Promoting individual, organisational and group health through workplace team sport participation

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Promoting Individual, Organisational and Group Health Through Workplace Team Sport Participation

by

Andrew Brinkley

A Doctoral Thesis
Submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy of Loughborough University

October 2017

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For my family
Abstract

Working age adults are at a high risk of inactivity, a modifiable behaviour associated with non-communicable illnesses, premature mortality, and diminished organisational health. Limited evidence has investigated the promotion of workplace team sport. This research utilised mixed methods to investigate the efficacy and feasibility of providing workplace team sport.

Study one synthesised the evidence examining the efficacy of workplace team sport. Study two used interviews to understand the facilitators and obstacles influencing participation. In study three, a 12-week team sport intervention programme for the workplace, was implemented, using a quasi-experimental design, and evaluated for its impact on individual (e.g., fitness), social-group (e.g., relationships) and organisational (e.g., productivity) outcomes. The intervention was underpinned by self-determination theory. A RE-AIM process-evaluation (Study four) was conducted to assess delivery and impact.

Workplace team sport participation is influenced by intrapersonal, interpersonal, organisational, environmental and societal factors. A participatory approach and needs-supportive environment may alleviate these challenges. Findings indicate participation in workplace team sport has benefits for individual, social group and organisational health. VO₂ Max (+4.5±5.80 ml/kg/min), PA duration (+154.74 minutes) and communication (+3%) significantly improved over 12-weeks in the intervention group. Qualitative evidence indicates workplace team sport has benefits for employees and the organisation (e.g., behaviour change, wellbeing, relationships and productivity). Efficacy and implementation of the programme were highly successful. The adoption and maintenance of the programme were moderately successful. The reach of the programme was less successful.

In conclusion, team sport is a mode of workplace PA, with a high degree of efficacy, and should be considered by employers and external stakeholders promoting health within the workplace. Future research should continue to examine the promotion of workplace team sport over the long-term.
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Mum, Dad and Neil, thank you for your love and for always supporting me, and for shaping who I am today.

Finally, thank you to my girlfriend Ellie. Thank you for your unconditional love and support. Thank you for always being there. I look forward to our journey together.
Publications


AB, HM and FM designed the study. AB conducted the literature search and included/excluded studies. All authors contributed to the interpretation of the findings.


AB, HM and FM designed the study. AB and FJ conducted data collection. AB analysed the data. AB, HM and FM contributed to the interpretation of the findings.


AB, HM and FM designed the study. AB recruited participants, conducted data collection and managed the intervention. AB analysed the data. All authors contributed to the interpretation of the findings.


AB, HM and FM designed the study. AB recruited participants, conducted data collection and analysed the data. All authors contributed to the interpretation of the findings.

Reports

Dissemination of Research

Presentations


<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>BMI</strong></td>
<td>Body Mass Index</td>
</tr>
<tr>
<td><strong>BNSSS</strong></td>
<td>The Basic Needs Satisfaction in Sport Scale</td>
</tr>
<tr>
<td><strong>BNT</strong></td>
<td>Basic Needs Theory</td>
</tr>
<tr>
<td><strong>CHD</strong></td>
<td>Coronary heart disease</td>
</tr>
<tr>
<td><strong>CPS2</strong></td>
<td>Copenhagen Psychosocial Questionnaire II</td>
</tr>
<tr>
<td><strong>CST</strong></td>
<td>Chester Step Test</td>
</tr>
<tr>
<td><strong>CTG</strong></td>
<td>Changing the Game</td>
</tr>
<tr>
<td><strong>CVD</strong></td>
<td>Cardiovascular illnesses, diseases and conditions</td>
</tr>
<tr>
<td><strong>EPHPPT</strong></td>
<td>Effective Public Health Practise Project Tool</td>
</tr>
<tr>
<td><strong>HR</strong></td>
<td>Human resources</td>
</tr>
<tr>
<td><strong>IPAQ</strong></td>
<td>International Physical Activity Questionnaire (Short-Form)</td>
</tr>
<tr>
<td><strong>ITT</strong></td>
<td>Intention-to-Treat</td>
</tr>
<tr>
<td><strong>MET</strong></td>
<td>Metabolic equivalent of task</td>
</tr>
<tr>
<td><strong>MRC</strong></td>
<td>Medical Research Council</td>
</tr>
<tr>
<td><strong>NRS</strong></td>
<td>Need for Recovery Scale</td>
</tr>
<tr>
<td><strong>PA</strong></td>
<td>Physical activity</td>
</tr>
<tr>
<td><strong>PSS</strong></td>
<td>Perceived Stress Scale</td>
</tr>
<tr>
<td><strong>RCT</strong></td>
<td>Randomized control trial</td>
</tr>
<tr>
<td><strong>RE-AIM</strong></td>
<td>Reach, efficacy, adoption, implementation, maintenance</td>
</tr>
<tr>
<td><strong>RPE</strong></td>
<td>Rate of perceived exertion</td>
</tr>
<tr>
<td><strong>SCQ</strong></td>
<td>Sport Climate Questionnaire</td>
</tr>
<tr>
<td><strong>SDT</strong></td>
<td>Self-Determination Theory</td>
</tr>
<tr>
<td><strong>SET</strong></td>
<td>Social Exchange Theory</td>
</tr>
<tr>
<td><strong>SIT</strong></td>
<td>Social Identity Theory</td>
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<tr>
<td><strong>SLS</strong></td>
<td>Satisfaction with Life Scale</td>
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<tr>
<td><strong>SVS</strong></td>
<td>Subjective Vitality Scale</td>
</tr>
<tr>
<td><strong>UWES</strong></td>
<td>Utrecht Work Engagement Scale</td>
</tr>
<tr>
<td><strong>VO_{2} Max</strong></td>
<td>Maximal oxygen uptake</td>
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Chapter 1  Health, the workplace and team sport: An introduction
Health, the workplace and team sport: An introduction

Introduction

This chapter provides the evidence for the health and work benefits of providing physical activity (PA) opportunities within a workplace setting. An introduction for why the benefits of team sports may be more advantageous for workplaces than individual physical activity interventions is given, supported by evidence from the literature. Finally, the aims, research questions and methodology are presented.

