Differences		
	M	*M*	*MD (SD)*	95%CI (LL, UL)	*d*
Well-being	18.94	20.45	1.51 (3.51)	-7.10, 4.10	0.43
Self-Esteem	14.50	17.50	3.00 (4.69)	-10.46, 4.46	0.64
PA (mod.)	60	300	240 (287.52)	-697.51, 21.51	0.84
PA (vig.)	7.50	55	47.50 (58.52)	-140.62, 45.62	0.81
PA (total)	67.50	355	287.50 (273.42)	-722.57, 147.57	1.01
SB	5355	3840	-1515 (-2881.41)	-3069.96, 6099.96	0.53

Note: PA = Physical Activity; mod. = Moderate; vig. = Vigorous; SB = Sedentary Behaviour; *M* = Mean; *MD* = Mean Difference; CI = Confidence Interval, LL and UL = Lower and Upper limits of CI, *d* = Effect size (Cohen, 1988)

To evaluate potential dose-response effects of the intervention, individual case descriptives and a series of line graphs were analysed to identify patterns or associations between attendance to each component (i.e. dose) and pre-post change in outcome variables (i.e. response; see Table 7.8).

[5] It should be noted that data obtained for 'Participant 4' is reflective of pre-post changes across the final two weeks of the intervention period.

Table 7.8

Attendance to Intervention Components and Corresponding Pre-Post Outcome Change

Participant	Attendance		WB Change	SES Change	PA Change	SB Change
	DBT-ST	PA				
3	7	7	+5.99	+7	+300	-2160
4	2	2	0	-1	+20	-2100
5	7	1	+2.29	-1	+660	+2520
6	5	3	-2.23	+6	+170	-4320

Notes: DBT-ST = Dialectical Behavioural Therapy Skills Training component; PA = Physical Activity component; WB Change = pre-post Well-being difference; SES Change = pre-post Self-Esteem difference; PA Change = pre-post Physical Activity difference; SB Change = pre-post Sedentary Behaviour difference

There was a positive relationship between DBT-ST attendance and pre-post well-being change- with increased well-being reported by participants who had attended the most DBT-ST sessions (Figure 7.3). There was also a positive relationship between PA attendance and pre-post self-esteem change- with increased self-esteem reported by participants who had attended the most PA sessions (Figure 7.4).

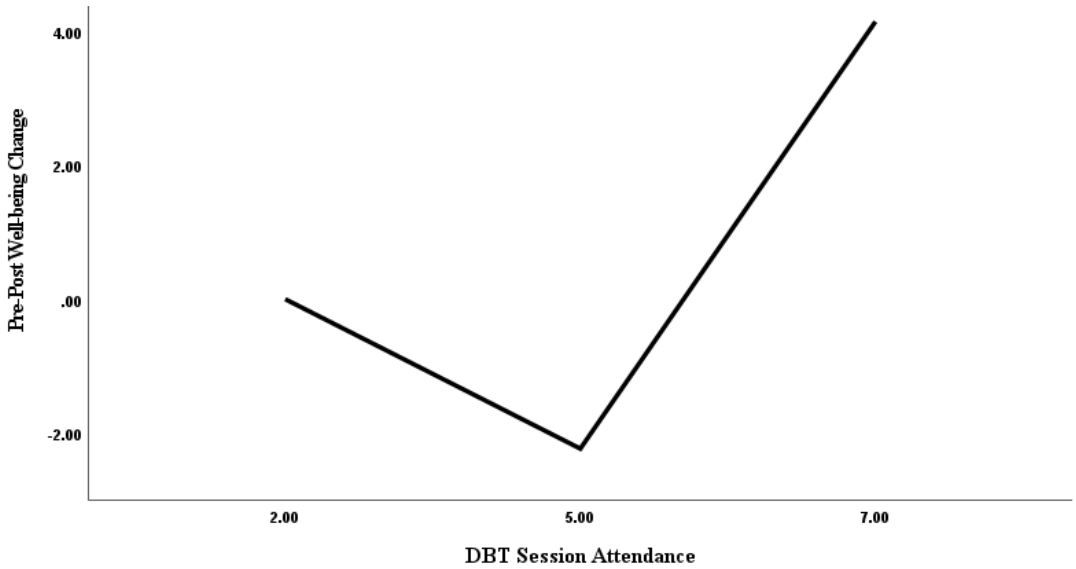

Figure 7.3. *Association between DBT Skills Training Session Attendance and Pre-Post Change in Well-being Scores*

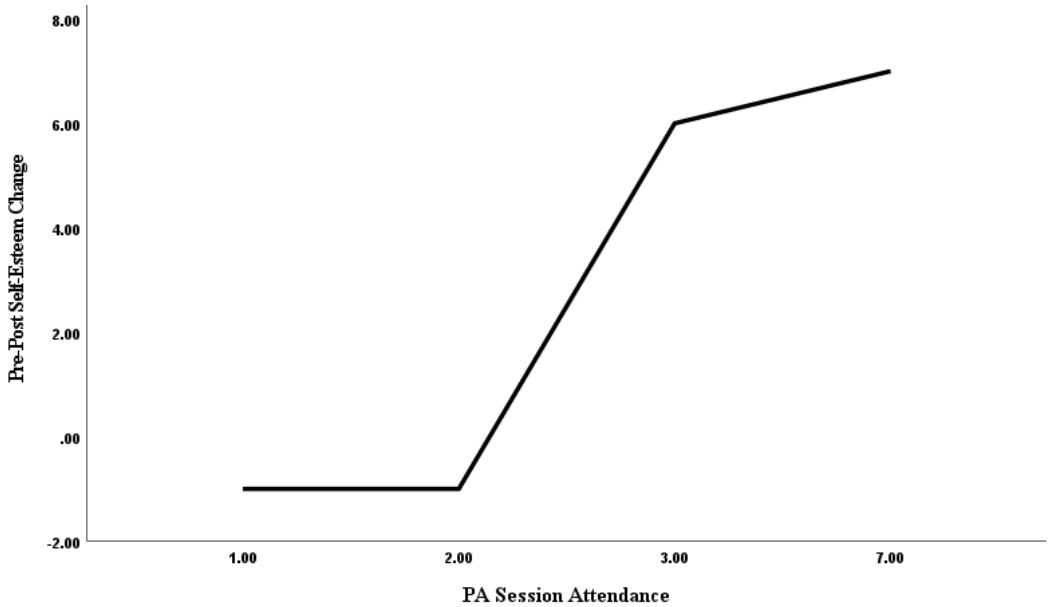

Figure 7.4. *Association between Physical Activity Session Attendance and Pre-Post Change in Self-Esteem Scores*

7.3.4.2 Qualitative Evaluation

Throughout the follow-up discussions it became apparent that the relatively small group of participants may have accounted for variable levels of attendance, and related outcome effects. Overall, for the DBT-ST component this was perceived as a positive aspect which promoted engagement and helped establish an environment in which all participants felt 'visible' and valued:

> *"I feel like it was beneficial being in a group situation, cos at the end of the day a team can only be nothing but a good thing if you ask me. Like discussions, even getting thoughts across" (P6)*
>
> *"When it's a bigger group it's hard to get a word in, and it's hard to speak your opinion. Cos you've got so many people around and it depends what type of people as well. Like you could get someone that's very loud and intimidating" (P5)*

It was evident that a smaller group had also encouraged social interactions between participants, which contributed to positive outcomes through an increased sense of social confidence, and connectedness *over time:*

"The social interaction. Getting to meet other people, other than my family. Outside the group all I'm around really is my family. So like when I come to the group I'm not round my family, so it's the different setting that I like" (P6)

"I know I talked but I wasn't talking as much like until the end, and I felt like I got more out of it towards the end than at the start because…I just developed and became more confident over the weeks" (P5)

Conversely, the group-based format of the PA sessions was largely accountable for disparities between participants' attendance to this component; which appeared to be determined by their perceived competence, and previous experiences of 'exercise' and 'sports':

"Just the feeling that all eyes are on you. Cos of my anxiety it's difficult for me to enjoy and get into group activities… And it doesn't matter for me how big the group is, I still wouldn't do sports unless I was on my own" (P5)

"It's like school, like a prison, simple" (P4)

This resulted in lower attendance overall to the PA sessions compared with DBT-ST; with the exception of P3- whose perceived competence and autonomy for PA were key antecedents to their motivation for participating in the intervention (Teixeira et al., 2012):

"I was more like into sports which is why I came. Yeah, it was alright, it was sports so I was up for that"(P3)

"I wouldn't have cared if there was more people doing the activities. To be fair, I just focus on myself and don't care about the others"

As consequence of their consistent engagement with PA sessions, often delivered as one-to-one 'coaching' rather than the intended group-based format, it was evident that this participant established a *reciprocal* connectedness with the coaches rather than other participants, thereby supporting their relatedness needs and overall psychological well-being (see Nagpaul & Chen, 2019):

"I think we got to about week five and we were like getting more competitive, and P3 was like, "yeah, you're going down". Yeah, just that kind of like friendly banter and being able to be a bit cheeky!" (Coach 1)

The individualised PA sessions also provided an opportunity for this participant to learn and develop new skills, which—through perceived competence—may have contributed to the reported increase in global self-esteem (Biddle et al., 2019):

> *"I felt like the young people in Cardiff were more focused on the skills that they could get out of sport, as opposed to the enjoyment. I think they were enjoying it, but it felt more focused on like you know "I want to focus on this area". It was more individualistic I guess" (Coach 3)*

While these excerpts demonstrate the direct effects of attendance to the PA sessions on psychometric outcomes, there was also evidence to suggest that participants who had regularly engaged with the DBT-ST sessions, yet avoided the group-based PA (due to anxieties etc.; see above), *indirectly* experienced psychological and behavioural changes (pre-post increases in well-being and PA; see Table 7.8):

> *"I just got more confidence out of it- that group. Like that bouldering thing, that climbing thing - I would never gone to there before if I didn't learn from the group. Like, in a sense it boosted my confidence, and made me think like, not everything's as bad as it seems" (P5)*

In congruence with the findings presented in Chapter Two, it is evident that interventions which constitute psychotherapy and PA can engender larger positive effects than those comprising either component, *irrespective of 'dose' received* (see Thomas et al., 2020). In the context of this example, despite the negligible 'dose' of the PA component (one session) this participant reported the *largest* pre-post increase in self-reported PA (660 minutes per week); possibly reflecting the cumulative effect of applying psychological principles learned through DBT-ST (goal-setting, self-regulation), and increased competence for PA, derived through the vicarious experiences of other participants (Ashford et al., 2010; Lubans et al., 2016). Paradoxically, despite these effects this participant reported an overall increase in weekly sedentary behaviour time (2520 minutes per week)- highlighting that SB is not necessarily the inverse of PA time (Stamatakis et al., 2019), and potentially reflecting the need for

distinguishing how mentally 'active' or 'passive' SB time may differentially interact with psychological outcome (Vancampfort et al., 2017).

7.3.5 Contextual Factors

Evaluation of the evidence presented thus far suggests that implementation-related factors predominantly contributed to the challenges encountered, rather than a lack of intervention effectiveness or an unfeasible study design per se. Indeed, notwithstanding the small sample size, participants reported positive effects across all psychometric and behavioural outcomes; indicating that overcoming identified implementation barriers (see 7.3.3) could facilitate scale-up of the intervention, and translation from research into routine practice.

To comprehensively address 'what worked' for this intervention requires further exploration of how contextual factors might have interacted with mechanisms of effect (promoted / impeded), and thereby determined the magnitude and direction of outcomes for these participants (Moore et al., 2015).

Given the complexity of the intervention and respective constructs, identification and mapping of contextual barriers and facilitators was informed through implementation frameworks aligned to both the specific (DBT- see Toms et al., 2019; PA – see Cooper et al., 2021) and general (see Damschroder et al., 2009) multi-level factors encompassing the present intervention. Table 7.9 below provides a description of the interactions between contextual factors, mechanisms of effect, and subsequent outcomes of interest for this intervention (psychometric, behavioural, attendance/engagement-related), including the source of corresponding evidence supporting each causal explanation.

Table 7.9

Intervention Barriers and Facilitators Explained through Context-Mechanism-Outcome Interactions with Supporting Representative Quotes

	Barriers				Facilitators			
	Context	**Mechanism**	**Outcome**	**Evidence**	**Context**	**Mechanism**	**Outcome**	**Evidence**
Physical Activity Related	- Group format	- Anxiety-provoking - Low perceived competence	↓ Attendance ↑ SB	*If I had more confidence I probably would have gone to the activities but, it's just…when people have anxiety ..(P5)*	- Coach training	- Increased knowledge and understanding	↑ Participants' BPN support ↑ Coaches' reward and motivation	*You go back and you think about what has that done for their communication skills or self-esteem? That it really helps me then, to remember the theory behind it (Coach 1)*
	- Conflation of PA with sport / exercise	- Negative past experiences	↓ Motivation ↓ Engagement	*Sport…exercise. It's just effort (P4)* *I wasn't sure about the activity part, that's why I didn't take part, cos for me, I don't really like sport and so I didn't really enjoy that part of it (P5)*	- Adaptability	- 1:1 coaching and support	↑ Relatedness ↑ Autonomy	*It gave the young people a chance to kind of have more one on one time essentially..one on one attention and one on one connection, skill building, coaching in that sense (Coach 2)*
	- Intervention setting	- Anxiety-provoking - Low perceived competence	↓ Attendance	*It's like it's elitist a bit, it's not that inclusive. I mean I was intimidated walking in the first time and I like sports you know? It's like that barrier up. So I think that could have had some sort of impact as well (Coach 3)*	- Learning opportunity	- Intrinsic motivation and enjoyment	↑ Engagement ↑ Competence ↑ PA ↑ Well-being	*To see P3 develop and come back excited every week. You know you could see how vulnerable he was, but he was really engaged, really excited, and it was really nice to watch (Coach 3)*
					- Coaches attitude	- Genuine enthusiasm and encouragement	↑ Engagement ↑ Relatedness ↑ Self-esteem	*It was really amazing to see that transition from the start to the end of like them coming in not that interested, and then coming in excited and ready and like what are we going to do? (Coach 2)*
DBT-ST Related	- Classroom-based format	- Negative past experiences	↓ Engagement ↓ Motivation	*It felt like school. And I didn't like school (P4)*	- Group format and size	- Promoted trust and shared experiences - Reduced social anxieties	↑ Relatedness ↑ Well-being ↑ Engagement ↑ Self-esteem	*It gave me less anxiety to come then the next time. Like first time coming here I was like dreading it walking up, and then the second time I didn't feel the dread or nothing because I knew it was a nice environment and nice people around (P6)*
	- Perceptions of DBT-ST	- Low perceived utility of skills	↓ Motivation ↓ Relatedness	*It's not that I didn't like it, I didn't agree with her – we had a difference of opinion (P4)*	- Therapist's skills / qualities	- Participant belief in their abilities	↑ Attendance ↑ Competence ↑ Well-being	*I went there with all this baggage on my shoulders, and when I came out of there I felt like I can breathe again (P5)*

					- Classroom-based format	- Familiarity - Structure / routine	↑ Attendance ↑ Well-being	*I feel like that was one of the reasons I liked it maybe, it felt like school (P6)*
					- Learning opportunity	- Intrinsic motivation and enjoyment	↑ Engagement ↑ Competence	*I was into psychology before even coming here. And just like, it's made my interest a bit higher (P6)*
General Factors	- Intervention timing	- Competing priorities	↓ Attendance	*Maybe do it in the summer holidays, then you might get more engagement because we do have lots of young people that are in education (Support worker)*	- Incentives	- Extrinsic motivation to attend	↑ Attendance	*I said to P3 he gets a free fiver, so he needs to come along (P4)* *Knowing I get a fiver at the end of it, it gave me motivation to actually do what I'm here to do (P6)*
	- Lack of resources	- Staff unable to accompany participants	↓ Attendance	Potential participants wouldn't come alone due to social anxiety, or lack of transport (Correspondence with staff)	- Staff support	- Accompany participants, reinforce use of skills, reduce anxieties	↑ Engagement ↑ Relatedness ↑ Competence	*Having support workers present is also really useful tool when it's like an anxiety-based or nervous-based issue why there not participating or engaging (Coach 2)*
	- Promotional / recruitment materials	- Insufficient information	↓ Attendance	*In the future what would help is if we had joined up approach in terms of like us being able to sell what we do in a way that works for young people (Coach 3)*			↑ Attendance ↑ Self-esteem	*Cos [my support worker] introduced me to you all the first time, then the second time I found it alright, it was OK (P6)*
		- Ineffective mode of dissemination	↓ Reach	*Even if it's just like weekly tagged videos on their social then they might engage (P6)*				

7.3.6 Intervention Cost

A breakdown of the total cost of implementation is provided in Table 7.10.

Table 7.10

Total Costs for Implementation of the Combined Physical Activity and DBT-Skills Training Intervention

Category	PA Component	PA + DBT-ST Component
Intervention Facilitators		
Coaches	£0 (voluntary)	£0 (voluntary)
Psychologists	n/a	£1360
Facilities		
Meeting Room	n/a	£288.86
Sports Hall	£450	£372.15
Equipment and Materials	£425.18	£320.32
Incentive Scheme	£410	£115
TOTAL	**£1285.18**	**£2456.33**

Notes: PA = Physical Activity; DBT-ST = Dialectical Behavioural Therapy Skills Training; 'Incentive Scheme' calculation = Total attendances x £5

A total of six participants attended the intervention during the implementation period, resulting in a fundamental cost per head of £409.39. However, participants considered to have engaged with the intervention (i.e. attended > 5 weeks) reflect a more realistic and 'true' cost of £818.78 per head.

7.4 Cost-Effectiveness Comparisons

The incremental cost-effectiveness ratio (ICER) was utilised to guide interpretation of costs per unit of treatment effect for outcomes measured across both interventions (see Drummond & McGuire, 2001). The following equation was utilised to calculate ICER, whereby *C* = overall costs (see above), *E* = effectiveness (pre-post change in outcome), 1 = combined PA+DBT-ST, and 0 = PA only:

$$\frac{C_1 - C_0}{E_1 - E_0}$$

Given the differences in the number of participants who engaged with each intervention, ICER calculations were performed both for the overall intervention cost/effectiveness, and for cost-effectiveness per participant (i.e. *C* = total intervention cost / *n*). A full summary of relative ICER calculations is presented in Table 7.11.