Thesis structure

This thesis is constructed from six chapters (see Figure 1.1 for a schematic overview). Chapter 1 introduces the landscape of the thesis and provides a rationale for providing team sport in a workplace setting. Chapter 2 (study 1) reviewed the evidence examining the efficacy of workplace team sport. This review was published in April 2015 (see Brinkley, McDermott and Munir, 2017a). Chapter 3 (study 2), a qualitative investigation with employees both participating and not participating in workplace team sport explored the facilitators and obstacles associated with participation. This study was published in February 2017 (see Brinkley, McDermott and Munir, 2017b). The data collected from studies 1 and 2 informed the design of a team sport intervention for the workplace. The methods and findings of this intervention programme (i.e., ‘Changing the Game’) are presented in Chapter 4 (study 3). This study was published in August 2017 (see Brinkley, McDermott, Grenfell-Essam & Munir, 2017c). Chapter 5 presents a process-evaluation of ‘Changing the Game’ (CTG) (study 4). This process evaluation used a mixed methods approach and was guided by the RE-AIM framework (Gaglio, Shoup and Glasgow, 2013), and was accepted for publication in October 2017 (See Brinkley, McDermott & Munir, 2017d). Finally, Chapter 6 discussed the findings presented in this thesis. The discussion centres on the implications for the future research, the limitations of the current thesis and recommendations for practise and policy.
Figure 1.1: Schematic Overview of Thesis Structure
**Physical activity and the workplace**

**Physical activity guidelines and working age adults**

Physical activity can be considered bodily movement that results in an increase in metabolic energy expenditure (Colberg et al., 2016; Ekelund et al., 2016). Common modes of physical activity are sport and exercise (Ekelund et al., 2016). Sport can be considered competitive and non-competitive physical activity with rules or traditions, whereas exercise is structured and planned physical activity (Council of Europe, 2001; Colberg et al., 2016; Ekelund et al., 2016).

National and international guidelines state working age adults, aged between 18 to 64 years should, at a minimum, participate in 150 minutes of moderate intensity PA (>3-6 MET) (e.g., cycling) or 75 minutes of vigorous physical activity (PA) (>6 MET) (e.g., team sport, running) per week in bouts of more than 10 minutes (Department of Health, 2011; Townsend, Wickramasighe, Williams, Bhatnager & Rayner, 2015; World Health Organisation, 2010). For observable adaptations in individual health outcomes, the World Health Organisation (2010) suggest working age adults should participate in double the recommended weekly guidelines (i.e., 300 minutes of moderate intensity or 150 minutes of vigorous PA per week).

In developed countries, working age adults are failing to meet these guidelines (World Health Organisation, 2010). Within the UK, 33% of working age men and 45% of working age women fail to meet minimum PA guidelines (Townsend et al., 2015). From an economics perspective, the accumulative impact of inactivity in the UK was calculated as £8.2 billion in 2014 (UK Active, 2014). Furthermore, a recent pooling of global data analysed conservatively through sensitivity analysis found $67.5 billion is spent per annum on the global direct health-care and indirect costs of inactivity (Ding et al., 2016). Therefore, arguments within the literature suggest urgent action is required to address the apparent and well-reported global ‘inactivity pandemic’ (Andersen, Mota & Di Pietro, 2016; Das & Horton, 2016).

A plausible explanation for this pandemic of inactivity within a workplace setting may be the increasing time employees spend at work in job
roles which encourage sedentary behaviour (Hallal et al., 2012). Activities which require low levels of metabolic energy expenditure (<1.5 MET) whilst sitting or lying down can be categorised as sedentary behaviour (e.g., computer use, desk bound job roles) (Atkin et al., 2012; Hamilton et al., 2008). Sedentary behaviour can be assessed through self-reported questionnaires (e.g., TV viewing time, computer usage, diaries) and objective measurement tools (e.g., accelerometers, posture indicators, biometric markers) (Atkins et al., 2012; Kelly, Fitzsimons & Baker, 2016). Despite their acceptability and feasibility to assess mode and duration of sedentary behaviour, self-reported measures may over- and under-estimate sedentary time due to recall bias and social desirability, and therefore are limited in their test-retest reliability and content validity (Atkin et al., 2012; Kelly et al., 2016). Objective measures whilst offering superior test-retest reliability and strong concurrent validity may be limited in their content validity, acceptability and feasibility (Atkin et al., 2012; Kelly et al., 2016). For example, accelerometers struggle to capture postural change and frequently classify standing as sedentary behaviour (Atkins et al., 2012; Kelly et al., 2016). Moreover, measures of postural change may be limited by participant acceptability (e.g., removing the monitor) and concurrent validity (i.e., identification of mode of sedentary behaviour) (Atkin et al., 2012; Kelly et al., 2016). Therefore, recommendations of research indicate an approach utilising objective and subjective measures of intensity, duration and frequency is favourable (Atkin et al., 2012; Kelly et al., 2016).