Table 7.11

Incremental Cost-Effectiveness Ratio's for the DBT-ST + Physical Activity Intervention versus the Physical Activity Only Intervention

	Incremental Cost-Effectiveness Ratio	
Outcome[1]	**Intervention**	**Per Participant**
Well-being (SWEMWBS)	£472.98[2]	£282.89
Self-Esteem (RSES)	£337.51	£198.22
Physical Activity (Mins. per week)	-£37.61[3]	-£22.17
Sedentary Behaviour (Mins. per week)	£1.91	£1.13

Notes: SWEMWBS = Short Warwick-Edinburgh Mental Well-being Scale; RSES = Rosenberg Self-Esteem Status; Mins. = Minutes; [1]Pre-post change difference; [2]Positive ICER = More effective and higher cost; [3]Negative ICER = Less effective and higher cost

While the PA+DBT-ST intervention was more effective across most outcomes (greater pre-post change for well-being, self-esteem, and sedentary behaviour), the incremental costs per unit of positive effect displayed in Table 7.11 illustrate that—comparatively—these marginal, non-clinical benefits may not justify the relative difference in cost (i.e. outcomes remain below desirable range despite relatively large associated cost; see Cohen & Reynolds, 2008). By contrast, ICER calculations for change in total PA levels indicate economical 'dominance' of the PA intervention over the PA+DBT-ST intervention for positive PA behaviour change (i.e. cost-saving intervention and greater pre-post increase in PA levels).

7.5 Conclusions

This Chapter has substantiated previous findings presented within this Thesis, through evidencing the positive effects of psychologically-informed group-based PA interventions for YPEH. The reported increases in PA, and significantly reduced SB are particularly promising for this population, given the protective role of wider psychosocial and physiological benefits associated with these behavioural changes (e.g. improved sleep quality, reduced maladaptive coping etc.; see Sampasa-Kanyinga et al., 2020). Despite the absence of change in pre-post intervention measure for psychological outcomes (well-being, self-esteem), follow-up qualitative evaluation identified evidence pertaining to the psychosocial benefits participants had experienced by virtue of the need-supportive environment cultivated through group-based PA, and corresponding 'active ingredients' of positive change.

Despite the implementation-related challenges encountered throughout the PA +DBT-ST intervention, the process-evaluation afforded important insights into potential barriers and facilitators which require consideration when designing and delivering programmes involving YPEH. Through incorporating evidence derived from multiple sources (participant group interviews, coaches' feedback, correspondence with staff, observational monitoring), it was apparent that challenges may arise across multiple levels encompassing the implementation process (i.e. contextual, individual, organisational), and therefore mitigating 'implementation failure' may necessitate multiple strategies involving all stakeholders (Moore et al., 2015). Notwithstanding implementation difficulties, the post-study evaluation suggested that a combined PA + DBT-ST intervention can be delivered with good fidelity to the theoretical framework (for PA), and integrity to the treatment approach (for DBT-ST); with preliminary

findings indicating that—if successfully implemented—the intervention may be effective for well-being, self-esteem, and positive behaviour change of YPEH.

Chapter Eight:
General Discussion

8.1 Introduction

The research presented throughout this Thesis has provided a comprehensive, insightful, and timely contribution to knowledge through evidencing: the effectiveness of interventions which combine PA and psychotherapies for behavioural and psychometric outcomes; the feasibility of a combined PA and psychotherapy intervention for YPEH; the impact of COVID-19 restrictions on YPEHs' well-being and PA behaviours; the effectiveness of a combined PA and psychotherapy intervention for YPEH; and the challenges and enablers associated with implementing and evaluating interventions with YPEH. While each of these unique studies served to inform and guide the researcher's approach to the next, a clear and consistent theoretical framework ensured that decisions were underpinned by 'what works', yet applied to reflect what works i*n this context, for this population.*

As the project developed and evolved, the rationale progressed from conceptualising PA as a means of encouraging YPEH to engage with psychotherapy, to presenting PA as a credible *treatment target* for increasing engagement, socialisation, and well-being of this population. Throughout this process, numerous additional (and somewhat unexpected) questions and challenges emerged; how to overcome the multi-level barriers; what are the active mechanisms of change; and not least, how to design and implement an intervention in the midst of an unprecedented global pandemic? While each presented their own difficulties from a practical, research, and personal perspective, the project culminated in the implementation and evaluation of a two-arm study informed by evidence derived from the accumulated experiences and findings preceding this phase. Notwithstanding the hindrances encountered, and consequential amendments to the intended methodology (see Chapter's Six and Seven), findings from this study elucidated not only the effectiveness and potential mechanisms of change for PA-based

interventions, but informed how future research and practice with this population may overcome potential barriers and avoid common pitfalls.

As described in Chapter One, this research project initially comprised three inter-related aims:

1. To investigate whether PA may be an effective vehicle for encouraging YPEH to engage in psychotherapy.

2. To compare psychosocial and behavioural effects of interventions delivering either PA, psychotherapy, or a combination of PA and psychotherapy.

3. To identify the 'active ingredients' of effective interventions, and explore potential mechanisms of change.

While the unanticipated challenges presented by the pandemic forestalled the intended full-scale trial, this project has addressed these aims through the accumulation of novel insights and evidence derived from empirical research, real-world experiences, and theory-based explanations. To illustrate how each research study contributed to these overarching aims, and informed progression of the overall project, an overview of the key findings is presented in Table 8.1.

Table 8.1

Key Findings from each Study, Organised by the Overarching Aims of the Project

	Is PA a viable means of encouraging engagement in psychotherapy?	What are the effects of PA, psychotherapy, or both combined?	What are the mechanisms of change for observed effects?
Chapter Two: Systematic Review	N/A	- Equal effectiveness across all conditions - Increased PA requires psychological framework	- No PA dose-response suggests psychosocial mechanisms - Behavioural activation may explain psychological and behavioural changes
Chapter Four: Pilot Study	- Inability to recruit into DBT-ST group = 'proof of concept' - Significant association between attendance to PA and DBT-ST groups	- Significant increase in pre-post well-being scores - Positive change across all outcomes	- No dose-response between PA and psychological outcomes - Social connectedness, new relationships, and having fun cited (qualitative)
Chapter Five: Impact of COVID-19	N/A	- Increased PA predictive of psychological well-being - Reduced PA associated with low self-esteem	- Further (qualitative) exploration required as small proportion of variance - Changes in SB may account for differential effects on outcomes
Chapter 7-1: PA Intervention	N/A	- PA intervention = increased PA and significantly reduced SB - No change in pre-post well-being or self-esteem scores	- Increased moderate PA predictive of reduced SB time - Evidence for association between BPNS and positive experiences
Chapter 7-2: PA+DBT-ST Intervention	- Inconclusive – Participants attended DBT-ST without PA, or DBT-ST because of PA	- Positive change across all outcomes - PA attendance associated with increased self-esteem - DBT-ST attendance associated with increased well-being - Increased PA reported pre-post DBT-ST attendance	- No dose-response between PA and psychological outcomes - Learning skills, and challenge cited (qualitative) - Social support, and fun cited (qualitative) - Behavioural activation and vicarious experiences may explain outcomes

Notes: N/A = Not Applicable; DBT-ST = Dialectical Behavioural Therapy Skills Training; PA = Physical Activity; SB = Sedentary Behaviour; BPNS = Basic Psychological Need's Support (Competence, Autonomy, Relatedness).

As demonstrated in Table 8.1, research findings presented within each Chapter have been evaluated with reference to the extant literature, and applied in the context of subsequent research to be undertaken in fulfilment of this project's aims. While this chapter thus far has provided a summary of these respective studies and key findings, the remainder will focus on further evaluation and discussion of results from the concluding 2-arm study (see Chapter Seven), including triangulation of key findings to facilitate the quality of inferences and support

validity of overall interpretations and conclusions (Teddlie & Tashakkori, 2009). To further understanding of 'what works', and address existing gaps in the evidence-base these findings will be utilised to: explore key determinants of outcome effects and perceived benefits within and between interventions; and explain patterns or variations in mechanism-outcome interactions, according to contextual nuances (e.g. *demi-regularities*; see Zachariadis et al., 2013). The Thesis will conclude by presenting implications of the overall project findings- including recommendations for incorporating key principles into clinical practice, and addressing implementation-related determinants of engagement and effectiveness with this population. A discussion of the strengths and limitations of this project will precede potential directions for further research to address remaining ambiguities and gaps.

8.2 Interpretation and Discussion of Key Findings

Despite discrepancies between the relative 'success' of implementing the interventions described in Chapters Six and Seven, the pragmatic evaluation of the results afforded insights and *practical utility* of the findings which, arguably, may not have been attained within a more positivist paradigm and analytic approach (Feilzer et al., 2010). Specifically, findings derived from intervention one (psychologically-informed group PA) provided quantitative data which reinforced the importance of *psychologically-informed* delivery (c.f. evidence presented in Chapter Two) for achieving effective behavioural change (increased PA, decreased SB). Post-intervention focus-group discussions elucidated further understanding of the interplay between contextual factors, theoretical principles, and psychosocial or behavioural outcomes; with the derived themes suggesting that optimal PA interventions necessitate *balance* between identified mechanisms of change, rather than a quantifiable 'dose' (see 7.2.4). Intervention two (psychologically-informed group PA + DBT-ST) exemplified many of the challenges described

throughout the literature which often compromise implementation and effectiveness in research with 'harder to reach' groups (Kidd et al., 2018; O'Cathian et al., 2019). Nonetheless, integration of evidence from multiple sources (researcher's monitoring observations and correspondence with support staff, post-intervention focus groups with participants and deliverers) was utilised to inform a comprehensive evaluation of multi-level barriers and facilitators to the processes involved with implementing complex interventions with this population. Although based on a relatively small sample, additional descriptive quantitative effects indicated that positive behavioural change (increased PA) may be associated with psychotherapeutic treatment alone, and engaging with PA or psychotherapies may induce differential effects on self-esteem and well-being, respectively (see 7.3.4).

When scrutinising findings from these interventions (including comparisons with those from preceding studies in this Thesis) there are clearly patterns and associations both within and between the datasets; the direction and magnitude of which are ostensibly determined by the interaction between contextual factors and subjective experiences. The following sections will address each of these identified 'demi-regularities', to complement explanation of the integrated findings, and explore how mechanisms of effect may be influenced by variable external factors and conditions (Zachariadis et al. 2013).

8.2.1 The Effectiveness of Physical Activity Interventions for Engagement and Positive Outcomes

The studies completed throughout this research project have evidenced that—given the opportunity—YPEH are amenable to participating in PA which is either self-directed and individual (i.e. during COVID-19 lockdown), or organised and group-based. Although this corroborates existing literature supporting the acceptability and utility of PA for this population

(e.g. Sandford et al., 2006), in the context of this research project three common external factors were repeatedly identified as determinants of the young people's engagement, each of which corresponded to pivotal phases throughout the implementation process. From the researcher's observations, feedback from participants, and concordant with previous studies (Deenik et al., 2019), recruitment, reach, and *pre-intervention engagement* necessitated an identified 'Champion' from the organisation to promote the research from the 'inner setting', and encourage participation. The presence or absence of this key individual influenced the relative success of reaching and recruiting participants from the organisation- both directly (i.e. identifying and contacting eligible young people), and indirectly (i.e. snowball sampling via correspondence with other staff). Evaluation of integrated data subsequently indicated that *early engagement* of recruited participants was more likely when accompanied by a trusted and familiar individual, such as their support worker. Despite this evidence emerging through the difficulties encountered in the pilot study (see 4.5.1), variable staff support accounted for the differences in initial attendance and engagement as reported and described in Chapter Seven. Although staff support remained important for *sustained engagement*, follow-up analysis indicated that ongoing incentives (i.e. vouchers for attendance) contributed to participant continuation for the duration of the intervention period. Although this extrinsic reward was cited by some participants as the sole reason for attendance to intervention two (PA+DBT-ST), evidence strongly indicated that most participants experienced internalisation of their motivation to attend (i.e. from extrinsic), through support and satisfaction of their basic psychological needs (Ryan & Deci, 2008). Specifically, common themes across the studies infer that the 'active ingredients' of this process include: social connectedness, opportunities to learn, and a fun, non-pressurised environment and

approach; which collectively indicate that these elements may be predictive of continuation or drop-out of participants for future programmes or interventions.

While increasing overall levels of PA was not a primary objective of this research project, the complex, and often reciprocal interplay between PA, psychological well-being, self-esteem, and mental health (Kandola et al., 2019), highlights the necessity for further investigation of mechanisms of change affecting PA behaviour. As evidenced in findings from the systematic review (Chapter Two), PA-based interventions are more effective for increasing PA when designed and delivered within a theoretical framework which facilitates intrinsic motivation and supports behaviour change. Comparing outcomes from this project's pilot study (Chapter Four), with those reported in the final two-arm study (Chapter Seven), unequivocally demonstrates this concept when examining the pre-post change in participants' levels of PA (pilot = marginal, final interventions = large). While the pilot study was intended to demonstrate effectiveness and 'proof of concept', this was not the primary objective during this early phase of the research project- wherein the theoretical framework was in early stages of conceptualisation and testing. Contrastingly, the design and implementation of the PA component described in Chapters Six and Seven was informed by extensive theory, literature, collaboration, and preceding findings evidencing the most effective principles and techniques for positive outcomes with this population in this context; possibly accounting for the evident PA change reported pre-post intervention. While notable variance between these interventions' timing, settings, training provided, activities, and delivery coaches warrants consideration of confounding factors, the collective evidence indicates that PA-based interventions designed within a relevant theoretical framework, delivered through psychologically-informed techniques *conducive to prominent*

needs of the population, may be more effective for positive PA behaviour change, irrespective of PA 'dose' delivered or received.

While PA behaviour was not a *primary* outcome of interest in for this research project, SB was not initially considered as a potentially relevant outcome prior to findings from the COVID-19 study (Chapter Five), in which the subtleties of 'inactivity' 'PA change', and 'SB time' were demonstrated through interpretation of statistical results. Although not a PA intervention *per se*, restrictions imposed during this study propounded individuals' perceptions of PA from an often non-prioritised, or unimportant aspect of daily life, to one of the few permissible reasons or excuses to leave home each day. While SB was not measured as a discrete variable within this study, the disparities observed between changes in PA and resultant self-esteem suggested a non-linear relationship may exist between these variables; with reduced PA (increasing SB) presenting a risk factor for experiencing low self-esteem. This timely finding intersected with an upsurge in evidence and calls for further research investigating the independent effects of SB and PA on psychological outcomes (Bull et al., 2020; Kandola et al., 2020; Hallgren et al., 2020), and thereon included in this project as a key outcome target, and possible mediating variable for positive change. Findings from the subsequent PA intervention (presented in Chapter Seven) endorsed this decision- with participants reporting significantly lower SB time from pre-post intervention, which—moreover—was predicted by increased levels of moderate PA. Given the beneficial effects of *replacing* SB with moderate PA (Hallgren et al., 2019; 2020), these findings emphasise the potential for encouraging achievable increases in daily PA, rather than 'prescribing' current recommended targets (Bull et al., 2020), and specifically suggest that increasing moderate PA levels by 10 minutes per day could achieve a reduction of 10.5 hours per week in total SB time (see 7.2.3.2). Furthermore, this insinuates that the relatively large

reduction in participants' pre-post intervention SB reflects a more general change in behaviours (i.e. unrelated to PA) such as participants reducing excessive screen time, and by virtue of spending less time alone in their rooms simply 'moving more' at any intensity (Sampasa-Kanyinga et al., 2020, Stamatakis et al., 2019). This further supports the positive feedback loop described by some participants post-intervention (see 7.2.4)- whereby attendance to the PA sessions engendered an increase in wider self-regulated behaviours, which—through association with positive psychosocial effects—reinforced longer-term, sustained engagement (Deci & Ryan, 2000). While most studies to date have reported the physiological effects of 'reallocating' SB to PA time (Kandola et al., 2021; Prince et al., 2014), this indicates that providing *opportunities* for individuals to achieve small increases in PA behaviour could amplify the corresponding reduction in their SB time, and thereby augment the associated psychological and physiological health benefits.

Despite the aforementioned association between reduced levels of PA (i.e. SB) and low self-esteem (see above and Chapter Five), the overall findings throughout this research project provide limited evidence for a causal relationship between increased PA and global self-esteem; indicating that participants' experience of PA (rather than a quantifiable 'dose') may determine the intervention effectiveness for this multidimensional construct (Biddle et al., 2018). For example, increased self-esteem reported in the pilot study (Chapter Four) did not correspond with increases in total PA (marginal change), whereas increased in PA reported in the PA intervention (Chapter Seven) did not translate to improved self-esteem (similar pre-post scores). For the intervention comprising both PA and DBT-ST, increased self-esteem was reported *only* by participants who had engaged with the PA component, however this was not associated with changes in pre-post PA behaviour. These findings are somewhat ambiguous, given substantial

evidence for each intervention supporting the satisfaction of participants' competence needs, and the mediating role of perceived competence in the relationship between PA and self-esteem (Lubans et al., 2016). Notwithstanding, the findings reflect a wider evidence-base citing the influence of numerous other mediating and moderating variables (i.e. self-worth, self-perception, self-concept) on the PA↔self-esteem relationship (e.g. Biddle et al., 2018; Dale et al., 2019; Liu et al., 2015), and demonstrates the complexities associated with measuring this multi-faceted construct- particularly in the context of PA, for which the *quality* of one's experiences may ultimately determine self-esteem change.

The strong reciprocal relationship often reported between psychological well-being and global self-esteem (Rosenberg et al., 1995) was concurrent with the similar direction of pre-post changes reported for these outcomes throughout the current research project. Conversely, the relationship between these outcomes and participants' levels of PA varied somewhat across the studies; indicating that distinct mediating factors *unrelated* to self-esteem may have determined the magnitude and direction of the differential associations reported between PA and well-being. For example, the significant increases in well-being observed pre-post the pilot intervention (despite marginal increases in PA; see Chapter Four), directly contrasted with findings from the subsequent PA-only intervention (Chapter Seven)- after which participants reported an increase in PA, yet no change (slight decrease) in overall psychological well-being. While this reinforces the inconclusive evidence for dose-response relationship between PA and well-being, it is somewhat counterintuitive to the needs-supportive environment and experiences depicted by participants throughout the follow-up discussions (see 7.2.4), and corresponding literature evidencing the influence of need satisfaction on psychological well-being (both in the context of PA, and for this population; see Krabbenborg et al., 2017; Reis et al., 2000; Teixeira et al.,

2012). A key difference between the pilot study and subsequent PA intervention which may explain these findings is the duration for which each study was conducted (12-weeks and 8-weeks, respectively), and therefore timeframe between pre-post measures. Given the range of biopsychosocial mediators of effect between PA and psychological well-being, it is entirely plausible that an eight-week duration was insufficient for relevant biological changes associated with PA (i.e. reduced inflammation, neurogenesis etc.) to have impacted participants' psychological well-being (Kandola et al., 2019). Equally, the contrasting changes observed for PA between the interventions (pilot intervention– marginal increase, PA-only intervention – large increase; see above) indicate that the psychologically-informed approach applied to the PA intervention elicited an initial (acute) *behavioural* response from these participants (i.e. increased PA), with the absence of corresponding psychological change possibly reflecting a delayed (long-term) effect, as reported in similar research elsewhere (e.g. Carter et al., 2015; Merom et al., 2008; Parker et al., 2016). These findings also suggest that while needs-supportive PA interventions can positively change PA behaviours, the longer-term effects and pathways between need-satisfaction and psychological well-being are highly complex, and warrant further investigation of how specific contextual and individual moderators may directly and indirectly effect behavioural, and psychological outcomes (Ntoumanis et al., 2021).