Although work should be considered good for health, the modern workplace may contribute to the maintenance of sedentary behaviour (Batt, 2009; Del Pozo-Cruz, Gusi, Adsuar, del Pozo-Cruz, Parraca, & Hernandez-Mocholí, 2013). Indeed, Waddell and Burton (2006) found adults spend upwards of a third of their life at work. Further, Hallal et al. (2012) argue increases in technology and subsequent working practises have resulted in a decrease in energy expenditure and PA in the workplace. This has created white collar workforces which do not or cannot participate in adequate PA within their job role. More specifically, research has indicated white collar employees in desk bound roles (e.g., call centres, offices) with limited
capacity for occupational physical activity are at greater risk to non-communicable illness and disease and ill-health than blue employees with high levels of occupational physical activity (e.g., builders, engineers) (Eriksen, Rosthøj, Burr & Holtermann et al., 2015; Owen, Healy, Matthews & Dunstan, 2010; del Pozo-Cruz et al., 2013). Therefore, it is unsurprising that evidence calls for the addition of supplemented workplace PA (e.g., active desks, walking, sport) (Andersen et al., 2016; Das & Horton, 2016; Ding et al., 2016; Ekelund et al., 2016).

The World Health Organisation (2010) state the importance of promoting health and PA in stable community settings, such as the workplace. Evidence highlights the positive impact advocacy and participation in workplace health promotion may have upon the individual employee, their community (e.g., colleagues, friends, family) and the organisation (Batt, 2009; Conn et al., 2009; Dugdill, Brettle, Hulme, McCluskey & Long, 2008; Rongen, Robroek, van Lenthe & Burdof, 2013). Promoting PA within a workplace may allow schemes and programmes the capability to reach a large, captive and stable group of individuals in a functioning social network (Robroek, van de Vathorst, Hilhorst & Burdof, 2012; Yancey et al., 2004a). The duty of care provided by employers may also encourage participation in workplace PA (Batt, 2009; Robroek et al., 2012; Yancey et al., 2004a; Yancey et al., 2004b).

Physical activity behaviour is known to be influenced by a dynamic array of intrapersonal, interpersonal, organisational and environmental factors which occur over the lifespan of working age adults (Bauman et al., 2012; Murray et al., 2017; Mazzola, Moore & Alexander, 2017; Malik et al., 2014; Yang et al., 2014). However, the exact correlates which influence participation in workplace physical activity are ambiguous (Keegan et al., 2016). However, previous research has suggested the promotion of workplace PA is influenced by facilities (Halonen et al., 2015); external schemes (e.g., Workplace Challenge; see Carter et al., 2014); funding (McEachan, Lawton Jackson, Conner & Lunt, 2008); time (Tavares & Plotnikoff, 2008); the impact or presence of a workplace culture (Bennie, Salmon & Crawford, 2010; Scherrer, Sheridan, Sibson, Ryan, & Henley, 2010); social support (Conn et al., 2009);
the influence of workplace champions (Shephard, 1996); and the support of superiors or managers (Veitch, Clavisi & Owen, 1999).

With regard to participation, research has consistently demonstrated a non-linear relationship between participation in PA (including sport) and age in working adults (Bauman et al., 2012; Mazzola et al., 2017; Malik et al., 2014; Yang et al., 2014). More specifically, a survival analysis by Lunn (2010) of self-reported sports participation data suggests participation in sport (i.e., team and individual) negatively decreases with age following a peak at age 15-21 (i.e., during secondary and higher education). Indeed, age and associated responsibilities (e.g., child-care, work-life balance, marital status) are known to challenge participation in PA (Bauman et al., 2012; Lunn, 2010). Qualitative research has indicated parents attribute participation in PA in a workplace or leisure-time context to feelings of guilt and a lack of responsibility (Audrey & Proctor, 2015). While, Lunn (2010) indicates transition from education (e.g., university) to the workplace its responsibility contributes to dropout from sport and exercise. When considering employee participation, social-economic positions (e.g., wage and disposable income) are known to influence adult participation (Lunn, 2010). More specifically, individuals with a low social-economic position (i.e., lower wage and high expenses) are less likely to participate or adhere to PA (Bauman et al., 2012; Lunn, 2010). Furthermore, challenges specific to active commuting may be increased by child-care (Yang et al., 2015). Indeed, transport associated with dependents (e.g., transporting children to and from school) may remove the capacity for regular active transport (Audrey & Proctor, 2015, Yang et al., 2014). Finally, workload is thought to increase with age, time and responsibility in the workplace (Waddell and Burton, 2006). Recently, workload has been negatively associated with participation in workplace PA (Mazzola et al., 2017). However, little is known about how these challenges to PA participation influence specific modes of activity in a range of workplace settings and industries. Therefore, it remains important to understand the factors which underpin modes of PA (e.g., team sport) within differing contexts such as the workplace. The current study aims to address this lack of understanding though investigating participation in workplace team sport.
Physical activity and employee and organisational health

To prevent, manage and treat ill-health, and promote health, wellbeing and quality of life through PA, a variety of methods (e.g., gym training/classes, walking, active transport, education, activity challenges, active work stations) have been adopted in a workplace setting with varying levels of acceptability, feasibility and efficacy (Batt, 2009; Brockman & Fox, 2011; Conn et al., 2009; Dishman, DeJoy, Wilson & Vandenberg, 2009; MacEwen, MacDonald & Burr, 2015; Malik et al., 2014; Plotnikoff, McCargar, Wilson & Loucaides, 2005; Rongen et al., 2013). However, these schemes rely on specific tailoring to individual workplaces and often fail to create pathways to maintainable changes in behaviour activity behaviour (Batt, 2009; Conn et al., 2009; Malik et al., 2014). Moreover, despite its popularity within society, research within a workplace setting is only beginning to investigate the impact of sport.

Employee health

Compelling evidence suggests that physical inactivity increases the risk for diseases associated with physical fitness such as cardiovascular disease (CVD) (Hamilton, Healy, Dunstan, Zderic & Owen, 2008); type 2 diabetes (Hu et al., 1999, 2001); obesity (Liou, 2007; Medina, Janssen, Campos & Barquera, 2013); osteoporosis (Tan, LaMontagne, Sarmugam, & Howard, 2013); forms of cancer (Brenner, 2014; Kohl, LaPorte & Blair, 1988; Na & Olinsky, 2011); and markers of poor mental health and wellbeing (Kim et al., 2012; Lindwall, Ljung, Hadžibajramović & Jonsdottir, 2012).