8.2.3 Combined Physical Activity and Psychotherapy Interventions as a Requisite for Optimal Engagement and Effectiveness

Integrated findings from the pilot study (Chapter Four) and PA+DBT-ST intervention (Chapter Seven) suggest that interventions which comprise both PA and DBT-ST may be effective for well-being, self-esteem, and PA behaviours of YPEH. Nonetheless, the component to which participants attributed positive effects is less clear- as illustrated through the mixed responses and experiences provided during qualitative follow-up discussions of the respective

interventions. To delineate mechanisms, it is therefore imperative to interpret findings beyond dose-response effects; given the evidence to challenge any assumption that attendance equates to engagement (and thus dose received; see Rowbotham et al., 2019). Indeed, the significant improvement in participants' well-being observed during the pilot study should be considered with reference to both relative attendance levels (PA = 50%, DBT-ST = 30%), and participants' subjective experiences of attending these respective components. In conjunction, these findings implied that positive benefits reported and described by this study's participants were predominantly derived from aspects related to the PA, rather than DBT-ST group (see section 4.5). As this study was focussed on testing *feasibility* rather than effectiveness however, necessary deviations from protocol most likely compromised fidelity to the DBT-ST component, thereby undermining conclusions relating to treatment effectiveness (see McCay et al., 2018).

Findings from the refined PA+DBT-ST intervention presented in Chapter Seven provide a more nuanced insight into the complexities associated with engaging YPEH, and indicate that common mechanisms of positive effects may be determined by subjective experiences of the intervention, rather than derived through a specific component (i.e. PA or DBT-ST) or consequential to cumulative effects. Although the sample size of this intervention precluded inferential statistical analysis, it was evident that perceived benefits to participants were accumulated through aspects such as learning new skills, having sense of purpose or routine, and social connectedness to others (see 7.3.4.2)- *irrespective* of their preference, and resultant attendance to either the PA or DBT-ST components. While an evidence-based approach was adopted for conceptualisation of the DBT-ST programme (see Chapter Three), these aforementioned 'active ingredients' distinctly correspond to the Basic Psychological Need Theory (BPNT; Deci & Ryan, 2000) underpinning the intervention's PA component. For example, providing participants with opportunities to learn

and master new skills (both in the context of activities and DBT) may have supported their perceptions of competence, and thereby contributed to specific self-esteem and subsequent continuation of the behaviour (Rosenberg et al., 1995; Vansteenkiste et al., 2020). This reinforcement for sustained engagement with the intervention may have also contributed to participants' satisfaction of autonomy through increased self-regulated behaviour- such as *volitionally* attending weekly sessions, rather than for externally-regulated motivations (e.g. staff encouragement, incentives; see Deci & Ryan, 2000). Furthermore—through routine attendance to the sessions— participants may have also experienced increased *familiarity* with the intervention setting, facilitators, and other young people; thereby promoting sustained engagement in both DBT-ST and PA-based interventions (see Bergholz et al., 2016; Vitopoulos et al., 2017), while simultaneously supporting satisfaction of relatedness needs through engendering social connectedness, perceived safety, and trust (Teixeira et al., 2020). This exemplifies the notion of 'interdependence' between the BPNs; i.e. that socio-contextual conditions which are supportive of one need will promote satisfaction of the others through direct and indirect pathways (Ryan & Deci, 2017). Moreover, these findings concur with recent evidence illustrating 'interrelatedness' between the specific behaviour change techniques; i.e. those adopted to *primarily* target one need will invariably have an effect on the other two (Gillison et al., 2019; Teixeira et al., 2020). This may be particularly relevant in the context of interventions for YPEH; for whom targeting perceived competence (i.e. through providing opportunities to learn new skills) has been evidenced to *directly* contribute to improved quality of life, while *indirectly* supporting satisfaction of autonomy and competence through reduced psychological distress, and increased perceptions of social support (Krabbenborg et al., 2017; Parry et al., 2021). Furthermore, despite the psychosocial benefits associated with group-based

interventions (Ntoumanis et al., 2021), and importance of supporting relatedness needs for 'at-risk' young people (Nagpaul & Chen, 2019), the findings presented throughout this Thesis evidenced how 'social anxiety' can frequently undermine this population's sense of competence, and thereby impede initial engagement in such opportunities. It is therefore plausible that implementing competence-supportive techniques during the *initial* stages of interventions or programmes may be necessary for *subsequent* satisfaction of participants' relatedness needs-through increased self-efficacy for the activity as a facilitator of sustained engagement and progressive enhancement of social connectedness (Begun et al., 2018; Deci & Ryan, 2000).

In contrast to findings from the pilot study, attendance to the DBT-ST group did not necessitate the adjunctive PA for some participants who engaged with the intervention, whereas others attended the DBT-ST solely as a pre-requisite to the subsequent PA sessions. It is therefore plausible that future programmes or interventions incorporating both components may benefit from adopting a more flexible, pragmatic design wherein participants are given *autonomy* to attend either PA, DBT-ST, or both; provided each is delivered in accordance with psychological principles underpinning identified mechanisms of change (see above and Chapter Seven). Providing participants with choices in this manner may be integral to their motivation and well-being; firstly, through endorsing self-directed behaviours aligned to personal preferences and goals (Altena et al., 2018); and secondly, through supporting psychosocial adjustment by virtue of promoting *volitional functioning* (Soenens et al., 2007). Preliminary findings discussed in Chapter Seven also indicate that participants whose initial motives may be directed towards one component of the intervention (i.e. either PA or DBT-ST), may—through vicarious experiences, perceived social 'norms', or a general 'behavioural activation' effect—change their attitudes and therefore behaviours in relation to the secondary intervention component (i.e. increased PA for

DBT-ST participants). Despite recent calls to integrate PA into psychological therapies as a viable 'treatment target' (Ashdown-Franks et al., 2019; Thompson et al., 2020), relatively little is known about the reciprocal or synergistic effects 'first line' treatments on PA levels (Cuijpers et al., 2014), or whether PA levels are associated with young people's attitudes towards seeking or receiving therapeutic support. Given the apparent similarities between the 'active ingredients' and processes involved in either effective PA or psychotherapy-based interventions (as described above; see Michie et al., 2013), these concepts warrants further investigation to establish: how the interplay between PA and psychological well-being may influence YPEHs' initial motivations for engaging in available opportunities (i.e. psychotherapy, PA, or other activities); whether supporting sustained adherence to one component may—*by proxy*—engender positive change towards the other (attitudes, intentions, or behaviours); and how unintended consequences (i.e. increasing PA, accessing psychological support) may moderate long-term physical or psychosocial health outcomes (see Figure 8.1 for illustrative model).

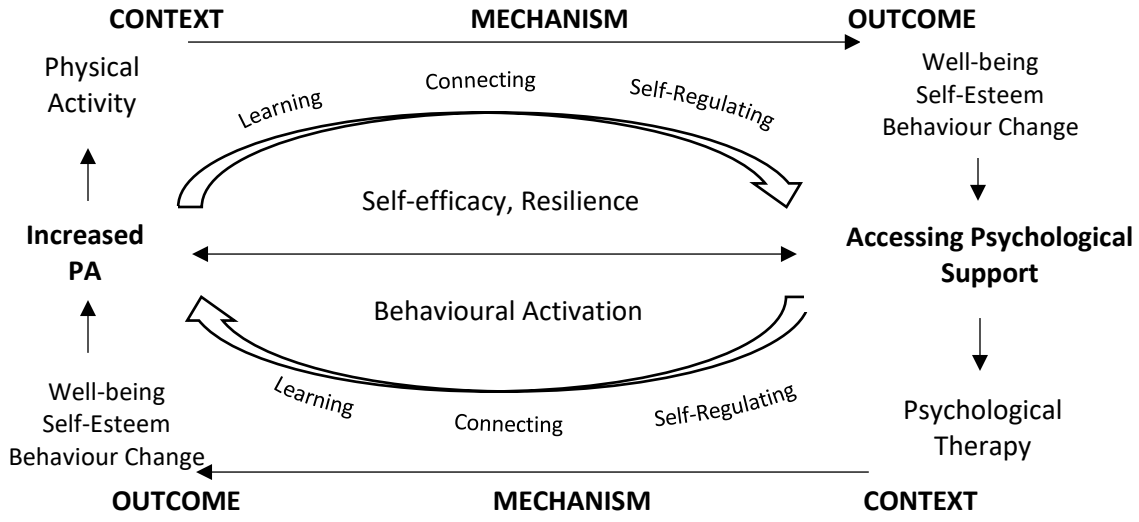

Figure 8.1. *Theoretical Model Illustrating Potential Synergistic Mechanisms of Change between Physical Activity and Psychological Therapy Engagement*

As depicted in the model above, targeting the determinants of the desired outcomes (i.e. well-being, self-esteem, PA behaviour) on physical and psychological levels of influence may promote *optimal* initial engagement of YPEH, while simultaneously supporting longer-term effects through *mutual reinforcement* between the respective interventions (Weiner et al., 2012). Furthermore, when considering the heterogeneity in past experiences, mental health status, substance use etc. of YPEH (Kidd et al., 2018; Fowler et al., 2019), it is evident sufficiently addressing this population's diverse needs may necessitate more flexible, unconventional approaches than those which assume that 'one size fits all' (Curry et al., 2021).

8.3 Clinical Implications

The range of studies undertaken in fulfilment of this project's initial aims and objectives have provided valuable and novel insights into general principles for designing and implementing programmes for YPEH, and specific evidence pertaining to the effectiveness of PA-based interventions as either an adjunct to psychological therapy or effective 'standalone' treatment option for psychosocial well-being and positive behaviour change. Despite the challenges and difficulties associated with completing this research amid a global pandemic, the collective findings have several implications for translating this research to evidence-based practice with marginalised, vulnerable young people. These can be broadly categorised as: implementation-related implications (i.e. for facilitating recruitment, engagement, and positive experiences); or theory-related implications (i.e. for embedding psychological principles for positive outcomes and behaviour change), which are applicable and generalisable across diverse opportunitie*s* which may be provided for this population as *routine* practice or care (Patsopoulos, 2011).

8.3.1 Implementation of Positive Opportunities

The pragmatic nature of the four 'real-world' studies presented within this Thesis provided flexibility to deviate from protocol; allowing *necessary* adaptations according to variations in resources and participants' needs (Zwarenstein et al., 2008). While multiple barriers and challenges to implementation were encountered throughout the research, these modifications provided additional insight into multi-level factors which may help reduce or remove such barriers, and thereby support optimal recruitment, retention, and engagement of young people in further, similar programmes implemented in real-world settings. To facilitate this process the 'determinants of success' at each level of implementation will be discussed below, thereby providing a conceptual framework from which research findings may be integrated into practice (see Nilsen, 2015).

8.3.1.1 Individual Level Factors

A common theme across each of the studies presented within this Thesis was the difficulties associated with initially reaching and recruiting young people from the target population. While this is frequently cited as one of the key challenges when conducting research with individuals experiencing homelessness (Strehlau et al., 2017), several strategies for improving recruitment and reach were identified through study modifications, and post-intervention recommendations from participants. Possibly reflecting the target population age (16-24 years), and acceleration of internet usage owing to the pandemic (OFCOM, 2021), utilising digital / social media outlets may be an effective means of expanding reach, increasing 'attractiveness', and promoting initial familiarisation with the initiative or opportunity. This may also be particularly relevant for future research, given the reliance on organisation staff to identify and 'refer' eligible participants for

the respective studies, thereby increasing the risk of selection bias, and possibly compromising external validity of the findings.

It was evident throughout the research that utilising incentives was a highly effective means of initially recruiting YPEH into the studies. For some, this extrinsic reward became less important than internalised motives for participation (i.e. fun, social connections; see 8.2.1), other participants attributed their attendance purely to receiving monetary vouchers each week. In contrast to the pilot study, 'staggering' incentives in this manner was conducive to lower attrition and drop-out, compared with offering larger rewards 'up front', and therefore may be vital to successful engagement of YPEH in future programmes (see Chapter Four). Although the restrictions associated with COVID-19 limited food-based incentives for participants, findings from the pilot study indicated that providing food for participants was an important factor which encouraged continued attendance, yet also for addressed potential practical (ensuring participants were adequately 'fuelled') and social (encouraging conversations in an informal, 'normalised' context) challenges when working with this population. It would therefore be advisable that to maximise retention *and* promote engagement of YPEH, future programmes would benefit from providing a structured monetary / voucher-based incentive system, while additionally providing on-site food for participants.

From a programme-content and delivery perspective, involving participants at every stage of implementation was pivotal to sustained attendance and engagement in each of the interventions. Firstly, this enabled potential barriers to engagement (e.g. inappropriate content, lack of understanding etc.) to be rapidly identified and resolved, and secondly promoted positive, trusting relationships between participants and those responsible for intervention delivery. Through encouraging feedback and suggestions from YPEH in this manner, future programmes

should be continuously reviewed and tailored accordingly by those responsible for implementation, to ensure the needs of participants are sufficiently met and supported at all times (Morton et al., 2020).

8.3.1.2 Organisation Level Factors

A primary determinant of each study's relative success in reaching and recruiting eligible participants was the presence (or absence) of an individual from within the organisation to promote the intervention to both colleagues, and the young people they support. Enlisting programme 'champions' is commonly cited as a crucial facilitator when implementing DBT-based (Toms et al., 2019) or PA-based (Koorts et al., 2018) interventions, particularly when potential participants are considered hard to reach and engage (i.e. experiencing homelessness; see Siersbaek et al., 2021). This was evident in the implementation challenges associated with the PA+DBT-ST intervention (as described in Chapter Seven), and highlights the importance of identifying 'internal advocates' as early as possible in the recruitment process (Durlak & DuPre, 2008). Staffing resources may also be integral to retention and engagement of young people throughout the programme duration. As demonstrated through the pilot study (Chapter Four), and PA-based intervention (Chapter Seven), an adequate ratio of support staff : participants enabled sustained attendance, and facilitated engagement for several reasons. Firstly, it was apparent throughout every stage of research in this project that disproportionately high levels of social anxiety, and low perceived self-efficacy amongst YPEH present a prominent barrier to uptake of opportunities, and—in the extreme—even leaving the house. Accordingly, *almost all* of participants' attendances to interventions sessions were synonymous with accompaniment of a staff member from the organisation; on whom the young people are evidently reliant for both practical (i.e. transportation) and psychosocial (i.e. anxiolytic) support- particularly during the

early stages of attendance to a new programme or opportunity. Thus, while it may be unrealistic, unsustainable, and potentially unhelpful for staff to accompany participants to all available sessions, it is imperative that a trusted individual is available for supporting their initial attendance as a minimum, and ideally until the young person has developed a sense of familiarity and trust within the given socio-contextual setting.

8.3.1.3 Programme Level Factors

While this research project provided some evidence to support the utility of PA-based programmes for well-being and engagement of YPEH, the collective evidence derived across all studies indicated that the 'ingredients' of optimal programmes may be more generic, than specifically attributed to the incorporation of PA *per se*. These firstly incorporated factors relevant to the content of interventions or programmes for YPEH, including: opportunities to learn new skills (competence); activities which enable connection with others (relatedness); and alignment of content to self-regulated values and goals expressed by participants within the group (autonomy, self-regulation). The congruence of these factors with the parenthesised 'basic psychological needs' to which they support (Deci & Ryan, 2008) highlights the relative advantage of implementing 'theory-informed' interventions (Michie et al., 2017), and furthermore exemplifies how such principles may be incorporated into routine practice with this population. In addition to programme content, the encompassing environment should, at all times, promote a fun, enjoyable, relaxed atmosphere with high tolerance for non-adherence, and (within reason) deviation from programme 'rules' (Curry et al., 2021). Given the resistance and poor engagement YPEH often display towards structured delivery of psychotherapy, adopting a more integrated approach whereby PA and DBT-ST are delivered *simultaneously* in an informal setting (i.e. sports hall) through incorporating DBT skills into PA-based tasks, could be one pragmatic

approach to overcome participants' perceived barriers towards psychotherapy such as negative associations with a 'classroom-based' environment (see Chapter Seven), or difficulties adhering to a manualised intervention (see Chapter Four).

Structural factors relating to the format and modality of interventions were also identified as important determinants of recruitment, retention, and engagement throughout the studies within this research project. These included temporal-related aspects, such as the time of year, intervention duration, session length, and start / finish time each week. The cumulative findings from observational, anecdotal, and qualitative evidence across all studies provided insight into barriers each of these factors presented, and therefore the following recommendations for the optimal timing and 'dose' of programmes for this population:

1. **Time of year**: Summer holidays.

Reasons: Minimal 'competing interests' such as school, college, work or training; better weather which may allow for outdoor delivery and thus cost-effectiveness.

2. **Intervention duration**:- Eight weeks.

Reasons: Engagement waned >8 weeks for longer programmes; sufficient duration to support positive outcomes and behaviour change.

3. **Session length**:- 1.5 – 2 hours.

Reasons: Overly time-intensive sessions may conduce drop out, or part-attendance (i.e. one component); limited resources (i.e. money or staffing) may limit implementing longer sessions.

4. **Start / finish time**:- 3:30-4:30pm / 5:30-6:30pm

Offering sessions within this 'window' would allow those in education or training to attend; ensuring sessions don't finish too late may encourage staff to attend and support.

Finally, the selected setting for the programme or opportunity may also be important for attendance, engagement and sustainability. While community-based settings are favourable for prolonged motivation and psychosocial well-being (Ntoumanis et al., 2021), it is crucial that these are easily-accessible, and non-intimidating to potential young people who may wish to

attend. Finally, the settings should be cost-effective to ensure successful programmes may be replicated or offered to YPEH on a 'rolling' basis.

8.3.2 Psychological Principles and Behaviour Change Techniques

The theoretical framework applied to intervention development in this research project was utilised to integrate principles of motivation, well-being, and behaviour change through supporting participants' Basic Psychological Needs (BPNs; Deci & Ryan, 2008), and implemented in conjunction with context-specific behaviour change techniques (BCTs) postulated to support the respective BPNs (see Chapter Three). Findings presented throughout this Thesis have evidenced the effectiveness of adopting a *psychologically-informed* approach when delivering programmes to YPEH, and identified the principal mechanisms of change which correspond to support and satisfaction of needs (social connectedness, learning and mastering new skills, self-regulating behaviours aligned to values and goals). While these 'active ingredients' for supporting positive experiences for YPEH reflect *what* is required, ensuring programmes include these elements necessitates further explanation of *how* practitioners may incorporate the corresponding psychological principles into routine practice settings.