Physical fitness is the ability to conduct daily tasks (e.g., job role) with vitality and control, whilst maintaining energy to participate in supplementary PA (e.g., team sport) (Caspersen, Powell & Christenson, 1985). Physical fitness can be measured in terms of an individual’s cardiorespiratory and musculoskeletal function (Caspersen et al., 1985). Physical fitness is measured using objective laboratory (e.g., gas-analysis, densitometry), applied field tests (i.e., estimations of absolute value) and anthropometric indicators (e.g., stature) (Caspersen et al., 1985; Wenger & Bell, 1986). Lower physical fitness is an identifiable risk-factor for non-communicable illness and
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disease (Blair & Brodney, 1999; Ekelund et al., 2016; Ding et al., 2016; Lee et al., 2012).

Within the UK, CVD accounts for >1.6 million adult hospital inpatient visits (10.1% men and 6.3% women over the age of 18 years) per year. Furthermore, CHD is the leading cause of mortality worldwide, with 70,000 deaths per year in the UK alone (British Heart Foundation, 2017). In 2014, 65% of working age men and 58% of working age women were considered overweight or obese within the UK, and upwards of 3.2 million individuals are known to have type 2 diabetes (Health and Social Care Information Centre, 2016). Global trends reflect this with more than 1.9 billion working age adults being classified as overweight (600 million obese), and estimates suggesting 422 million adults globally to be living with diabetes (World Health Organisation, 2016). The World Health Organisation (2016) estimated in 2015, a third of the cancer mortality is accountable to modifiable risk factors including inactivity and body mass increases (2.9 million deaths).

Finally, 300 million individuals suffer with depression (World Health Organisation, 2017), while statistics from the UK indicate at least one in six people aged over 16 years have a common mental health problem (e.g., generalized anxiety disorder, post-traumatic stress disorder) (Mental Health Foundation, 2016). Therefore, promoting PA remains a central component of international and national public health policy (Department of Health, 2011; World Health Organisation, 2010).

Moreover, it remains important to consider the metaphysical stance of mind-body dualism when investigating the impact of physical activity on mental health and wellbeing (Mehta, 2011; Scully, Kremer, Meade, Graham & Dudgeon, 1998). Mind-body dualism philosophy assumes the mind and body are separate entities and therefore react differently to a given stimulus (e.g., PA) (Scully et al., 1998). The neurological and biological pathology of mental health conditions and illness (e.g., depression, generalized anxiety disorder, PTSD) may be considered the ‘body’, while wellbeing (e.g., happiness, satisfaction, emotion, feeling) can be considered the ‘mind’ (Scully et al., Mehta, 2011). When applied to a PA both the body and mind can allow and
individual to negotiate a mental health condition or illbeing. Indeed, an individual's biological and neurological response to PA (e.g., endorphin levels decreases cortisol, stimulated production of norepinephrine, serotonin and brain level neurotrophic factor) can reduce the prevalence of mental health conditions, while subjective wellbeing can provide a disassociative effect on illbeing (i.e., low subjective wellbeing) (Mehta, 2011; Scully et al., 1998).

Meeting national and international PA guidelines can reduce the risk of CVD by as much as 50% (Bassuk & Manson, 2005; Myers et al., 2015), and reduce the disease process of CVD (Dickins & Braun, 2017; Nes, Gutvik, Lavie, Nauman & Wisløff, 2017). Likewise, participation in PA can prevent risk factors associated with ischaemic and haemorrhagic stroke, such as hypertension, high body mass index, type 2 diabetes and stress (Aune, Norat, Leitzmann, Tonstad, Johan Vatten, 2015; Colberg et al., 2016; Diaz & Shimbo, 2013; Gallanagh, Quinn, Alexander & Walters, 2011; Lee, Folsom & Blair, 2003; Wendel-Vos et al., 2004). For example, one systematic review found a 30% reduction in type 2 diabetes risk and incidence in adults who met the minimum PA guidelines (Lambert & Bull, 2014).

PA has a protective effect upon some forms of cancer (Courneya & Friedenreich, 2010; Friedenreich, 2001; Nunez et al., 2017). Studies have found that adults who meet the PA guidelines have a reduced risk of colon, rectal, breast, prostate, lung, endometrial, ovarian, pancreatic, testicular, hematopoietic and bladder cancer (Lee, 2003; Liu et al., 2016; Thune & Furberg, 2001). Regular PA also contributes to a lower incidence of poor mental health and poor quality of life in working age adults (Penedo & Dahn, 2005; White et al., 2017). In particular, reduced psychological distress and elevated wellbeing has been linked to participation in low-intensity PA (e.g., walking) (Hawker, 2012; Scuamannia et al., 2017; Thøgersen-Ntoumani, Fox & Ntoumanis, 2005). Whilst, participation in sport and socially supportive activities has been associated with reduced stress (Asztalos et al., 2012; White et al., 2017).

PA behaviour (i.e., mode, duration, intensity) can be captured through self-reported (e.g., questionnaires, diaries) and objective (e.g., doubly labelled
water, pedometers, accelerometers, calorimetry) measurement tools, each with their respective challenges to reliability and validity (Kelly et al., 2016; Ndahimana & Kim, 2017; Sylvia, Berstein, Hubbard, Keating, Anderson et al., 2014). Moreover, self-reported measures are known to be effective at classifying mode, yet challenged by their test-retest reliability and social desirability bias (e.g., participant over or under estimates behaviour due to social influence) (Kelly et al., 2016; Ndahimana & Kim, 2017; Sylvia et al., 2014). In contrast, gold standard objective measures such as accelerometers, doubly labelled water, biometric monitoring (e.g., heart rate monitors) and pedometers are effective at assessing metabolic energy expenditure and total body movement respectively in various modes of PA, yet are limited in their ability to understand specific PA mode, are associated with low participant acceptability and feasibility, are expensive to adopt within many studies and may encourage participants to adapt their behaviour (Kelly et al., 2016; Ndahimana & Kim, 2017; Sylvia et al., 2014). Therefore, the gold standard measure of PA may be a multi-measure approach which is specific to the context measured (Kelly et al., 2016; Ndahimana & Kim, 2017; Sylvia et al., 2014).

**Organisational health**

Evidence suggests that PA has several further health benefits associated with work. By reducing the risk factors associated with non-communicable diseases and ill-health PA may reduce the prevalence of sickness absenteeism (Amlani & Munir, 2014; Michie & Williams, 2003) and sickness presenteeism (Hilton, Scruffham, Sheridan, Cleary, Whiteford, 2008; Widera, Chang & Chen, 2010). PA has also been found to reduce work-related fatigue and job satisfaction (an indicator of well-being) and improve work productivity (Dutta, Koepp, Stovitz, Levine & Pereira, 2014; Evers, Castle, Prochaska & Prochaska, 2014; Leijten, van den Heuvel, Ybema, van der Beek, Robroek & Burdorf, 2014; Lindwall, Gerber, Jonsdottir, Börjesson & Ahlborg Jr, 2014; Thorp, Kingwell, Owen & Dunstan, 2014).

Furthermore, there is growing evidence that supports inverse relationship between sedentary time (e.g., computer usage) and productivity
(Madeleine, Vangsgaard, Hviid Andersen, Ge & Arendt-Nielsen, 2013; Puig-Iberia et al., 2015). Several studies have also found that high rates of inactivity to be associated with reduced work performance and job satisfaction (Thorsteinsson, Brown & Richards, 2014; Yuan, Tan, Huang & Zou, 2014); job stress (Edwards, Guppy & Cockerton, 2007); musculoskeletal pain (del Pozo-Cruz et al., 2013; Rainville, Hartigan, Martinez, Limke, Jouve & Finno, 2004); and work-engagement (ten Brummelhuis & Bakker, 2012; van Berkel, Proper, van Dam, Boot, Bongers, & van der Beek, 2013).

Whilst employment is considered good for health and wellbeing (Waddell & Burton, 2006), factors such as mental, emotional and physical exertion at work, other workplace demands, (e.g., overtime) and lack of sleep contribute to the onset of occupational fatigue (Techera, Hallowell, Stambaugh & Littlejohn, 2016; Waddell & Burton, 2006). Occupational fatigue and the need for psychological and physical recovery from work, are associated with lower productivity and the prevalence of mental ill-health (Sluiter, de Croon, Meijman & Frings-Dresen, 2003), sickness absence (de Croon et al., 2003), burnout (Kant, Bultmann, Schroer, Beurskens, van Amelsvoort & Swaen, 2003), staff turnover and poor work-engagement (Leiter & Stright, 2009; Lu, Barriball, Zhang & While, 2012; Mohsin, Lengler & Aguzzoli, 2015; Mohsin, Lengler & Kumar, 2013; Steel & Nestor, 1984).

Within the UK, a total of 131 million days of work and £100 billion loss was recorded due to ill-health in 2014 (Office for National Statistics, 2014). The direct cost of inactivity and sedentary behaviour (i.e., a group of behaviours relating to low-energy expenditure; Hamilton et al., 2008) related to diseases currently stands at £5.5 billion per year in the UK (Department of Work and Pensions, 2014). Consistent with these data, Ding et al. (2016) estimated the indirect (i.e., total productivity lost) cost of inactivity to be $13.7 billion globally. Likewise, the cost of staff turnover is substantial, with each case, on average costing £30,614 (i.e., advertising and training fees, human resources (HR) costs, loss of productivity, wages) in the UK (Oxford Economics, 2014).
However, these statistics only account for CHD, stroke, diabetes and some forms of cancer, and often fail to include sickness presenteeism and productivity based losses. Consequently, the detrimental impact of inactivity on health outcomes may be underinflated, and the economic loss may be significantly greater than what is reported within the literature. Therefore, promoting PA to employees remains fundamental to organisational health strategies and policy (Department of Health, 2011; Townsend, Wickramasighe, Williams, Bhatnager & Rayner, 2015; World Health Organisation, 2010).

The relationship between participation in PA and organisational health outcomes is established (Batt, 2009). For example, a prospective cohort study found that leisure time PA is associated with a significantly reduced risk of sickness absence (van Amelsvoort et al., 2006). Likewise, a review clarifying the relationship between PA and sickness absence by Amlani and Munir (2014) found that weekly resistance and endurance training interventions have a positive effect in reducing sickness absence (although the studies were considered to have a medium risk of bias).

Participation in workplace PA may positively influence factors contributing to productivity such as cognitive function and work-engagement (Conn et al., 2009; Pronk, Martinson, Kessler, Beck, Simon & Wang, 2004; Proper & van Mechelen, 2008). Standing, cycling or walking at the workstation has been associated with improved cognitive function when compared to a sitting condition (Mullane, Buman, Zeigler, Crespo & Gaesser, 2017), while regular PA can improve working memory, sleep quality and cognitive function (Kato et al., 2017; Peng Cox et al., 2016). While no research has investigated the impact of sport on cognitive markers of productivity in employees, research with undergraduate students participating in sport found improvements in executive function and motor control (Chang et al., 2017; Jacobson & Matthaeus, 2014).