8.3.2.1 How to Support Psychosocial Well-being

While detailed explanation of the interplay between BPN support, active ingredients, and positive outcomes can be found elsewhere in this Thesis (e.g. 3.2.3, 8.2.1), it is evident from the collective findings that a range of psychologically-informed approaches to delivering activities or tasks with this population, can (through BPNs) scaffold an environment to support positive experiences and outcomes for YPEH. An overview of these specific approaches, corresponding needs, and active ingredients is presented in Table 8.2.

Table 8.2

Psychologically-Informed Delivery Approaches to Support Basic Needs and Positive Experiences

Basic Psychological Need	Active Ingredient	Delivery Approach
Competence	Learning / Mastering Skills	**- Provide choice and variety of tasks** **- Provide positive reinforcement and praise** - Offer constructive feedback - Include problem-solving tasks - Make tasks optimally challenging - Provide further explanation if required
Relatedness	Social Connectedness	**- Invite feedback and suggestions** **- Provide positive reinforcement and praise** **- Offer non-pressurised encouragement** **- Promote fun and enjoyment at all times** - Facilitate communication between participants - Introduce 'healthy' competition
Autonomy	Self-Regulated Behaviours	**- Offer non-pressurised encouragement** **- Invite feedback and suggestions** **- Provide choice and variety of tasks** **- Promote fun and enjoyment at all times** - Employ minimal, flexible rules and regulations

As demonstrated within Table 8.2, overlapping psychologically-informed approaches may be effective for supporting multiple needs, and therefore it is advisable that practitioners incorporate (as a minimum) those highlighted in bold. Furthermore, while these recommended delivery approach techniques are predominantly derived from PA-based interventions, they are intended for generic application to varied contextual-settings, activities, or tasks.

8.3.2.2 How to Support Positive Behaviour Change

In addition to supporting psychosocial well-being, the recommended 'delivery approaches' identified through this research project (see above) are also likely to promote long-term change for YPEH- through generating a positive reinforcement loop between psychological need satisfaction, positive psychosocial outcomes, and subsequent increases in autonomously motivated behaviour change (Deci & Ryan, 2008). While this behaviour change may be specific

to the tasks or activities comprising each opportunity, the collective findings attained throughout this Thesis have highlighted the utility of several additional, non-specific BCTs which may be employed by practitioners to support wider behavioural outcomes for YPEH, through general 'behavioural activation effects' (Bailey et al., 2018).

During the initial stages of programme implementation for this population, participants' perceptions and impression of the person/s responsible for delivery may determine both early engagement and longer-term, sustained behaviour change. Conveying a knowledgeable and professional appearance (appropriate to the specific task / activity) has been evidenced to increase participants' perceived competency of those responsible for delivery (see 7.3.3.2), which may support beliefs in their own capabilities to execute and master the task or behaviour (e.g. Rhodes et al., 2020). This can be further supported if the providers concomitantly model the desired behaviour with genuine enthusiasm and effort, to vicariously encourage positive change through supporting participants' self-efficacy beliefs (Morton et al., 2020).

As indicated through findings across this research project, perceived 'social norms' may be a prominent influence on YPEHs' attitudes, intentions, and decision-making towards a particular behaviour, and thereby determine both initial uptake, and sustained long-term engagement and change (c.f. Gavine et al., 2017). Applied to routine practice, the use of social and digital media could be one effective method to encourage initial uptake by young people displaying amotivation towards the behaviour. Specifically, this could incorporate short video clips of similar young people engaging in the behaviour, or promotional media delivered by peers to endorse the associated benefits. Allowing non-participatory observation of the activity or opportunity may also be effective; particularly for those displaying ambivalence towards the

behaviour, who may be positively influenced through vicarious experiences, and modified perceptions towards the potential benefits of participation (Bandura & Locke, 2003).

While the above techniques may facilitate initial engagement, and positive change in behaviours which directly reflect the activity or programme (e.g. reduced sedentary behaviour following a PA-based intervention), evaluations of the studies presented throughout this Thesis have indicated that implementing any low-barrier, group-based opportunities which incorporate a psychologically-informed approach can also indirectly engender positive change in wider behaviours. While the detailed principles of behavioural activation are beyond the scope of this research project (see Veale, 2008 for a comprehensive description), it is apparent that providing YPEH with such opportunities can have positive effects simply by virtue of presenting an alternative option to boredom and social isolation (see Chapter's Four and Seven)- provided these are delivered according to the principles and techniques described above. To facilitate a more general behavioural activation effect for participants, providers should encourage self-monitoring through discussing associations between the behaviour and their feelings or mood; for example, the effects of socially rewarding interactions within a group-based setting, and how this may change avoidant behaviours of further social activities or events (Veale, 2008). While the importance of accompanying YPEH to activities or opportunities has been highlighted previously in this Chapter (8.3.1.2), this support should always be participant-led to promote self-motivated planning and scheduling, and thereby develop mastery and self-efficacy for self-regulation of behaviours in wider contexts (c.f. Parry et al., 2021).

8.4 Strengths and Limitations

Many challenges were encountered throughout the duration of this research project, predominantly owing to the difficulties associated with implementing complex interventions

amid a global crisis, with a vulnerable, and typically 'hard-to-reach' population. Nonetheless, a number of strengths of the research are evident throughout the Thesis, which has provided a novel, comprehensive, and timely insight into potentially *what works best* when designing and implementing programmes to improve psychosocial and behavioural outcomes for young people experiencing homelessness. Indeed, a major strength of all four studies which involved this population was implementation under real-world conditions- thereby increasing the overall external validity of the findings, and applicability to other opportunities and settings (CRD, 2009). Furthermore, (despite the limited sample sizes of some studies within this Thesis), utilising intention-to-treat (ITT) analysis ensured the inclusion of all available data; thus reducing the chance of attrition bias, and better reflecting 'real world effectiveness', in which withdrawal and non-compliance to protocol are both highly likely (Gupta, 2011). The series of studies presented throughout this Theses were implemented and evaluated chronologically, which enabled continuous refinement according to the findings, and resulted in the design of two high-quality, evidence-based interventions which were implemented with fidelity and integrity, despite the emergent challenges (see Chapter Seven). This temporal process of evaluating, learning, and refining complex interventions was necessary for this population, given the dearth of available evidence and recommendations form which this project's inaugural research could be informed (CRD, 2009). A final primary strength of this research project is the diverse range of methods and corresponding evaluation approaches which were applied across the respective studies. In sum, these have contributed to research in the field of PA and psychotherapy through: systematically reviewing the evidence-base of relevant studies; utilising mixed-methods to explore feasibility, acceptability, and appropriateness of such interventions with YPEH; evaluating quantitative survey data to identify relationships between changes in well-being, self-

esteem, PA, and SB, and surmise 'protective effects' for YPEH; implementing a mixed-methods process evaluation of a combined (PA+DBT-ST) intervention with YPEH (including cost-effectiveness); and conducting a mixed-methods evaluation of the effectiveness of PA-based interventions for YPEH (including cost-effectiveness). The combined findings from each of these informative studies ensured that final evaluations and recommendations not only addressed 'what works, and why', but also *how* programmes may be best implemented with this population in routine practice settings.

Despite the numerous strengths of this research project, there are also a number of limitations to be cognisant of when interpreting key findings. Firstly, for all the studies presented in this Thesis the recruitment of eligible participants relied on either staff referral, or self-selection through advertisements or word-of-mouth. Given the difficulties associated with reaching and recruiting YPEH for research trials (predominantly due to the disproportionately high prevalence of psychiatric disorders; see Hodgson et al., 2014; Strehlau et al., 2017), this may have resulted in an unrepresentative sample, therefore compromising applicability of findings to routine practice with the target population. The absence of a control group in the final study (for reasons described in Chapter Five) is also problematic, as it limits the extent to which any observed effects (positive or negative) can be attributed solely to the interventions. Furthermore, despite the inclusion and evaluation of monitoring data for participants' 'exposure' to the intervention condition (i.e. attendance), ascertaining the specific 'dose' received by participants is difficult when attendance is not always indicative of engagement. The inclusion of qualitative methods within a critical realist framework partially mitigates this limitation however, through allowing a more nuanced insight into how socio-contextual factors may influence participants' experiences, and ultimately determine outcome effects (Feilzer, 2010). Despite the use of psychometrically

robust measures for outcomes of interest across the studies these were reliant on subjective self-reported assessment, which may have compromised reliability and internal validity of the findings due to poor or inaccurate recall, and providing socially-desirable answers to the individual administering the questionnaire (often the participant's support worker; see Althubaiti, 2016). Finally, it is highly likely that the extraneous influences of the global pandemic will have influenced every aspect of the interventions- from recruitment to retention, and pre-post test data, while concurrently precluding the option for long-term follow-up due to revised and restricted timescales.

8.5 Recommendations for Future Research

The research presented throughout this Thesis largely supports the potential of PA-based interventions for increasing engagement, well-being, and positive behaviours of YPEH. Findings have also provided partial support for the utility of PA as an adjunctive treatment to first-line therapies (such as DBT skills training), to encourage uptake and attendance to treatment programmes, and potentially augment treatment effect through a synergistic interaction between the components. Pandemic-related restrictions on what research could be undertaken, however, compromised the possibility of a full-scale trial- resulting in greater focus on implementation processes, mechanisms of action, and generic recommended delivery techniques when providing group-based opportunities for YPEH. This preliminary research has therefore provided a comprehensive, evidence-based foundation for continuation of similar research- specifically through informing study design, implementation, and evaluation methods which may be most appropriate and effective with this (and potentially other hard-to reach) population.

While randomised control trials (RCTs) may be considered by many as the 'gold standard' of research (Hariton, & Locascio, 2018), the current Thesis has demonstrated that RCTs with this

population are neither feasible nor ethical, and may lack external validity when seeking to replicate effectiveness under 'real world' conditions. Future studies could potentially adopt a design whereby groups are randomised at a cluster level (i.e. by locality), however this would require revised *a priori* sample size calculations (than those provided in 4.5.2.3), given the implications of intra-cluster correlations on sufficient sample size (see Eldridge et al., 2009). Alternatively, future research in this context may benefit from adopting an approach whereby allocation of participants (i.e. intervention or control group) more pragmatic; i.e. determined by sufficient resources (such as staffing) and access to appropriate intervention settings. In addition to the inclusion of a 'treatment-as-usual' (TAU) control, findings from this project's process evaluation (7.3) could be applied when designing future studies with this population, to potentially overcome the difficulties encountered when attempting to recruit participants to a standalone 'psychological therapy' condition (see Chapter Four). Implementing a four-arm, mixed methods, controlled trial (TAU, PA-only, Psychological Therapy-only, PA + Psychological Therapy groups), based on recommendations presented throughout this Thesis (e.g. 8.3.1) could help elucidate whether effectiveness is a product of *what* the intervention comprises (i.e. specific content), or *how* the intervention is delivered and perceived by participants (i.e. psychologically-informed). Study quality and reproducibility may be further enhanced through adopting more rigorous assessment of intervention fidelity, such as 'knowledge tests' to measure the degree to which the intervention was *received* by participants, and utilisation of self-report diary cards to quantify participants' *enactment* of DBT skills (see Lambert et al., 2017).

The psychometric and behavioural measures utilised within the current research project were selected on the basis of: suitability to the research questions; proven validity and reliability with

similar groups; potential for comparison with population 'norms'; relatively minimal demand on cognitive ability and time; low cost to administer; and the option to disseminate virtually, or via a third-party (e.g. support worker). Although outcomes relating to fitness and energy expenditure were not considered relevant for the current research project, the validity of self-report PA and SB measures in future studies may be improved through calculating metabolic equivalent of task (MET) in comparison to energy expended at rest (Loney et al., 2011), while incorporating the 'biological demands' associated with the *type* of SB (Panahi & Tremblay, 2018). Depending on the available funds, it may also be prudent for future researchers to explore options for more objective measures of PA and SB (i.e. wrist-worn) to reduce bias associated with recall and social desirability. Furthermore, implementing these measures *irrespective* of the group to which participants are allocated will contribute to the limited evidence-base for the effects of psychotherapy alone on PA or SB behaviours.

While participants' experience of basic psychological need satisfaction (BPNS, Deci & Ryan, 2000) was explored through theoretically-informed qualitative methods (see Chapter Six), this provided limited understanding of whether engagement in PA and psychological therapy is associated with differential satisfaction of needs, and to what extent each need mediates the relationship between PA / psychological therapy and positive outcomes such as well-being and behaviour change. Utilising additional quantitative instruments to measure participants' psychological need satisfaction (e.g. Brief BPNS Scale for Adolescents, see Girelli et al., 2019), could elucidate differences in need satisfaction afforded through PA and/or therapeutic engagement, and therefore better inform what is required to cultivate a need-supportive environment for YPEH. Triangulating the data in this manner could also provide a more comprehensive understanding of the relative importance of each need for this population, and

whether positive psychological outcomes necessitate *balanced* satisfaction of the three needs (Creswell et al., 2003; Sheldon & Niemiec, 2006).

Throughout this research project there have been disparities between post-intervention changes reported for PA and psychological outcomes, which may reflect lack of long-term follow-up and therefore insufficient time to identify potentially delayed effects (e.g. immediate increases in PA preceding later psychosocial improvement; see Kandola et al., 2019). To establish whether immediate post-intervention change translates into long-term behaviour change, and how this may be influenced by reciprocal relationship between behavioural (i.e. PA / SB) and psychological (i.e. well-being, self-esteem) outcomes, it would be beneficial for future studies to obtain outcomes at multiple timepoints for up to six-months post-intervention, to account for delayed effects (Carter et al., 2015). For research involving YPEH, it is recommended that strategies for reducing loss to follow-up should be explored during the intervention design phase (i.e. extended incentives, method of communication), and eligibility protocol for participation is amended accordingly (i.e. still likely to be involved with the service).

8.6 Contribution to Knowledge

This research project had provided an important contribution to knowledge in the field of PA and psychological well-being through reviewing and implementing novel interventions which combine psychotherapy with group-based activities. Given the dearth of available literature evidencing effective interventions for YPEH (Morton et al., 2020), the studies included within this Thesis have also provided important insights into the 'active ingredients' which can contribute to positive experiences for these young people, and how best to implement opportunities for this group in the context of both a research and practice.

The systematic review presented in Chapter Two of this Thesis is the first to evaluate the effectiveness of interventions which combine PA with psychotherapy for both psychological and behavioural outcomes of diverse populations. The synthesised findings provided important insight into how psychologically-informed PA alone may be an effective 'standalone' treatment for mild-moderate depression, and thus offer a viable alternative for individuals who may be resistant to medication and/or psychotherapy. The absence of a consistent dose-response effect across the studies also contributed to a developing evidence-base supporting psychosocial (rather than physiological) factors as active mechanisms of change in such interventions.

Adopting a mixed-methods approach for the pilot study presented in Chapter Four of this Thesis improved understanding of key aspects which require consideration when designing and implementing interventions with YPEH. While the quantitative analysis offered initial support for combining PA with psychotherapy as an effective intervention for this population, the rich accounts provided by participants through qualitative exploration elucidated a number of crucial aspects of the intervention which may impede or enhance their overall experience, and potentially determine outcomes. Given the limited knowledge and evidence pertaining to pragmatic, real-world interventions with this population, these findings underpinned subsequent decisions in the context of this research project, such as modifying the intervention design (i.e. rearranging the order of intervention components), and revising strategies for encouraging sustained engagement (i.e. staggered incentives across the study period).

Although the research described in Chapter Five (impact of COVID-19 lockdown) was unexpected and originally unintended, this study added a necessary and timely contribution to knowledge of how PA behaviours and well-being of YPEH changed during the early stages of the pandemic. The pre-post 'lockdown' design was also somewhat unique – with similar studies

presenting either retrospective, cross-sectional, or post-lockdown data, and thereby limiting confidence in the findings. Contrary to expectations, the findings presented in this Thesis reflected exceptional resilience by this 'vulnerable' population, and highlighted the role of PA in contributing to positive outcomes. The nuances in pre-post outcome change reported by sub-groups of participants (i.e. active / inactive, male / female) contributed to wider literature through illustrating the importance of tailoring PA promotion according to the target population. Moreover, the identified relationships between PA, well-being, SB and self-esteem informed decisions in the current research project such as including SB as a discrete outcome variable, and further exploring the distinct effect of reducing sedentariness- irrespective of reported increases in PA (i.e. meeting recommended guidelines).

Findings from the concluding study of this Thesis (Chapter Seven) may be limited owing to restrictions and small sample sizes, yet—collectively—further understanding of the difficulties and challenges researchers may experience when implementing interventions in real-world settings this (and other similar) difficult-to-reach population. The pragmatic decision to deviate from the planned evaluations described in Chapter Six of this Thesis afforded more detailed, mixed-methods analyses of both a PA-based and combined PA+DBT interventions for well-being and behaviour change of YPEH. Outcome effects observed following the PA-based intervention are informative from a public health perspective; indicating how significant reductions in SB are achievable through relatively small daily increases in moderate PA. Findings from the process evaluation of the combined intervention may also be particularly useful when planning future studies with this population, through increasing opportunities for researchers to pre-empt common challenges and threats to research integrity throughout each stage of the implementation process, and ensure limited resources are allocated and distributed in

accordance with identified facilitators and enablers (i.e. adequate staff support, suitable equipment and materials etc.). The collective findings also contribute to practice in the context of how best to design and deliver positive opportunities (not limited to PA-based), and support well-being and behaviour change of YPEH.

8.7 Reflections

Having the opportunity to complete this research project has been an overwhelmingly positive experience through which I have learned, developed, and grown on an academic, professional, and personal level. A key factor in this process has undoubtedly been the requirement to overcome prevailing challenges, and make key research decisions which would fulfil obligations to all stakeholder's involved (i.e. Llamau, participants, the researcher, funding bodies), while maintaining high integrity and working within the limitations of various contextual constraints.

From the PhD's inception in September 2018 these key decisions and challenges were integral to how the project evolved, and ultimately contributed to the wider literature and evidence-base for implementing complex interventions with this population in a real-world setting. Initially, the premise of this research was to provide a strength and conditioning (gym based) exercise programme combined with trauma-informed therapy to young men, as this group had been identified as being more disengaged and therefore requiring a 'health by stealth' approach. From my perspective, I was immediately uncomfortable with this rationale for several reasons: firstly, I found the exclusion of female participants would be unethical, and also misaligned with wider policy targets to minimise gaps in PA participation, and ensure equal opportunities to all (gov.wales/sport-and-active-recreation); secondly, to include participants based on gender would be problematic given the high proportion of YPEH who don’t identify within these binary definitions; and finally, the delivery of relatively individual-based exercise with emphasis on

outcomes (i.e. strength, body image) seemed outdated, given the plethora of evidence supporting superiority of non-prescriptive, socially-based activity for mental health and well-being. As a newly appointed PhD student, expressing these concerns to supervisors, funders, and the partner organisation were extremely daunting yet, through presenting my argument based on these factors, provided me with a sense of confidence and autonomy in relation to the project, and an opportunity to begin establishing relationships with stakeholders from the outset of the PhD.