Occupational fatigue and the need for recovery from work may be reduced by regular participation in PA (Formanoy et al., 2016). Leisure-time PA has been associated with a lower need for recovery in white water raft
guides (i.e., a role with high physical demands) (Wilson, McDermott & Munir, 2016). Likewise, participation in ‘off-job’ activities (e.g., team sport) may alleviate workplace pressure and stress, and improve momentary happiness, relaxation and mood states (Coffeng, van Sluijs, Hendriksen, van Mechelen & Boot, 2015; Formanoy et al., 2016; Oerlemans, Bakker & Demerouti, 2014).

Participation in workplace PA may contribute to reduced staff turnover (Conn et al., 2009; White et al., 2017). However, while participation in PA may not have the capacity to directly reduce the organisational antecedents for staff turnover (e.g., workplace demands), the positive adaptations in individual health and the social support may allow employees to cope better within the workplace (Grawitch, Gottschalk & Munz, 2006; Sparks, Faragher & Cooper, 2001). Likewise, evidence suggests that fulfilling an employee’s needs for personal growth, development and meaning at work fosters positive attitudes and emotions towards the organisation, and therefore job satisfaction and affect (Blake, Zhou & Batt, 2013; Conn et al., 2009; Dawson, Tracey & Berry, 2008; Judge et al., 2017).

Finally, work-engagement (i.e., vigour, absorption, dedication) is known to contribute to productivity (Lu, Lu, Gursoy & Neale, 2016). Good evidence has indicated work-engagement may be positively influenced by participation in PA (White et al., 2017). Likewise, leisure-time PA has contributed to increased work-vigour and a lower need for recovery (ten Brummelhuis & Arnold, 2012). Moreover, work-vigour and work-absorption have been associated with lower level of sitting in female employees (Munir et al., 2015). However, the impact of workplace physical activity on work-engagement is equivocal. For example, two studies failed to observe significant changes in work-engagement over time following participation in a multi-component PA intervention (Strijk, Proper, van Mechelen & van der Beek, 2013; van Berkel et al., 2013).

Communication, interpersonal relationships and cohesion are widely manipulated and studied variables within organisational interventions (Cannon-Bowers and Bowers, 2006; Jones et al., 2004). Moreover, team training to promote social group outcomes within the workplace has been
associated with improved team performance and team productivity (Buljac-Samardzic et al., 2010; McEwan et al., 2017). However, a criticism of previous workplace PA interventions and programmes has been the absence of measures relating to social group outcomes (e.g., communication, interpersonal relationships, cohesion) and team productivity (Conn et al., 2009; White et al., 2017).

This absence in measurement may been attributed to the type of physical activities studied (e.g., walking, gym training/classes, active transport, education, active work stations). These activities, whilst implemented with a workforce population (Salas et al., 1992; Salas, Cooke & Rosen, 2008), lack the inter-dependence associated with team performance, cohesion and interpersonal relationships (Cannon-Bowers & Bowers, 2006; Mach et al., 2010). One novel mode of PA recently embraced within the literature is team sport (Department of Health, 2011; UK Government, 2015). Initial evidence indicates participation in workplace team sport may have a comparable impact on individual and organisational health outcomes to other modes of workplace PA, while promoting social and task cohesion and interpersonal relationships.

Team sport and the workplace

An introduction

Equivocally, participation in sport is assumed to be ‘good for an individual’s health’ (Berg, Warner & Das, 2015). This has led to stakeholders promoting sport within a variety of settings without sufficient evidence to support its efficacy, or a strong understanding of its acceptability and feasibility (Berg et al., 2015; Evans et al., 2016). Despite being neglected as mode of physical activity promotion for ‘all’ (see Berg et al., 2015), recent health promotion research and recommendations have embraced sport and team sport as a method to promote health within a workplace setting (e.g., Department of Health, 2011; UK Government, 2015). This form of mass participation under the ethos ‘sport for all’ lacks evidence to support its inclusion within public health promotion (Berg et al., 2015). Critically, there is insufficient evidence to support this mode of health promotion when compared
to more established modes of activity such as walking, sit-stand desk and active transport (See Conn et al., 2009 for an overview). Likewise, there has been a lack of research exploring the negative side of sport (Berg et al., 2015). This thesis therefore attempts to address these limitations.

For the purposes of this thesis, team sport is defined as competitive/non-competitive and informal/formal traditional team sports (e.g., baseball, basketball, cricket, soccer, handball, rugby); individual team sports (e.g., badminton, cycling, running); team-based walking/activity challenges (e.g., Global Corporate Challenge, Yomp, Workplace Challenge); or novel group sports (e.g., archery, canoeing) (Berg et al., 2015). Within this thesis, team walking and team activity challenges were considered as ‘team sports’, given their inherent competitive nature (e.g., step goals, external rewards), the social interaction present during participation and the organisational processes that underpin these activities (e.g., organising walks, reliance on others to participate) (Berg et al., 2015).

Both the academic literature and the grey literature report on workplaces that have implemented a range of team sports (Carter et al., 2014; Lee, 1991). For example, there are several commercial and non-commercial initiatives that deliver workplace team sports programmes and competitions (e.g., Sportivate, Workplace Challenge, and Corporate Games). These initiatives arguably have increased the awareness and popularity of workplace team sports, and have the capacity to promote a wide variety of sports to organisations representing a range of industries (Carter et al., 2014). However, evidence suggests, these schemes rely on the support from external stakeholders, local governing bodies and sports partnerships to influence employers’ views on sport and team sports as methods to effectively promote health (Carter et al., 2014; Evans et al., 2016). Moreover, it is difficult to assess the effectiveness of these schemes as their evaluations are not presented as scientific studies (e.g., no control group, validated measures). Therefore, further research is required to understand and evaluate the acceptability, efficacy and feasibility of schemes and programmes relying (e.g., Workplace Challenge) and not relying on stakeholders.
A number of recent scientific reviews have reported on the efficacy of modes of workplace PA on individual and organisational health outcomes (e.g., Amlani & Munir, 2014; Conn et al., 2009; Malik et al., 2014). Whilst these reviews provide a good insight into the efficacy of PA, they do not examine sport, and more specifically team sport within the workplace. This thesis addresses this gap by presenting results from a systematic review conducted as part of the thesis (see Chapter 2).

**Aims and research questions**

The aim of this research was to implement a pilot efficacy intervention underpinned by behaviour change theory into a workplace setting. A further aim was to assess its acceptability and feasibility, and its efficacy across individual, social group and organisational health outcomes. The research questions posed in this thesis are therefore presented in two phases (1. Study design and intervention development, 2. Intervention implementation and assessment). To design the intervention two qualitative studies were conducted. The intervention was assessed using outcomes measures and a process-evaluation. Research questions for each study phase are posed below:

**Phase 1: Study design and intervention development**

1. What are the benefits of providing workplace team sport for employees, employers, workplace teams and the organisation?
2. What are the environmental, social and behavioural enablers and challenges that exist for employees and organisations to participating in workplace team sport?

**Phase 2: Pilot efficacy intervention implementation**

1. What is the impact of a workplace team sport intervention on markers of individual, social group and organisational health outcomes?
2. What is the acceptability, efficacy and feasibility of providing a theory-driven team sport intervention in a workplace setting?
Research Process

Following an iterative process (see Hagger & Chatzisarantis, 2011), data collected from the systematic literature review and the two qualitative studies were applied to the design of the workplace team sports intervention study, and its process-evaluation. A mixed methods research approach (see Anguera, 2014; Bowling, 2014; Camerino, Castaner & Anguera, 2014) adopts quantitative and qualitative methods simultaneous or in sequence to interpret and therefore investigate phenomena (Andrew & Halcomb, 2006; Molina Azorin & Cameron, 2010; Todd, 2004). Mixed methods centre upon the complementariness, completeness, development, expansion, corroboration, compensation and diversity of the data collected and are well-established in research (Bryman, 2006; Fiorini, Griffiths & Houdmont, 2016; Giacobbi Jr, Poczwardowski & Hager, 2005; Henderson, Ainsworth, Stolarczyk, Hootman & Levin, 1999; Östlund, Kidd, Wengstom & Rowa-Dewar, 2011).

A degree of debate surrounds the use of mixed methods research and the philosophical paradigm underpinning this line of inquiry (Östlund et al., 2011). A criticism of mixed methods research has been the contrasting epistemological and ontological positions underpinning the qualitative interpretivist paradigm and quantitative positivist paradigm (Anguera, 2014; Bowling, 2014; Camerino, Castaner & Anguera, 2014). However, Fiorini et al. (2016) argued that the pragmatic paradigm can address the philosophical challenges arising in mixed methods research. A pragmatic paradigm considers both subjective and objective knowledge within the research process and in the inquiry of a given phenomenon (Fiorini et al., 2016; Morgan, 2007; Sale et al., 2002). Pragmatism is often considered the ‘what works’ approach and therefore is ideally suited for use in an applied setting such as the workplace or within public health research (Fiorini et al., 2016; Giacobbi Jr, Poczwardowski & Hager, 2005). Pragmatism does not integrate the contrasting philosophical paradigms, rather it considers the advantages and disadvantages of each paradigm or method in a complementary position, therefore making it useful during the adoption of a mixed methods investigation (Giacobbi et al., 2005; Morgan, 2007).
This thesis used pragmatism and mixed methods in sequence. Two qualitative studies explored the perceived benefits, and enablers and barriers to participation. These studies informed the design of a quantitative intervention examining the efficacy of workplace team sport using objective and validated measures of individual, social group and organisational health. Likewise, the final study, a process evaluation used a simultaneous mixed-methods approach to understand the acceptability, efficacy and feasibility of workplace team sport. The process of triangulation (i.e., drawing evidence from multiple sources) used within the process-evaluation expand the breadth of information available (Molina Azorin & Cameron, 2010; Webb, Campbell, Schwartz & Sechrest, 1966). Moreover, quantitative evaluations of applied interventions are known to benefit from the exploratory insights of qualitative research (Henderson et al., 1999; O’Cathain et al., 2014).

Ethics

Prior to each study, the committee independently provided ethical clearance. The ethical clearance for each study is provided in the respective chapter. The research conducted was in all cases in compliant with the guidelines and requirements outlined by Loughborough University’s Ethical Advisory Committee (Sub Committee for Human Participants).
Chapter 2 ‘What Benefits Could Team Sport have for the Workplace? A Systematic Review’ (Study 1)
Chapter 2: Study 1 - The Benefits of Team Sport for the Workplace: A Review

Study 1

What Benefits Could Team Sport have for the Workplace? A Systematic Review

Introduction

Chapter 1 provided an overview to the impact of participation in workplace PA on employee and organisational health outcomes. Moreover, an introduction to participation team was presented alongside the aims, objective and research process adopted within this mixed methods thesis.

Recent evidence reflects the growing popularity of workplace team sports (Adams et al., 2016; Barene et al., 2014a; Carter et al., 2014; Eichberg, 2009; Evans et al., 2016; Lee, 1991; Joubert et al., 2011). However, workplace team sport studies are in their infancy. Therefore, the purpose of this review was to synthesise the evidence on the benefits of team sports for individual (e.g., fitness and health), group (e.g., teamwork relations) and organisational health (e.g., sickness absence). This review includes evidence from observational studies and qualitative studies to provide a comprehensive understanding of workplace team sports and their benefits. This review was published in April 2015 (see Brinkley et al., 2017a) and updated in October 2017.