As a researcher with no background in youth work or homelessness, I realised very early on in the PhD that conducting research in this context would require efforts to increase the organisation's awareness of the study, build relationships with staff and young people across Llamau, and ensure that by the point of intervention delivery I would understand the structure of this large organisation and identify key contacts within this. To enable this, I utilised the first 6 months of the PhD to embed myself into Llamau, through securing space in their head office, visiting all projects across South Wales, and getting involved with as many activities and events as I was able to at this time. Although academic tasks were also undertaken during this period (systematic review, planning the pilot study), this experience provided me with invaluable insights into the organisational culture, potential challenges, and key aspects which would be important to the project's 'success', as well as improving my understanding of the complex lives and associated needs of YPEH. This period also involved many anecdotal conversations with Llamau's staff and young people around their perceptions of physical activity, what types of activities they may particularly enjoy, and how the format (i.e. group-based, location etc.) of the interventions may determine participation and engagement.

How the global pandemic impacted on the research is clearly documented in Chapter Five of this Thesis, however this account omits much of the personal worries, uncertainties and general

challenges which arose during this critical stage of the PhD (March 2020 – May 2021). On reflection, I felt a huge sense of disappointment and loss during the initial stages of this period- especially given the sudden interruption of 'momentum' which had been gradually intensifying up until this point. An initial challenge was how to complete data collection of the 8-week survey under severely restricted conditions (i.e. no project visitors, face-to-face contact, travel etc.), which was fortunately reduced owing to the relationships I had formed with staff during the early PhD stages. Although this involved huge efforts over email, telephone, and a general need to be flexible according to the young peoples' routine (i.e. remotely completing T2 surveys on evenings and weekends), the persistence proved worthwhile; with the data providing key insights which would inform later decisions in the research project, and providing an opportunity for wider dissemination via publication in a high-impact journal. To say this period was a rollercoaster would be an understatement, and I personally found the lack of control or ability to plan ahead both extremely frustrating and restrictive. Although there were several 'options' for the direction the project could take at this point (detailed in Chapter Five), I remained intent on adhering as closely as possible to the original plan (albeit scaled-down)- despite this presenting the most challenging path, and greatest risk in terms of implementation and completion. The reason for this was both personal; that I would have never felt satisfied or fulfilled if I hadn't attempted this option, and moral; that I wanted to ensure the organisation received what was originally requested, and evidently required for the young people.

While the challenges and limitations of this project's main study are documented in Chapter Eight of this Thesis, my experiences during this key phase of the research (June 2021 – Dec 2021) were perhaps the most important and insightful for my personal and professional development as a researcher. I feel immensely proud to have implemented two well designed and

delivered interventions with a 'hard to engage' population, under very adverse circumstances. While it was difficult to accept the shortcomings of the second intervention compared with the relative success of the first, I now feel that in reality most of the barriers were outside of what I could control, and on reflection, this difficult period perhaps afforded the most useful insights into the realities of conducting research in this context. Although barriers relating to the pandemic undoubtedly compounded these challenges, most were synonymous with those encountered during the pilot study phase, suggesting they may determine 'research success' regardless of such contextual aspects. For example, both studies adopted a collaborative approach with the intervention facilitators at all times (coaches, psychologists), however in retrospect, one aspect which may have contributed to interest and engagement in the study may have been to adopt a more co-productive approach with the young people directly, rather than via staff who supported them. In hindsight, this may have been particularly useful during the planning / recruitment phase, to inform key decisions such as timings of intervention delivery, and use of social media to support the recruitment drive. Additionally, while participants' sense of relatedness and connectedness were evidently fostered through the group-based delivery, diverse personalities, physical abilities and cognitive capabilities between participants also compounded the challenges associated with ensuring each interventions met individual preferences and needs. For example, while a small PA-based group benefitted some participants through increased one-to-one 'coaching' and tailored PA, for others it proved the main barrier to engagement due to greater 'visibility' thus increased social anxieties. Conversely, other group participants appeared to thrive through the increased interactions, learning opportunities, and overall enjoyment experienced in a larger group setting, despite this diversity increasing the challenge for intervention facilitators to cater for all skills and abilities. Such accounts clearly

reinforce the message that for this population one size does not fit all, yet it is possible to establish a 'best fit' for the group, albeit through some trial and error.

Notwithstanding these reflections, my observations and anecdotal evidence for the small impact these interventions had on these young people's lives provided me with motivation at the time to persevere with the research, and a huge sense of accomplishment now when I contemplate everything that has been achieved through this project.

8.8 Conclusions

The disproportionally high prevalence of psychological disorders reported by YPEH is alarming, however this Thesis has demonstrated that psychologically-informed interventions can be effective for positive psychosocial and behavioural change. In particular, those incorporating group-based PA appear to be an acceptable, cost-effective, and adaptable means for providing these young people with the opportunity to learn skills, connect with others, and establish a positive routine in a familiar, enjoyable, and safe environment.

The collective findings presented throughout this Thesis have also provided partial support for the potential of group-based PA as an effective means of encouraging YPEH to engage with psychological therapy. Whether combining these interventions translates to augmented effects is less clear however, and warrants further investigation to establish whether associated costs may be justified by synergistic health benefits, or an integrated approach (i.e. teaching DBT skills through the medium of PA) may be a more acceptable, and potentially effective approach to improving engagement and outcomes of YPEH. Nonetheless, when delivered with fidelity and integrity to the treatment, preliminary findings within this Thesis indicate that successful

implementation of group-based DBT-ST is feasible with this population, and may indeed be initially more suited to those with low self-esteem and amotivation for PA.

Designing and implementing a series of interventions with this population under the most challenging of circumstances, may have (paradoxically) expedited understanding of the multi-systemic barriers and enablers which require consideration when planning group-based opportunities, or initiatives in the context of either research or practice. The insights and lessons derived through exploring strategies to remove such barriers for YPEH, has provided a timely contribution to the field of implementation science, and specifically how to cultivate an environment in which these vulnerable young people may thrive. Through providing key recommendations for both successful implementation, and techniques for psychologically-informed delivery aligned to 'mechanisms of change' (i.e. learning, connecting, self-regulating), this Thesis offers a viable 'toolkit' of resources which may be applied across a broad spectrum of potential opportunities through which YPEH may accumulate positive experiences.

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Appendices

Appendix 1. Systematic Review Search Strategy

Completed in November 2018:

(("individuals" or "young people" or "adolescents" or "youth" or "teenager" or "patients" or "clients" or "adults" or "males" or "men" or "females" or "women" or "boys" or "girls") and ("therapy" or "trauma-informed" or "CBT" or "cognitive-behavioral" or "cognitive-behavioural" or "cognitive behavioral" or "cognitive behavioural" or "cognitive behaviour" or "cognitive behavior" or "CBT-E" or "CBTEX" or "dialectical" or "DBT" or "BEHAVIOURAL ACTIVATION" or "behavioral activation" or "counseling" or "counselling" or "problem solving" or "psychotherapy" or "stress management" or "positive youth development" or "life skills" or "psychosocial skills") and ("combined" or "alongside" or "integrated" or "addition" or "conjunction" or "adjunct" or "simultaneous") and ("physical activity" or "physical training" or "exercise" or "sport" or "aerobic" or "strength-based" or "strength" or "fitness" or "high intensity") and ("mental health" or "wellbeing" or "well-being" or "depression" or "anxiety" or "trauma" or "PTSD" or "self-esteem" or "confidence" or "helplessness" or "hopelessness" or "resilience" or "positive affect" or "mastery" or "coping" or "panic" or "suicide" or "self-harm") and ("controlled" or "trial" or "randomised" or "randomized" or "randomly" or "comparison")).ab

Appendix 2. Systematic Review Quality Assessment

Authors	Selection Bias	Study Design	Confounders	Blinding	Data Collection	Withdrawals/ Dropouts	**Global Rating**
Abdollahia et al., (2017)	Moderate	Strong	Strong	Weak	Strong	Moderate	**Moderate**
Brovold et al., (2012)	Moderate	Strong	Strong	Strong	Strong	Moderate	**Strong**
Duijts et al., (2012)	Weak	Strong	Strong	Weak	Moderate	Weak	**Weak**
Engberg et al., (2017)	Weak	Strong	Strong	Weak	Moderate	Weak	**Weak**
Euteneur et al., (2017)	Moderate	Strong	Strong	Strong	Strong	Strong	**Strong**
Fremont & Craighead (1987)	Weak	Weak	Strong	Weak	Strong	Weak	**Weak**
Gary et al., (2010)	Moderate	Weak	Strong	Moderate	Strong	Strong	**Moderate**
Gourgouvelis et al., (2018)	Moderate	Weak	Moderate	Weak	Strong	Strong	**Weak**
Jacobsen et al., (2013)	Moderate	Strong	Strong	Weak	Strong	Weak	**Weak**
Jacquart et al., (2014)	Moderate	Strong	Strong	Moderate	Strong	Strong	**Strong**
Kashikar-Zuck et al., (2018)	Weak	Strong	Strong	Weak	Strong	Strong	**Weak**
Lera et al., (2009)	Moderate	Strong	Strong	Strong	Strong	Moderate	**Strong**
McBeth et al., (2012)	Weak	Strong	Strong	Moderate	Strong	Moderate	**Moderate**
McGale et al., (2011)	Weak	Strong	Strong	Weak	Strong	Weak	**Weak**
Melnyk et al., (2009)	Weak	Strong	Weak	Moderate	Strong	Strong	**Weak**
Melnyk et al., (2013)	Weak	Strong	Moderate	Moderate	Strong	Weak	**Weak**
Melnyk et al., (2015)	Weak	Strong	Moderate	Moderate	Strong	Weak	**Weak**
Merom et al., (2008)	Moderate	Strong	Strong	Weak	Strong	Weak	**Weak**
Parker et al., (2016)	Moderate	Strong	Strong	Moderate	Strong	Strong	**Strong**
Pentecost et al., (2015)	Moderate	Strong	Strong	Moderate	Strong	Moderate	**Strong**
Smeets et al., (2008)	Moderate	Strong	Strong	Moderate	Strong	Strong	**Strong**
Van der Waerden et al., (2013)	Weak	Strong	Strong	Moderate	Strong	Strong	**Moderate**

Appendix 3. DBT-ST Workbook

Session 1: Introduction to DBT

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Guidelines

- We may not all know each other now, but over the next 8 sessions we will work together to learn skills which can help us live happier lives.
- We will start by discussing some general guidelines, and adding any other you feel may be important.

1. Participants in training support each other at all times

2. Any information shared is kept confidential outside of training

3. Arrive on time for training, and stay until the end

4. Try and do the practice exercises each week in between training

5. Don't come to sessions under the influence of drugs or alcohol

6. Give help to each other when asked, and accept help and advice if given

Any other guidelines you would like to add?

Goals

- We will learn and practice skills to help us change patterns that are linked to problems in our lives, and emotions and thoughts which are causing distress.

We will learn to DECREASE:

- Chaos in our lives
- Impulsive behaviour
- Conflict with others
- Up-and-down emotions

We will learn to INCREASE:

- Being able to tolerate distress
- Making more mindful decisions
- Positive relationships and respect
- Control over our emotions

Task: What thoughts/feelings/behaviours would you like to change?

What I want to **INCREASE:**

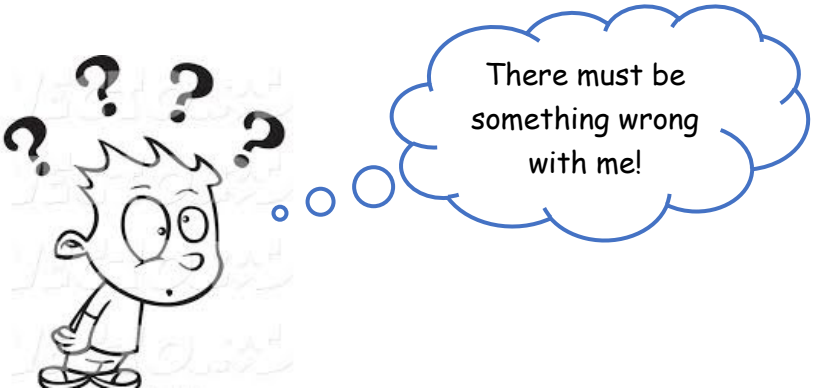
What I want to **DECREASE:**

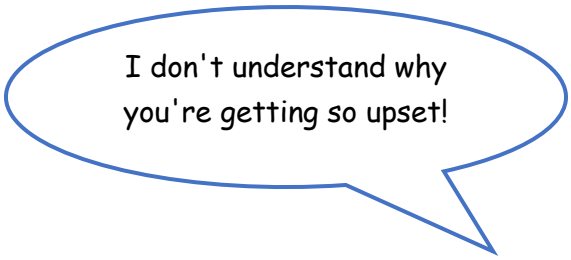
Biosocial Model of Emotions

- Why is it so hard to control our emotions and actions?

BIO

Our biological make-up can mean that some people's emotions are more intense, and more difficult to control than others





SOCIAL

Our environment (people around us) can influence our emotional experience such as being told that we are overreacting, or giving in to bad behaviour

How can Mindfulness Help?

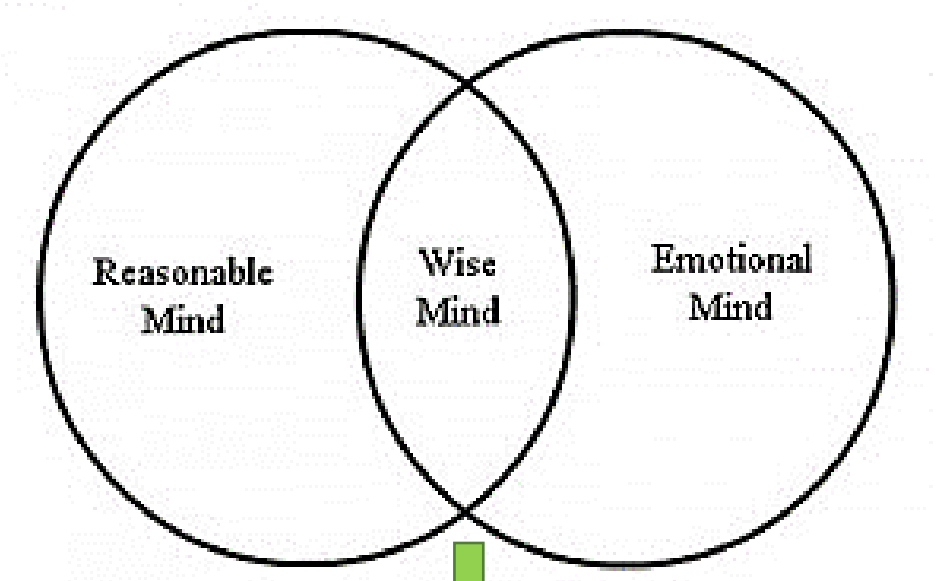
- Mindfulness means paying attention to our feelings and thoughts in the present moment and without judgement

- Most often we are on 'auto pilot', and caught up with thoughts about the past and the future

- **Without mindfulness, we respond to situations automatically, often controlled by our emotions…**

TASK: Can you think of any examples??

The Three States of Mind



Rational

Logical

Task focused

Values and feelings are not important.

Impulsive

Mood-dependent

Emotion focused

Facts and logic are not important

BEST OF BOTH!!

Ideal for making difficult decisions

Helps us know how to react in situations

Often linked to intuition, or a "gut feeling" of what is right

EXAMPLE: You are in a relationship where your emotions conflict: you feel love, but also anger, frustration, hurt and disappointment.

- By bringing together EMOTION MIND and REASONABLE MIND we can make the best decision based on our values and goals, and not let our emotional attachment get in the way.

Practicing Wise Mind

WHAT we do: **Observe**, **Describe** and **Participate** in what is happening

HOW we do this: **Don't judge**, **Stay focused**, **Do what works**

TASK: Choose one "what" skill, and one "how" skill to practice over the next week

WHAT Skills
___ Observe
___ Describe
___ Participate

HOW Skills
___ Don't judge
___ Stay focused
___ Do What Works

Briefly describe each situation, and how you practiced the skills:

Briefly describe how using the skills affected your thoughts, feelings or behavior:

Session 2: Distress Tolerance

Crisis Survival Skills

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Mindfulness Exercise

- Balloon Tennis (2 minutes)

- Task: Either in pairs or as a group hit the balloon to one another

- Think about where you will send the balloon next, and how hard or soft your shot needs to be

- Stay alert throughout the task in case it comes towards you!!

- What thoughts did you have during this exercise?
- What did you find most difficult?

Introduction and Goals

What does "distress" mean to you?

- Psychological suffering? "She felt great distress due to the bad news"

- Being in danger? "The passengers on the stranded ship were very distressed"

- Experiencing physical pain? "After the tackle the player looked in distress"

- **Everyone experiences distress differently**, both in what **types of situation** cause this feeling, and how they **think and feel** at that moment.

- When experiencing feelings of **panic and fear**, it is difficult not to act **impulsively**, and sometimes then make the situation **worse**.

- By learning to **tolerate** these difficult feelings, and distract our attention to positive things, we can make **wiser** choices to help us **cope more effectively** with the situation.

In this session, we will focus on how we can use distress tolerance skills to help us get through a **crisis,** rather than using solutions to cope with the pain which may actually **make things worse.**

? What do we mean by a "crisis"?

? What urges may we have which we think will help us cope better?

STOP Skills

- ✓ Helps keep us from acting impulsively on difficult emotions, and stop a bad situation becoming worse

Stop	Do not just react. Stop! Freeze! Do not move a muscle! Your emotions may try to make you act without thinking. Stay in control!
Take a step back	Take a step back from the situation. Take a break. Let go. Take a deep breath. Do not let your feelings make you act impulsively.
Observe	Notice what is going on inside and outside you. What is the situation? What are your thoughts and feelings? What are others saying or doing?
Proceed mindfully	Act with awareness. In deciding what to do, consider your thoughts and feelings, the situation, and other people's thoughts and feelings. Think about your goals. Ask Wise Mind: Which actions will make it better or worse?

TIP Skills

Ways to change our body chemistry, and quickly reduce heightened emotions

To reduce extreme emotion mind *fast*.

Remember these as **TIP** skills:

T

TIP THE TEMPERATURE of your face with COLD WATER*
(to calm down fast)

- Holding your breath, put your face in a bowl of cold water, or hold a cold pack (or zip-lock bag of cold water) on your eyes and cheeks.
- Hold for 30 seconds. Keep water above 50°F.

I

INTENSE EXERCISE*
(to calm down your body when it is revved up by emotion)

- Engage in intense exercise, if only for a short while.
- Expend your body's stored up physical energy by running, walking fast, jumping, playing basketball, lifting weights, etc.

P

PACED BREATHING
(pace your breathing by slowing it down)

- Breathe deeply into your belly.
- Slow your pace of inhaling and exhaling way down (on average, five to six breaths per minute).
- Breathe *out* more slowly than you breathe *in* (for example, 5 seconds in and 7 seconds out).

PAIRED MUSCLE RELAXATION
(to calm down by pairing muscle relaxation with breathing out)

- While breathing into your belly deeply tense your body muscles (*not* so much as to cause a cramp).
- Notice the tension in your body.
- While breathing out, say the word "Relax" in your mind.
- Let go of the tension.
- Notice the difference in your body.

Pros and Cons Skills

- ✓ Helps us decide between two options when we are in a crisis situation: either acting impulsively on our emotions, or resisting potentially destructive urges

TASK

Think back to a time when you faced a crisis which was especially difficult to tolerate, and possibly led to impulsive actions and destructive behaviours to try and cope…

Name the impulsive urge:

……

Use the boxes below to list the positive (pros) and negative (cons) consequences of being impulsive (acting on the urge), or tolerating the distress (not acting on the urge). Try and include both short-term and long-term effects of each.

	Pros (Advantages)	**Cons (Disadvantages)**
Acting on urge		
Not acting on urge		

Practice Exercises

TIP Skills

Due Date _____

Choose one TIPP skill to practice this week. Check it off now and prepare yourself to use this skill when emotional arousal gets very high.

Rate your emotional arousal before you use the skill: 1–100: _____

TIPP your body chemistry with:

____**T**emperature

Alter your body temperature by holding your breath and placing head in bowl of cold water. Or, splash cold water on your face or place a cold gel mask on your eyes or forehead. Hold for at least 30 seconds. Works best if bent over forward.

____**I**ntense exercise

Run in place, do a high-intensity weight circuit, jump, put on music and dance (10–15 minutes). Don't overdo it!

_____ **P**aced breathing

Slow down your breath so that you're breathing in for about 4 seconds and out for 5–8 seconds. Do this for 1–2 minutes to bring down your arousal.

_____ **P**rogressive muscle relaxation

Tense and relax each muscle group, head to toe, one muscle group at a time.

Rate your emotional arousal after using the skill: 1–100: _____

Session 3: Interpersonal Effectiveness

Communicating What YOU Want

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Mindfulness Exercise

- Jelly Babies (2 minutes)

- Using one finger, balance the sweet on the table
- DON'T CHEAT!!!
- Try your best not to let it fall

- What was in your mind for those 2 minutes?

- Were you aware of any distractions?

Introduction and Goals

- Do you get what you want from other people?
- Do you find it hard to say "no"?
- Are your opinions and values taken seriously by other people?

All of these things require communication skills, which may be stopping you from achieving your goals…

Can you think of any factors which make effective communication hard for you?

Other reasons may include:

- **Worrying** about what others will think, if you do or say what **you actually want**

- **Emotions** getting in the way of what you want, and controlling what **you actually say or do**

- Difficulty in **deciding** what is best, and so saying **"no"** / **giving in** to **<u>everything</u>** that other people ask

- Sometimes even at your **'skilful best'** you may **not** actually achieve what you want… how do you **cope** with this, and still **keep self-respect?**

? How can we overcome these challenges, and effectively obtain what we want and need...?

DEAR MAN Skills

DESCRIBE
EXPRESS
ASSERT
REWARD

MINDFUL
APPEAR CONFIDENT
NEGOTIATE

What to do

Describe the situation. Stick to the facts.
"You asked me to lend you money"

Express your feelings about the situation.
"My benefits have decreased, and I'm worried I may not have enough for bills"

Assert yourself by asking for what you want or saying no clearly.
"I can't lend you the money at the moment"

Reward the person by explaining the positive effects.
"I would be really relieved if you could stop asking me, and hope it won't affect our friendship"

How to do it

Mindfully: Keep your focus on what you want. Repeat your opinion again if necessary. Ignore threats and stick to your point.

Appear Confident: Use a confident tone of voice. Make good eye contact. Don't doubt yourself.

Negotiate: Be willing to GIVE TO GET. Try and help them find alternative solutions to the problem.

Task: Role Play

- Think of a scenario (made up or real), where DEAR MAN skills could be used
- This could be about you wanting to get something (returning an item to a shop), or saying no to someone else (a partner asking to stay over)

WHAT you said:

Describe

……

……

Express

……

……

Assert

……

……

Reward

……

……

HOW were you:

Mindful

……

……

Appearing Confident

……

……

Negotiate

……

……

Practice Exercise

Describe one situation during the week in which you used your DEAR MAN skills

_____

_____

_____

What did you want from the other person?

_____

_____

_____

<u>DEAR MAN Skills used (write down how you used each one):</u>

Describe (Describe the situation; just the facts):

Express (feelings):

Assert:

Reward:

Mind:

Appear Confident:

Negotiate:

What was the result of using your DEAR MAN Skills?

_____

_____

_____

Session 4: Interpersonal Effectiveness

Keeping healthy relationships and maintaining self-respect

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Mindfulness Exercise

- Mindful Listening (3 minutes)

- Break into pairs and sit next to that person
- Choose one 'speaker' and one 'listener'
- Speakers: talk about something really important
- Listeners: act like you're bored and not interested at all
- Swap roles and repeat

- How did it feel to talk to someone not being mindful?
- Try again but this time pay attention- what differences did you notice?

Introduction and Goals

- ✓ In the last session we learned skills to effectively get what we want (DEAR MAN), **BUT…**

? How can we make sure we keep good relationships?

GOAL: Relationship effectiveness is all about improving or maintaining a good relationships, while at the same time trying to obtain your objective.

Effective communication focuses on how you go about trying to **improve the relationship**, or make people want to give you what you need. For example do you ask, or do you demand? Do you listen to the other person, or do you cut this person off?

? How can we make sure we keep our self-respect?

GOAL: Self-respect effectiveness is about helping us to keep or improve our self-respect, while at the same time we try to get what we want.

Effective communication focuses on how to ask for what you want, **without going against your values and beliefs**. For example do you sacrifice your own needs for fear of losing the relationship, or do you feel good for staying true to yourself?

In this session we will learn **two** new skills, which can be used to achieve the goals above

GIVE Skills

✓ **When your GOAL is to build or maintain good relationships**

GENTLE
INTERESTED
VALIDATE
EASY MANNER

GENTLE — **BE NICE AND RESPECTFUL**

- No attacks (verbal or physical)
- No threats (be calm, no drama)
- No judging (don't preach or blame)
- No sneering (avoid eye-rolling, don't walk away)

INTERESTED — **ACT INTERESTED IN THE OTHER PERSON**

- Listen with eye-contact
- Don't interrupt
- Be patient

VALIDATE — **OTHER PEOPLES FEELINGS AND THOUGHTS**

- Use WORDS: "I understand" "That sounds tough"
- Use ACTIONS: Nodding in agreement

EASY MANNER — **USE A LITTLE HUMOUR AND SMILE** 😊

- Try to be light-hearted
- Sit next to the person if they are seated
- Don't have an attitude

FAST Skills

✓ **When your GOAL is to keep your self-respect**

FAIR
APOLOGIES
STICK TO VALUES
TRUTHFUL

F - (Be) FAIR To YOURSELF and to the OTHER person
* DO validate feelings

A - (No) APOLOGIES For you request, or having an opinion
* DON'T look ashamed

S - STICK TO VALUES And be clear about you believe in
* DO stick to your guns, but be fair

T - (Be) TRUTHFUL Don't lie, make excuses, or exaggerate
* DON'T act helpless

Task: Role Play

Scenario 1: A good friend of yours is spending a lot of time with someone who has bullied you in the past

- Which skill would we use to deal with this?
- Describe how each of the 4 stages could be used to help with this situation

_____
_____
_____
_____

Scenario 2: A friend is meant to be giving you a lift home from a party, but you have seen them drinking/taking drugs

- Which skill would we use to deal with this?
- Describe how each of the 4 stages could be used to help with this situation

_____
_____
_____
_____

*** How may these conversations be different if you didn't use the GIVE / FAST skill?**

Practice Exercise

Write down any examples of situations during the week where you used GIVE skills to maintain or build relationships

GENTLE _____

_____

_____

INTERESTED _____

_____

_____

VALIDATE _____

_____

_____

EASY MANNER _____

_____

Write down any examples of situations during the week where you used FAST skills to keep your self-respect

FAIR _____

_____

APOLOGIES _____

_____

STICK TO VALUES _____

_____

TRUTHFUL _____

_____

Session 5: Distress Tolerance

Short-term Relief from Stress and Pain

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Mindfulness Exercise

- Observation of music (2 minutes)

- Listen to this piece of music
- Try and observe your thoughts, emotions, and physical feelings
- Listen to the second piece of music
- Again, observe thoughts, emotions and physical feelings

- Did you notice any differences between the two?
- If yes, what were these and why?

Introduction and Goals

- In Session 2 we learned skills to **STOP** us from acting **impulsively**... can you remember these? (hint: there may be a clue in the question!!).

- Today we will learn about a range of skills to help **ease the pain and suffering** which is often felt in times of crisis.

- While these skills may not directly solve all your problems, they can help to **provide short-term relief** from painful emotions.

- We will learn **2 approaches** in this session:

1. **DISTRACTION**: Lowering your distress **in the moment.**
2. **SELF-CARE**: Finding ways to be mindfully **kind to yourself.**

Distraction Skills: ACCEPTS

- Which of these do you think may help you?
- Could different techniques be used in different situations?

Distracting

A way to remember these skills is the phrase **"Wise Mind ACCEPTS."**

With Activities:

- ❑ Focus attention on a task you need to get done.
- ❑ Rent movies; watch TV.
- ❑ Clean a room in your house.
- ❑ Find an event to go to.
- ❑ Play computer games.
- ❑ Go walking. Exercise.
- ❑ Surf the Internet. Write e-mails.
- ❑ Play sports.
- ❑ Go out for a meal or eat a favorite food.
- ❑ Call or go out with a friend.
- ❑ Listen to your iPod; download music.
- ❑ Build something.
- ❑ Spend time with your children.
- ❑ Play cards.
- ❑ Read magazines, books, comics.
- ❑ Do crossword puzzles or Sudoku.
- ❑ Other: _____

With Contributing:

- ❑ Find volunteer work to do.
- ❑ Help a friend or family member.
- ❑ Surprise someone with something nice (a card, a favor, a hug).
- ❑ Give away things you don't need.
- ❑ Call or send an instant message encouraging someone or just saying hi.
- ❑ Make something nice for someone else.
- ❑ Do something thoughtful.
- ❑ Other: _____

With Comparisons:

- ❑ Compare how you are feeling now to a time when you felt different.
- ❑ Think about people coping the same as you or less well than you.
- ❑ Compare yourself to those less fortunate.
- ❑ Watch reality shows about others' troubles; read about disasters, others' suffering.
- ❑ Other: _____

With different Emotions:

- ❑ Read emotional books or stories, old letters.
- ❑ Watch emotional TV shows; go to emotional movies.
- ❑ Listen to emotional music.

(Be sure the event creates different emotions.)

Ideas: Scary movies, joke books, comedies, funny records, religious music, soothing music or music that fires you up, going to a store and reading funny greeting cards.

- ❑ Other: _____

With Pushing away:

- ❑ Push the situation away by leaving it for a while.
- ❑ Leave the situation mentally.
- ❑ Build an imaginary wall between yourself and the situation.
- ❑ Block thoughts and images from your mind.
- ❑ Notice ruminating: Yell "No!"
- ❑ Refuse to think about the painful situations.
- ❑ Put the pain on a shelf. Box it up and put it away for a while.
- ❑ Deny the problem for the moment.
- ❑ Other: _____

With other Thoughts:

- ❑ Count to 10; count colors in a painting or poster or out the window; count anything.
- ❑ Repeat words to a song in your mind.
- ❑ Work puzzles.
- ❑ Watch TV or read.
- ❑ Other: _____

With other Sensations:

- ❑ Squeeze a rubber ball very hard.
- ❑ Listen to very loud music.
- ❑ Hold ice in your hand or mouth.
- ❑ Go out in the rain or snow.
- ❑ Take a hot or cold shower.
- ❑ Other: _____

Self-Care Skills: USING THE SENSES

- This may not feel natural to you at first, but with practice it can really help!!

Vision	Look at a picture or poster that you like. Look at the stars. Look at nature around you.
Hearing	Listen to music you find relaxing. Sing your favourite song. Listen to the sounds around you (birds, rainfall, traffic).
Smell	Put on some perfume. Light a candle. Smell foods you like.
Taste	Eat some favourite foods. Eat slowly and mindfully.
Touch	Take a bubble bath or hot shower. Hug someone. Wrap up in a blanket.
Movement	Go for a walk. Dance around your room. Stretch and take deep breaths.

Group Task:

- Rate your current distress level from 1-100
- Choose something on the table
- Using one (or more) of your senses, fully experience this for 5 minutes- Rate your distress again
- What did you think and feel?

Practice Exercise: ACCEPTS Skills

Briefly describe the stressful situation you were in when you chose to practice your skill:

_____

_____

_____

Did using this skill help you to
1) Cope with uncomfortable urges and feelings and/or
2) Avoid conflict of any kind?
Circle: YES NO

If YES, please describe how it helped:

_____

_____

If NO, please describe why you believe it did not help:

_____

_____

If you did not practice this skill, please explain why:

_____

_____

Extra Practice: Crisis Survival Skills

- Over the next week, observe any situations where you have used any of the skills learned in the two sessions.

Due Date: _____ Name: _____ Week Starting: _____

Practice your crisis survival skills at least twice. Describe the crisis event; check off which skills you used for that event; and then describe how you used the skill and what happened.

CRISIS EVENT 1: Rate level of distress (0–100) Before: _____ After: _____

Prompting event for my distress (who, what, when, where): What triggered the state of crisis?

- ❑ **STOP**
- ❑ **Pros and cons**
- ❑ **TIP**
- ❑ **Distract with ACCEPTS**
- ❑ **Self-soothe**
- ❑ **IMPROVE the moment**

At left, check the skills you used, and describe here:

Describe the outcome of using skills:

Circle a number to indicate how effective the skills were in helping you tolerate the distress and cope with the situation (keeping you from doing something to make the situation worse). Use the following scale:

I still couldn't stand the situation, even for one more minute.		*I was able to cope somewhat, at least for a little while. It helped somewhat.*		*I could use skills, tolerated distress, and resisted problem urges.*
1	**2**	**3**	**4**	**5**

CRISIS EVENT 2: Rate level of distress (0–100) Before: _____ After: _____

Prompting event for my distress (who, what, when, where): What triggered the state of crisis?

- ❑ **STOP**
- ❑ **Pros and cons**
- ❑ **TIP**
- ❑ **Distract with ACCEPTS**
- ❑ **Self-soothe**
- ❑ **IMPROVE the moment**

At left, check the skills you used, and describe here:

Describe the outcome of using skills:

Circle effectiveness of skills:

I still couldn't stand the situation, even for one more minute.		*I was able to cope somewhat, at least for a little while. It helped somewhat.*		*I could use skills, tolerated distress, and resisted problem urges.*
1	**2**	**3**	**4**	**5**

Session 6: Emotion Regulation

Protecting Yourself from Negative Emotions

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Mindfulness Exercise

- Positive Memories (2 minutes)

- Think back to an event when you felt happy and relaxed
- Taking deep breaths, focus your mind on that memory only
- Observe what you could see, hear, taste and feel
- Try and remember as much details as you possibly can

- Did you notice any changes in your feelings or emotions?
- What (if anything) did you find most difficult about the practice?

Introduction and Goals

WHY ARE EMOTIONS SO IMPORTANT?

1. Emotions help give us **information** – is this always correct?
e.g. "I love him, so he must be good for me"

2. Emotions help us to **communicate** – how may this influence other people?
e.g. Showing we are sad may cause someone to give some support

3. Emotions help **prepare** us for action – but we can't always control how we react
e.g. When frightened, we may either fight, freeze, or run!

Emotional Dysregulation…

Do you often experience intense emotions? (anger, frustration, sadness)

⬇

How does this affect the way you behave? (drinking, drugs, self-harming)

⬇

Do these behaviours help the problem? (how do they affect your emotions?)

Goals of Emotion Regulation

- Able to label and understand emotions
- Able to change emotional responses
- **Reduce vulnerability to emotional mind**

But HOW can positive emotions outweigh negative??…

ABC Skills

Taking control of our Emotion Mind

A	**ACCUMULATE POSITIVE EXPERIENCES** **Short Term:** Do pleasant things that are possible right now. e.g. Increase pleasant activities **Long Term:** Make changes in your life so positive events will occur more often. **Build a life worth living.** e.g. Take small steps towards long-term goals
B	**BUILD MASTERY** Do things that are **challenging**, so you can build **confidence** and a sense of **achievement** e.g. Plan at least one activity each day which will make you feel competent and more in control of your life
C	**COPE AHEAD OF TIME WITH EMOTIONAL SITUATIONS** Create a plan ahead of time so that you are prepared to cope skillfully with emotional situations. 1. Imagine your 'worst case scenario' 2. Rehearse in your mind what you would do and say 3. Practice this strategy – take control of the outcome!

What pleasant activities could you try and start doing to practice the "A" and "B" skills?

PLEASE Skills

Taking care of your **mind** by taking care of your **body**

Treat PhysicaL illness Take care of your body. See a doctor when necessary. Take medication as prescribed.

Balance Eating Eat regularly and mindfully. Make sure to get enough nutrition. Don't overeat or under eat.

Avoid Mood-Altering drugs Stay off non-prescribed drugs like cannabis or alcohol. Be aware of caffeine intake.

Balance Sleep Try to get the amount of sleep that helps you feel good (7-9 hours is ideal). Try to keep a regular sleep schedule.

Get Exercise Do some sort of exercise every day; try to build up to 20 minutes of intense exercise every day.

Practice Exercise

Choose one ABC and one PLEASE skill below to practice this week:

Choose 1

- Accumulating Positive Experiences____
- Mastery ____
- Coping Ahead____

and

Choose 1

- Treat **P**hysica**L** Illness ____
- Balance **E**ating ____
- **A**void Mood Altering drugs ____
- Balance **S**leep ____
- Get **E**xercise ____

- Which ABC SKILL did you use:

_____

_____

- Which PLEASE SKILL did you use:

_____

_____

- Did using the skills help you:

1) to feel better? **YES/NO**

2) to be more able to handle stress? **YES/NO**

If **YES**, describe how they helped:

_____

_____

If **NO**, describe why you think they did not help:

_____

Session 7: Emotion Regulation

Changing Your Emotional Response

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Mindfulness Exercise

- Sweet Switch (3 minutes)

- Choose your favourite sweet from the box on the table
- Put it in front of you and really imagine yourself eating the sweet
- Now pass your sweet to the person on your left!

- What are your initial thoughts and feelings?

- Now slowly eat the new sweet
- Close your eyes: focus on the smell, taste and texture

- What did you experience through the whole exercise?
- Did you notice your emotions change at any point?

Introduction and Goals

Sometimes our emotions may control our thoughts, and make a problem seem much worse than it actually is…

Q: How do we know if this emotion is correct?

A: **Check the facts**

"Does the emotion fit the situation?"

Emotion	
Fear	There is a threat to life, health, or well-being.
Sadness	You have lost something or someone, OR things are not the way you expected or wanted or hoped for.
Anger	An important goal is being blocked, OR you or someone you care about has been attacked, hurt, insulted, or threatened.
Jealousy	A relationship that is important to you is threatened or in danger of being lost.
Shame	You will be rejected from a very important group if characteristics of yourself or of your behavior are made public.
Guilt	Your own behavior violates your own values or moral code.

YES

USE PROBLEM SOLVING TO COPE WITH THE EMOTION

(This Session)

NO

USE OPPOSITE ACTION TO CHANGE THE EMOTION

(Next Session)

Problem Solving Skills

Step 1: Figure out and DESCRIBE the problem.

Step 2: Check ALL the facts- make sure you have the right problem situation!

Step 3: What's your GOAL – what needs to change for you to feel okay?

Step 4: BRAINSTORM- think of as many solutions as you can.

Step 5: CHOOSE the solution(s) that are likely to work- consider the Pros and Cons?

Step 6: ACTION! Try the solution

Step 7: **DID IT WORK?** → YES – REWARD YOURSELF!!!

↓

NO – DON'T GIVE UP, TRY ANOTHER SOLUTION!

Practice Exercise

This week try using the steps below to practice if your **problem solving** skills can help a situation which triggers painful emotions:

Step 1: What's the problem? What emotion do you want to change?

_____

_____

Step 2: Check the facts (What are they? Does this emotion fit?)

_____

_____

Step 3: What's my goal – what will make me feel better?

_____

_____

Step 4: My brainstorming ideas (possible solutions to the problem):

1. _____
2. _____
3. _____

Step 5: Consider the pros and cons.. Which solution shall I try:

_____

Step 6: Action! Try the solution…

Step 7: Evaluate - did it work? If not, go back to step 5 and try another one of your solutions

Session 8: Final Week!

Opposite Action to Change Emotions…

Celebrations and Goodbye's!

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Mindfulness Exercise

- Understanding each other

- Write down at least one 'worry thought' you are having at the moment

- Put this into the box in the middle

- Pick out one of the 'worries' (not your own!)

- Read out to the group

- As a group discuss why this worry is valid (show understanding)
- What DBT skills could help with this worry?

Opposite Action Skills

RECAP (Session 7): When our emotions DON'T FIT THE FACTS, we CAN change them by acting OPPOSITE to how we FEEL:

Step 1	**Identify and name the emotion you want to change**
Step 2	**Check the facts**
Step 3	**Identify and describe your action urges**
Step 4	**Ask:** Will this emotion make things better or worse?
Step 5	**Think of the opposite action** to your action urges
Step 6	**Act opposite ALL THE WAY** to your action urges!
Step 7	**Repeat acting opposite** until your emotion changes

For example:

Emotion	Urge	Opposite action
FEAR	RUN OR AVOID	APPROACH
SADNESS	ISOLATE	GET OUT AND ABOUT
SHAME	HIDE	BE OPEN- TELL SOMEONE

What other examples can you think of?...

Practice Exercise

- Try and use OPPOSITE ACTION for an emotional response you want to change

EVENT	EMOTION NAME	NATURAL URGE

FOLLOWED URGE?

YES **NO**

ACTION	OPPOSITE ACTION

OUTCOME	OUTCOME
Did emotion mind go up, or down? Do you have regrets? Yes No Are you moving toward goals? Yes No	Did emotion mind go up, or down? Do you have regrets? Yes No Are you moving toward goals? Yes No

Accomplishments

TASK:

Write down one thing **you** have learned from coming to this training, and one thing which you think need to practice more…

DISCUSSION:

From the skills we feel we have mastered, what situations in life can you think of where these may be useful to you?

What advice can you give to each other, in relation to the skills we feel we need to practice more?

Celebration Time!!!

- The rest of this session is a time for us to **celebrate** everything we have **learned and achieved**

- Feel free to **discuss your experiences** of the training (good and bad are both equally important!)

- If there is anything you are still unsure about, or would like extra advice on for the future- **now is the time to ask!!**

Appendix 4. Pilot Study Protocol

Leaps and Bounds" Well-being Programme: Pilot Feasibility Study Protocol

PREFACE

The Protocol follows the suggested format for clinical trials suggested by the National Centre for Complementary and Integrative Health (NCCIH).

FULL PROTOCOL TITLE

'Leaps and Bounds': A 12-week Programme Integrating Psychological Skills with Physical Activity: Pilot Feasibility Study.

Study Chairman or Principal Investigator:

Jennifer Thomas, Doctoral Researcher, Cardiff Metropolitan University.

Supported by:

KESS2 Funding and Llamau Ltd.

Study Intervention Provided by:

Physical activity sessions delivered by staff from Newport LIVE sports development team.
Psychological skills group based on Dialectical Behavioural Therapy approach (Linehan, 2015)

STUDY TEAM ROSTER

Physical activist sessions will be delivered by Katie Blair (Newport LIVE) and Jack Brazier (Cardiff Metropolitan University). DBT sessions will be delivered primarily by Dr. Elanor Maybury. All research will be conducted by Jennifer Thomas (Cardiff Metropolitan University).

PARTICIPATING STUDY SITES

Newport LIVE Centre (Sports Hall and Meeting Rooms)

PRÉCIS

Study Title

'Leaps and Bounds': A 12-week Programme Integrating Psychological Skills with Physical Activity: Pilot Feasibility Study.

Objectives

Primary Objectives:

- To analyse the *feasibility* of participant recruitment, including: barriers and facilitators to recruitment rates; feasibility of randomising groups, and retention and attrition rates to inform required sample sizes for full-scale trial

- To examine the *appropriateness* of intended outcome measures, including the most appropriate method of administering and collating pre-post surveys.

- To qualitatively assess the *acceptability* of implementing the intervention, from the perspective of: participants, support staff and individuals delivering each component (PA and DBT: content, duration, frequency, group size, delivery style etc).

Secondary Objectives:

- To conduct statistical analyses on within-group (pre-post) and between-group* outcome measures, such as: well-being, self-esteem and physical activity levels.

- To establish whether physical activity encourages participants to engage in psychological group therapy (Descriptive statistics and qualitative methods).

Design and Outcomes

This non-randomised pilot study will establish the feasibility, appropriateness and acceptability of implementing a 12-week physical activity and DBT programme to young people at-risk of homelessness, who have a range of complex support needs. Secondary outcomes include within and between-group comparisons on several well-being measures, and physical activity levels.

Interventions and Duration

The study will compare the intervention programme (PA and DBT), with PA-only and DBT-only groups over a duration of 12-weeks. Qualitative post-intervention feedback will be obtained from stakeholders; however no long-term follow-up will be required to achieve the aims and objectives of this study.

Sample Size and Population

The target population will be any young person (aged 15-24) supported by the organisation in the Newport area. Based on available resources, up to twenty participants can be included in the study, with up to seven in each of the 3 groups.

1. STUDY OBJECTIVES

1.1 Primary Objective

The primary objective of this study is to identify barriers and facilitators to implementation of the 12-week intervention. Specific aspects which will be considered include (but are not limited to) the study's: -

Feasibility (*The extent to which an intervention can be carried out in a particular setting or organisation):*

- Recruitment processes, recruitment rates, retention and attrition rates, use of extrinsic incentives, 'dose' of intervention delivered/received, group allocation, adverse events and risk of harm.

Appropriateness (*The perceived fit or relevance of the intervention in a particular setting or for a particular target audience or issue):*

- Outcome measures and administration method, DBT workbook materials, delivery style of both components, length of intervention, frequency of sessions, duration of sessions.

Acceptability (*The perception among stakeholders that an intervention is agreeable):*

- Physical activity in a group setting, types of activities delivered, delivery style, group-based DBT skills sessions, perceived benefits of intervention components, perceived disadvantages / barriers to engagement.

1.2 Secondary Objectives

- Through tracking participant's attendance in PA/DBT/both conditions, we hope to establish whether there is a relationship between engagement in PA and engagement in DBT.

- Attendance, retention and attrition rates will be analysed to inform sample sizes required to power a larger scale study; i.e. testing the effectiveness of the intervention on quantitative outcomes.

- Pre-post descriptive statistics will be reported for all outcome measures, predominantly to determine whether involvement in the study has any impact on participant's well-being (either positively or negatively), and whether this varies due to engagement in a particular group (PA/DBT/both).

2. BACKGROUND AND RATIONALE

2.1 Background on Condition, Disease, or Other Primary Study Focus

Young people (YP) at-risk of homelessness demonstrate poorer social, physical,

and psychological health compared with the general population (Edidin et al., 2011), however research identifying mechanisms of change in effective interventions are sparse (Altena et al., 2010). Nonetheless, the existing evidence-base indicates that trauma-informed physical activity (PA) programmes may improve such outcomes, predominantly due to greater acceptability and engagement than "treatment as usual" (TAU) (Bergholz et al., 2016). Additionally, while positive psychological approaches such as Dialectical Behavioural Therapy (DBT; Linerhan, 1993) have demonstrated some efficacy in treating this "hard to reach" population, successful outcomes are often compromised by barriers such as stigma, adherence, and disregard for treatment integrity (McCay et al., 2016).

Based on evidence from previous research, and principles derived from self-determination theory (SDT; Deci & Ryan, 2000), the current programme intends to utilise physical activity as a means of encouraging YP's to engage in DBT. Through adopting this 'combined' approach, it is hoped that participants will report improved physical and psychological well-being, and increased motivation for sustained engagement in positive social activities.

2.2 Study Rationale

Given that the prevalence of psychiatric disorders among this population is disproportionately high (Hodgson et al., 2015), novel approaches are required to both *directly* improve physical, psychological and social well-being; and *indirectly* increase acceptability and accessibility of evidence-based psychological therapies.

The bespoke 12-week programme which will be delivered in this study is underpinned by principles derived from existing theory, and previous evidence-based research, including: trauma-informed physical activity interventions (Bergholz et al., 2016; D'Andrea et al., 2013); intrinsic motivation and well-being (Altena et al., 2018; Deci & Ryan, 2010); Feasibility and effectiveness of DBT with similar populations (McCay et al., 2015, 2018; Lenz et al., 2016; Vitopoulos et al., 2017); and mechanisms of action …… the most effective 'combined' (physical and psychological) approaches (Thomas et al., in press).

To our knowledge, no previous studies have utilised physical activity as a 'vehicle' to increasing young people's engagement in group-based psychological therapy (DBT skills), whilst simultaneously contributing to their physical and social well-being. Thus, the rationale for this pilot study is to investigate and address the areas uncertainty which will ultimately inform a full-scale trial (Eldridge et al., 2016).

3. STUDY DESIGN

This community-based, non-randomised pilot study will explore the feasibility, acceptability and appropriateness of a 12-week programme which incorporates physical activity with DBT, for young people (15-24) who are at risk of homelessness. Utilising a quasi-experimental design, secondary outcomes will include whether attending group-based physical activity sessions increases engagement in group-based DBT, and if pre-post differences in well-being outcomes are observed within / between groups (PA-only, DBT-only, PA+DBT).

In planning for a full-scale trial, this study will also investigate potential barriers

and facilitators to recruitment, retention and attrition rates for individuals who are supported by the organisation in one area (Newport, South Wales). It is anticipated that up-to 20 eligible young people may volunteer to take part in the study, resulting in <10 participants per group (PA / DBT). Given the self-selective nature of recruitment, it would be unethical to assign some participants to a 'no treatment' / control condition, therefore any comparisons will be derived from previous research averages.

Quantitative data will be collected in weeks 1 and 12 of the programme, by means of a battery comprised from the following validated measures: Demographics (age, gender, ethnicity); Distress (CORE-OM); Well-being (WEMWBS); Self-Esteem (Rosenberg SE Scale); and PA levels (LTEQ). Participants will also be given a watch pedometer, to monitor their steps-per-day.

To qualitatively examine acceptability of the programme, all participants (including drop-outs) will be invited to partake in interviews, one-week after the programme has ended (week 13). Topics will include participants' perceptions of: data collection methods and measures, PA programme content, delivery of DBT skills in group format, frequency of sessions, duration of programme etc. The questions asked will be based on a comprehensive framework developed elsewhere (O'Cathian et al., 2015), to provide additional feasibility data, and primarily aim to identify and expand understanding of any barriers or facilitators in relation to the programme.

4. SELECTION AND ENROLLMENT OF PARTICIPANTS

The study population will include any young person aged 15-24, currently supported by the organisation's services in Newport, South Wales. Given the nature of the organisation, all participants have experiences / are high risk of homelessness and are significantly more likely to meet the criteria for at least one psychiatric disorder (Hodgson et al., 2015).

4.1 Inclusion Criteria

The inclusion criteria are:

- Individuals currently supported by the organisation's Newport services.

- Aged between 15-24 years.

- Capacity to understand study procedures and partake in physical activities.

- Not considered 'high risk' (according to current risk assessment) to self, public or property

- Able to provide informed consent.

4.2 Exclusion Criteria

The exclusion criteria are:

- Individuals deemed unable to provide informed consent due to learning difficulties, substance dependence, or current mental health diagnoses.

- Individuals whose risk assessment indicates a high risk of harm to self / others / property.

4.3 Study Enrolment Procedures

- The lead researcher (JT) will attend a full team meeting, whereby support staff will be given recruitment adverts, participant information sheets and consent forms to distribute to the people they support.

- Once informed consent is provided by the young person (or parent / guardian if aged 15 years), the participant will /be asked to complete the pre-intervention survey with assistance from their support worker, if required.

- Participants will be provided with specific information (dates / times etc.) in relation to their self-selected group.

5. STUDY INTERVENTIONS

5.1 Interventions, Administration, and Duration

The study will include two separate groups (Physical activity and DBT), with the intervention 'condition' being the combined PA+DBT programme. Although the programme duration will be 12-weeks, weeks 1-4 will be PA only, with the DBT group will commencing in week 5 for a duration of 8-weeks. Both groups will be delivered in suitable rooms at the Newport Centre (PA: Sports hall; DBT: Meeting room), and food will be provided after the PA session (thus in between both groups as of week 5).

Details of each group within the intervention are as follows: -

<u>Physical Activity</u>

12 x 1-hour sessions delivered by a qualified coach from the local authority (KB), plus one experienced volunteer from Cardiff Metropolitan University (JB). Both coaches will receive 2-hours training in the week prior to the start of the programme, as well as information relating to the rationale and theory underpinning the sessions.

Each session will follow a theoretically-informed structure, whereby the underpinning principles derived from SDT (autonomy, competence, relatedness) will be promoted through the coaches' delivery approach, in conjunction with the activity type (individual motor skill competencies; group-based challenges).

Based on the aims and objectives of the study and evidence derived from a recent review (Thomas at al., 2019), fidelity to these underpinning principles of the intervention will supersede the 'dose' of activity delivered / received (frequency, intensity, time, type); with progression throughout the duration of the programme encompassing process-oriented feedback and goals, rather than any specific fitness or performance-related outcomes.

<u>Dialectical Behavioural Therapy</u>

8 x 1-hour sessions will be delivered by an experienced Clinical Psychologist (EM), alongside a co-facilitator trained in delivering DBT Skills (JT). The 8-week programme will follow a bespoke DBT Skills manual, primarily based on contextually adapted DBT guidelines, handouts and worksheets (Linehan, 2015; Rathus & Miller, 2015).

Each session will begin with a brief mindfulness exercise, followed by a group-based homework review. The remainder of the session will then focus on teaching and practicing the DBT skills associated with the module for that week (Emotion Regulation; Interpersonal Effectiveness; Distress Tolerance).

Given the sensitive nature of discussions within the group, session one will begin by establishing the 'group rules', including confidentiality in regards to information shared. To minimise any adverse effects each participant will be asked to complete the 'CORE-10' outcome measure at the beginning of each session, thereby allowing the group facilitators to monitor potential risk.

5.2 Handling of Study Interventions

In addition to detail outlined in section 5.1, please refer to attached documents outlining further detail of the delivery approach, and the DBT-manual to be used in the study.

5.3 Concomitant Interventions

We do not anticipate any participants to engage in any alternative psychotherapy whilst completing the intervention programme.

5.3.1 Allowed Interventions

Any existing / ongoing treatments.

5.3.2 Required Interventions

Although not a condition *per se,* food will be available for all participants to ensure they adequately refuel after the physical activity session.

5.3.3 Prohibited Interventions

Not applicable.

5.4 Adherence Assessment

Adherence will be measured by the number of PA / DBT sessions attended, respectively. The feasibility criteria will be: 8/12 PA sessions (67%), and 6/8 DBT sessions (75%).

6. STUDY PROCEDURES

See Table 6.1 for full schedule of evaluations.

6.1 Schedule of Evaluations

Assessment	Screening Visit (Day-14 to Day -1)	Baseline Visit (W1)	Treatment Visit (W12)	Follow-up Visit (W13-14)
Informed Consent Form	X			
Demographics		X	X	
CORE-34		X	X	
Rosenberg SES		X	X	
SWEMWBS		X	X	
Godin LTEQ		X	X	
Documentation Review		X	X	
Qualitative Data Collection				X
Adverse Events		X	X	X

6.2 Description of Evaluations

Informed Consent Form: Right to withdraw; Audiovisual recording agreement; Use of anonymised quotes.

Demographics: Age; Gender.

CORE-34: Well-being; Symptoms (anxiety, depression, physical, trauma); Functioning (personal, social, general); Risk (self; others).

Rosenberg SES: Global Self-Esteem.

SWEMWBS: Short Warwick-Edinburgh Mental Well-being Scale.

Godin LTEQ: Leisure-Time Exercise Questionnaire.

Documentation Review: Screening for missing data; input to SPSS.

Qualitative Data Collection: Semi-structured interviews.

Adverse Events: Risk to self / others monitored via: risk assessment (from organisation) and monitoring of relevant CORE items.

6.2.1 Screening Evaluation

Consenting Procedure

All potential participants will be given a study information sheet describing: the study procedures and principal aims; potential risks and benefits, use of personal data, and details of eligibility to take part. An adapted sheet will be provided to parents / guardians of any individuals <16 years.

Participants will then be given a separate informed consent form by the lead

researcher (JT), prior to the intervention start date. This will include details and dates pertaining to the participants' right to withdraw from the study at any point.

Screening

We will refer to the organisation's personal information and current risk assessment to ensure that all individuals who have provided consent meet the eligibility criteria.

6.2.2 Enrolment, Baseline, and/or Randomisation

Enrolment

Eligible young people were identified by the organisation's staff. The lead researcher (JT) met with all potential participants at least one week prior to the intervention start, to answer any questions about the study and distribute information sheets. Individuals were considered to be 'enrolled' in the study once informed consent was provided.

Baseline Assessments

Please refer to sections 6.1 and 6.2.

Randomization

Not applicable.

6.2.3 Blinding

Given the nature of the interventions it is neither possible or feasible to blind participants or staff involved in the study.

6.2.4 Follow-up Visits

Please refer to sections 6.1 and 6.2.

6.2.5 Completion/Final Evaluation

Details of post-intervention and follow-up measures can be found in sections 6.1 and 6.2.

Additional measures will include (where possible): obtaining reasons for drop-out / withdrawal from the study; overall attendance rates by group; completion rates and missing data of pre and post-intervention surveys.

7. SAFETY ASSESSMENTS

To maintain safety of all participants, the lead researcher (JT) will liaise with the organisation throughout the intervention in regards to any changes to personal risk assessments. All participants attending the DBT group will be asked to complete a weekly 'CORE-10' assessment, which will allow the facilitators to identify any risk so self / others.

At the start of each PA session the instructor will ask participants to disclose any current illness or injury, and adapt / change specific activities accordingly.

7.1 Specification of Safety Parameters

Not applicable.

7.2 Methods and Timing for Assessing, Recording, and Analyzing Safety Parameters

Not applicable.

7.3 Adverse Events and Serious Adverse Events

Definitions according to ICH Guidelines for Good Clinical Practice (1996):

Adverse Events (AEs): *Any unfavorable and unintended diagnosis, symptom, sign (including an abnormal laboratory finding), syndrome or disease which either occurs during the study, having been absent at baseline, or if present at baseline, appears to worsen.*

Serious Adverse Events (SAEs): *Any untoward medical occurrence that results in death, is life threatening, requires inpatient hospitalization or prolongation of existing hospitalization, results in persistent or significant disability/incapacity, or is a congenital anomaly.*

AEs/SAEs common to the study population may include: Self-harm; Mental illness; Attempted/actual suicide; Illness or injury.

We do not anticipate that any of these events will occur as a direct result of involvement in the study, however any solicited / unsolicited AEs will be recorded by the lead researcher (JT) and followed-up appropriately with the organisation.

Any reductions in pre-post intervention well-being measures could be considered an AE of the study, and will be investigated fully by the lead researcher (JT).

7.4 Reporting Procedures

Any accidents / incidents which occur during the sessions will be recorded according to the organisation's preferred procedures (Health and Safety policy).

Any solicited / unsolicited AEs will be recorded and disclosed to the organisation.

Indications of AEs in relation to the intervention (pre-post comparison measures) will be reported to the organisation, and investigated by the lead researcher (JT).

7.5 Follow-up for Adverse Events

We will follow the advice and guidance from the organisation in regards to provisions for participants who may experience AEs, including discontinuation from the study if necessary.

7.6 Safety Monitoring

See protocol above.

8. INTERVENTION DISCONTINUATION

Participants may be discontinued from the intervention if they express that involvement is negatively impacting on their physical / social / psychological well-being. Any illness / injury will be assessed individually.

Discontinuation of the study would occur only due to unforeseen events, such as unexpected withdrawal of necessary resources (i.e. venue, instructors, DBT facilitators).

9. STATISTICAL CONSIDERATIONS

9.1 General Design Issues

The primary outcomes of this pilot study are to assess the feasibility, appropriateness and acceptability of implementing a combined PA and DBT intervention to young people at-risk of homelessness. The non-randomised method of group allocation may introduce selection bias and a homogenous, however we do not anticipate this will affect the results in relation to the purposes of the study. Any significant between-group differences in pre-intervention baseline measures will be considered when analysing the secondary outcome measures.

9.2 Sample Size and Randomization

As a pilot feasibility study, the small sample size will be relatively small (< 20), however outcomes will be subjected to pre-post analyses, rather than further inferential statistical testing.

Information pertaining to recruitment and retention rates will be used to inform sample size calculations with respect to a full-scale study.

Treatment Assignment Procedures

See sections 3, 4 and 6.

9.3 Definition of Populations

For the purposes of this study, all participants will be defined as intent-to-treat.

9.4 Interim Analyses and Stopping Rules

Not applicable.

9.5 Outcomes

9.5.1 Primary Outcome

The primary outcomes of the study are:

- Feasibility: Recruitment processes and rates; retention and attrition rates; group allocation methods; safety and adverse events.

- Appropriateness: Recruitment methods; outcome measures; data collection methods.

- Acceptability: Intervention setting, delivery, content, frequency and duration (PA and DBT groups).

This data will be collected both quantitively (throughout intervention period) and qualitatively (post-intervention).

9.5.2 Secondary Outcomes

The secondary outcome measures will include quantitative pre-post intervention data, as specified in section 6.

9.6 Data Analyses

Raw data from the paper-based secondary outcome measures will be inputted into SPSS to generate descriptive statistics. This will provide further detail of sample characteristics, pre-post differences in well-being measures, and any changes in participants' PA levels. Missing or incomplete data will also be analysed during this process.

Attendance data for both groups will be inputted into SPSS, to track retention and attrition throughout the intervention, and analyse whether a correlation exists between engagement in PA and DBT.

Interviews will be transcribed verbatim and analysed using a thematic approach (Braun & Clarke, 2006). Qualitative data will be obtained from participants, facilitators and support staff from the organisation, to identify multiple implementation-related barriers and facilitators in relation to the primary objectives and outcomes.

10. DATA COLLECTION AND QUALITY ASSURANCE

10.1 Data Collection Forms

Data will be collected using paper-based forms and surveys. This will be done by either the lead researcher (JT), or a support worker. All consent forms will be stored in a locked cabinet. All pre-post surveys will be coded using participant's initials to maintain anonymity and confidentiality.

10.2 Data Management

All data from the paper-based surveys will be inputted into statistical software (SPSS, Excel) on a password encrypted laptop belonging to /the lead researcher (JT). After this process, these documents will be destroyed in line with the university's confidential waste policy. Other forms (i.e. Consent) will be stored in a locked cabinet at the university for a duration of 10 years after the intervention ends (as per university policy).

Qualitative data will be anonymised during the transcription process, and all audiovisual recordings will be stored on the lead researcher's (JT) encrypted laptop. Participants will be advised that any information provided in the interview may be redacted up to 4 weeks after the interview date.

10.3 Quality Assurance

10.3.1 Training

- Physical Activity Staff: In addition to the qualifications and training held by the lead coach lead (KB), both instructors will receive: An information 'pack' which fully describes the rationale underpinning the study, delivery approach, session content and structure; 2 hours practical training by an expert in the fields (RM) and the lead researcher (JT).

- DBT Staff: The lead facilitator (EM) is a highly qualified and experienced clinical psychologist who has delivered numerous DBT skills training groups with similar populations the current study. The co-facilitator (JT) has the British Isles DBT Skills training qualification (2 day essential skills workshop).

10.3.2 Quality Control Committee

Ethical approval granted by Cardiff Metropolitan University School of Health Sciences Ethics Committee (Ref: PGR-1198).

10.3.3 Metrics

Not applicable.

10.3.4 Protocol Deviations

Not applicable.

10.3.5 Monitoring

The lead researcher (JT) will be present throughout the recruitment, screening and group allocation phases, as well as during the implementation of both components of the intervention (PA group and DBT group).

11. PARTICIPANT RIGHTS AND CONFIDENTIALITY

11.1 Institutional Review Board (IRB) Review

Not applicable.

11.2 Informed Consent Forms

See section 6.2.1.

11.3 Participant Confidentiality

See section 10.2.

11.4 Study Discontinuation

See section 8.

12. COMMITTEES

The lead researcher (Jennifer Thomas) will be supervised by Dr. Nicola Bowes, Dr. Katie Thirlaway and Dr. Robert Meyers from Cardiff Metropolitan University, and Sam Austin who is Deputy CEO of the partner organisation.

13. PUBLICATION OF RESEARCH FINDINGS

We intend to publish research findings which will be fully compliant with all policies and procedures outlined by the university and the organisation.

Appendix 5. Exemplar Physical Activity Session

	Principles	Activities	Delivery Approach
Warm-up (10 mins.)	+ Show genuine interest in YPs + Promote autonomy through involvement in decisions + Leadership communication		+ Warm, caring, genuine manner + Encourage suggestions for adapting structure and content + Invite YPs to assist with delivery
Motor Skills (15 mins.)	+ Provide choice, responsibility, and self-independence + Develop competence through mastery of skills + Promote problem-solving and self-improvement + Encourage self-directed goals		+ Avoid controlling language i.e. "I want…" / "you should…" + Positive reinforcement and encouragement + Encourage self-monitoring of progress / effort (not performance) + Highlight individual successes
Group Activities (25 mins.)	+ Shared decision-making of activity + Enhance relationships and strengthen bonds + Improve collaborative communication skills + Develop group-based confidence in all YPs + Build and maintain self-respect		+ Encourage feedback / suggestions of group-preferences + Team-based challenges which require communication + Monitor progression, maintain 'optimal challenge' + Encourage equal involvement, recognise challenges- adapt + Ensure all individuals have an equal voice / role
Cool-down (10 mins.)	+ Self-regulation and monitoring skills + Show interest and attention to all participants + Support interests of group and provide choice		+ Focus on bodily sensations and regulation of breathing rate + Positive feedback, reassurance, and empathy + Collaborate on preferred activities for following week

Key Points to remember:-

1. Autonomy: Provide choice and control (non-pressurised or instructive)
2. Competence: Set optimal challenges and goals (adapt to meet needs and ability)
3. Relatedness: Encourage co-production and teamwork (feedback and suggestions)

Appendix 6. Exemplar Physical Activity Session Feedback Sheet

Week:

Notes from previous session (goals/targets):

Section	Key Principles	Activities	Delivery Approach
Warm-up (10 mins.)	- Autonomy - Leadership - Communication		+ Assisted delivery + Encourage suggestions + Genuine interest
Motor Skill Competencies (15 mins.)	- Mastery - Problem-solving - Bodily awareness		+ Positive reinforcement + Externally-focused feedback / cues + Encourage self-monitoring
Group Activities (25 mins.)	- Relationships - Collaboration - Respect		+ Encourage communication + Monitor group progression / goals + Inclusive for all
Cool-down (10 mins.)	- Self-monitoring - Regulation - Mindful awareness		+ Help regulate breathing + Provide reassurance + Reflect on session

Notes for this week (equipment/activities):

Post Session Notes (Goals/progression; positives/negatives; engagement; next week):

Appendix 7. PA-only Questioning Route

Introduction

1. Could you briefly introduce yourself and tell us how long you've been involved with Llamau?

2. How did you first hear about the activity programme?

Antecedents to Participation

3. Why did you agree to take part in the programme?

4. What did you think would be involved?

Early Impressions

5. What do you remember about your experience of attending the first session?

6. What were your first impressions of the coaches?

7. How did you first feel about doing the activities with the group?
- PROBE: Anxious, apprehensive, nervous etc.. possibly scale 1-10?

8. Was there anything in particular at the start which encouraged you to come back again?
- PROMPT: Relating to other YP? Coaches? Activities?

Changes Over Time: Engagement and Motivation

9. What (if anything) did you learn during the 8-week programme?

10. Comparing the first to the last sessions you attended, what changes (if any) did you notice in yourself?

11. Was there anything you didn't like, or found particularly challenging (either in relation to the activities or attending in general)?
- PROBE: How did you overcome these challenges?

12. How did being in a group of other people affect your overall experience of the programme?

Outcomes and Intentions: Wellbeing and PA Behaviours

13. What was the biggest reward you gained from attending the programme?
- PROBE: Physical / Psychological / Social benefits?

14. Over the 8-weeks, and now, have you noticed any other changes in your general day-to-day life?
- PROBE: Physical / Psychological / Social?

15. How would you feel about getting involved with other types of activities or groups in the future?

16. If you could attend a similar programme again, what would you change about it?
- PROBE: Activities, time, duration, group size, coaches…

Closing Comments

17. Is there anything else at all that we haven't discussed, and you would like to add?

Appendix 8. PA + DBT-ST Questioning Route

Introduction

1. Could you briefly introduce yourself and tell us how long you've been involved with Llamau?

2. How did you first hear about the programme?

Antecedents to Participation

3. What was our main reason for agreeing to take part (appealed to you most- DBT / PA / vouchers)?

4. What did you think would be involved overall?

Early Impressions

5. What do you remember about your experience of the first session?

6. What were your first impressions of the DBT session? PA session?

7. How did you feel about being in a group?

8. Was there anything in particular at the start which encouraged you to come back again?
- PROMPT: Relating to other YP? Preeya? DBT? Coaches? Activities?

Changes Over Time: Engagement and Motivation

9. What (if anything) did you learn during the 8-week programme?

10. Comparing the first to the last sessions you attended, what changes (if any) did you notice in yourself during the sessions?

11. Was there anything you didn't like, or found particularly challenging (DBT / PA)?
- PROBE: How did you overcome these challenges?

12. How would being in a larger group of people have affect your overall experience of the programme? DBT / PA different?

Outcomes and Intentions: Wellbeing and PA Behaviours

13. What was the biggest reward for attending the programme?
- PROBE: Physical / Psychological / Social benefits?

14. Over the 8-weeks, and now, have you noticed any other changes in your general day-to-day life?
- PROBE: Physical / Psychological / Social?

15. How would you feel about getting involved with other types of activities or groups in the future? – what would it involve? Therapeutic or activity based?

16. If you could attend a similar programme again, what would you change?
- PROBE: Activities, time, duration, group size, coaches…

Closing Comments

17. Is there anything else at all that we haven't discussed, and you would like to add?

Appendix 9. Questioning Route for PA Interventions Coaches

Introduction

1. Could you each briefly introduce yourselves and explain how and when you first heard about the research project?

2. Prior to receiving any materials or training, what did you think would be involved?

3. How useful did you find the initial training session (PowerPoint and handouts) in preparing you for the delivery of sessions?

Implementation

4. Thinking about the first sessions, what did you find helped the participants feel more at ease?

5. Throughout each programme, what activities did you and the participants enjoy the most? -- Why do you think these were more effective than others?

6. There were several occasions when young people didn't want to join in with the sessions – how did you feel about this and what did you find was the best approach to those situations?

7. Over the course of both programmes, did you notice any changes in the way the participants engaged with yourselves or each other?
– What do you think might have affected this?

8. The programme was designed to be quite flexible, and mainly participant-led; to what extent did you feel you could adapt when necessary, and incorporate any suggestions from the young people?

9. What strategies did you find most effective for helping to support participants' confidence in that setting?

10. Thinking about both programmes, how did you adapt your approach and the activities to accommodate differences between the two groups?

11. Were there any psychological principles which you found difficult to incorporate into your delivery approach?
– choice and control; challenges and goals; co-production and teamwork.

12. Can you give some examples of what approach or delivery style was most effective with these young people?

Reflections

13. Do you feel your involvement in these programmes has changed the way in which you deliver group activities? (if yes, how)?

14. What would you change or recommend if we were to deliver activity programmes to groups of similar young people in the future?

15. is there anything else you would like to say about your involvement in these programmes?

Appendix 10. Completed Physical Activity Session Feedback Sheets

Week: 2

Section	Key Principles	Activities	Delivery Approach
Warm-up (10 mins.)	- Autonomy - Leadership - Communication	Name Game – using soft ball throwing back and forth to learn each other's names	+ Assisted delivery + Encourage suggestions + Genuine interest
Motor Skill Competencies (15 mins.)	- Mastery - Problem-solving - Bodily awareness	Hats and Bowls (cone flipping game)	+ Positive reinforcement + Externally-focused feedback / cues + Encourage self-monitoring
Group Activities (25 mins.)	- Relationships - Collaboration - Respect	Dodge ball- two types one where team swaps from side to side and the one game where individuals were eliminated	+ Encourage communication + Monitor group progression / goals + Inclusive for all
Cool-down (10 mins.)	- Self-monitoring - Regulation - Mindful awareness	Follow the leader- game where group follow one person sat in a circle and making different hand signals	+ Help regulate breathing + Provide reassurance + Reflect on session

Notes for this week (equipment/activities):
Cones and soft balls.

Post Session Notes (Goals/progression; positives/negatives; engagement; next week):

One young person who didn't want to take part, other young people who were initially stand offish. It was noted that a few of the young people were not interested in joining in sports activities but were happy to take part in non-sport related games.

Week: 8

Section	Key Principles	Activities	Delivery Approach
Warm-up (10 mins.)	- Autonomy - Leadership - Communication	Capture the flag – young people split into teams have to retrieve flag from other teams base and return it to their base without being tagged.	+ Assisted delivery + Encourage suggestions + Genuine interest
Motor Skill Competencies (15 mins.)	- Mastery - Problem-solving - Bodily awareness	Keith ball: Similar to dodge ball but when you are out participants must stand on a bench behind the opposite team and attempted to catch a ball in order to rejoin the game.	+ Positive reinforcement + Externally-focused feedback / cues + Encourage self-monitoring
Group Activities (25 mins.)	- Relationships - Collaboration - Respect	Football rounders- rounders but participants must kick a football rather than hit a ball with a bat. This week we added a twist to this game where participants had to complete their running lap on a space hopper.	+ Encourage communication + Monitor group progression / goals + Inclusive for all
Cool-down (10 mins.)	- Self-monitoring - Regulation - Mindful awareness	Football Rounders: To end the session we played another round of football rounders but we took away the space hopper element.	+ Help regulate breathing + Provide reassurance + Reflect on session

Notes for this week (equipment/activities): cones, flags, bibs, dodge balls, benches, football and space hoppers.
Post Session Notes (Goals/progression; positives/negatives; engagement; next week):

Young people engaged really well in this session, all but one of the young people took part in every game. This session was a great one to end on it was amazing to see the young people's confidence and ability grow over the last 8 weeks, the energy the young people brought to every session was amazing and we hope as a team they carry on between themselves and continue to develop their selves and abilities.

Appendix 11. Flyer for Recruitment to the PA + DBT-ST Intervention

'LEAPS AND BOUNDS'

WELL-BEING GROUP

Would you like…

The opportunity to do more activities?..
To learn life skills to help achieve your goals?..
To increase your physical and mental strength?...

Starting this Wednesday we will be running weekly group sessions which include learni about ways to improve confidence and self-esteem, and taking part in fun activities (such as dodgeball, frisbee, basketball, or whatever you suggest!)

YOU GET £5 EVERY WEEK!!

AND FREE SNACKS!!

WHERE: Sophia Gardens Sports Centre

WHEN: Wednesday 2:30-5:15pm

HOW DO I GET INVOLVED? Let a member of staff know ASAP 😊