Literature Search and Assessment

To identify the relevant articles, a search and inclusion and exclusion criteria were established (see Appendix 1) and a computerised search was conducted using the following databases; EBSCO, PsycARTICLES, Medline/PubMed, SPORTDiscus, EMBASE, Web of Science and CENTRAL (Cochrane Central Register of Controlled Trials) (see Brinkley et al., 2017a for detailed overview of the search strategy, inclusion and exclusion criteria and assessment). A total of 23 articles were considered appropriate to include within the review. Information detailing all studies is presented in Tables 2.1 to 2.5. An overview of study identification and selection is presented within Figure 2.1.
Chapter 2: Study 1 - The Benefits of Team Sport for the Workplace: A Review

**Figure 2.1: Identification and Selection of Publications Flowchart**

- **Identification**
  - Studies identified
    - Search via EBSCO, PsycARTICLES, Medline/PubMed, SPORTDiscus, EMBASE, Web of Science, CENTRAL (Cochrane Central Register of Controlled Trials)
  - Studies retrieved from manual searches of reference lists
    - \( n = 6 \)

- **Screening**
  - Number of studies after duplicates/multiple papers removed
    - \( n = 32,555 \)
  - Studies excluded on title and/or abstract
    - \( n = 32,499 \)
    - Key reasons for exclusion:
      - Concerned broad occupational issues
      - Team sport out of context
      - Centered around physical activity
      - Term misuse
      - Concerned youth/adolescence sport
      - Concerned active travel
      - Classroom based - sports education
      - Centered around philosophical issues

- **Eligibility**
  - Studies eligible for screening against inclusion/exclusion criteria
    - \( n = 56 \)
  - Studies excluded from review
    - \( n = 38 \)
    - Did not focus directly on workplace team sport (\( n = 22 \))
    - Comparisons between work and sport (\( n = 7 \))
    - Were reviews (\( n = 9 \))

- **Included**
  - Studies included the review
    - \( n = 18 \)
    - \( n = 4 \) (Randomized control trial)
    - \( n = 3 \) (Non-RCT intervention studies)
    - \( n = 2 \) (Cross sectional studies)
    - \( n = 9 \) (Qualitative exploratory studies)
  - Studies identified post review
    - \( n = 5 \)
    - \( n = 2 \) (Randomized control trial)
    - \( n = 2 \) (Non-RCT intervention studies)
    - \( n = 1 \) (Qualitative exploratory studies)
Each study was categorised as well as being examined for quality. Quality assessment of the methodologies used in each study was achieved by using their respective guiding methodological frameworks. RCT’s, intervention studies without control groups, prospective cohort studies and cross-sectional studies were assessed in accordance with Cochrane Collaboration guidelines and appraised using the Effective Public Health Practise Project Tool (EPHPPT) (Armijo-Olivo et al., 2012). Qualitative studies were assessed by the guidelines outlined by Garside (2014), Carroll and Booth (2014).

In total, 11 studies were identified as intervention studies (RCT or non-randomized control trials) conducted with white collar workers. Sample sizes of studies with an intervention design were broad (n=30 to 2118 participants), and participants were recruited from a range of industries. Studies rated as strong (Barene et al., 2013, 2014a, 2014b, 2016) reported a number of significant improvements in cardiorespiratory employee health only. These included significant improvements over the short- (i.e., 12-weeks) and long-term (40-weeks) in cardiorespiratory fitness (i.e., VO2 Max, exercise heart rate, blood plasma levels), musculoskeletal function (i.e., improved bone mineral content and flexibility, and decreased neck-shoulder and lower back pain and perceived exertion), body composition (i.e., reduced total body fat mass and percentage and lower limb mass/percentage).

Improvements in subjective perceptions of health, PA behaviour and psychological wellbeing were also reported in studies rated as strong and medium methodological quality (e.g., improved flow, reduced stress and anxiety) (Barene et al., 2013, 2014a, 2014b, 2016; Elbe et al., 2016; Negulescu & Oicà, 2016; Roessler & Bredah, 2006; Scherrer et al., 2010; Soroush et al., 2013; Thøgersen-Ntoumani et al., 2014; Uttley & Lovelace, 2016). All of the intervention studies were rated a strong to moderate (i.e., random selection, low attrition, blinding, confounders controlled). However, few intervention studies have been conducted, and in many cases these report from largely homogenous female samples (>70%). Therefore, further empirical research is required to explore the efficacy of workplace team sport on these outcomes.
Table 2.1: Randomized Control Trials and Interventions

<table>
<thead>
<tr>
<th>Study and (Quality Appraisal)</th>
<th>Location and Design</th>
<th>Intervention Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Outcome Measures</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barene et al. [2013, 2014a, 2014b] (Strong)</td>
<td>Norway; Intervention vs. control group (40-week)</td>
<td>Indoor soccer intramural standard, lasting 1 hour twice a week, outside of working hours.</td>
<td>Hospital</td>
<td>118 (107 females/11 males), age: 45.3, average weight: 70.6kg, BMI: 25.3, Physical fitness not discussed, largely nurses, assistants, physiotherapists, occupational therapists and managers.</td>
<td>Objective measures of blood pressure, cardiorespiratory fitness, blood sampling, heart rate, body fat, self-report measures on perceived exertion and participation.</td>
<td>Repeated measures ANCOVA</td>
<td>Individual outcomes: Significant improvements demonstrated in intervention group compared to control group in cardiorespiratory fitness, heart rate, blood plasma levels, lower limb mass, total body fat and lower limb fat percentage and neck-shoulder muscle pain.</td>
</tr>
</tbody>
</table>

Reproduced from Brinkley et al. (2017a)
### Table 2.1: continued. Randomized control trials and intervention

<table>
<thead>
<tr>
<th>Study and Location and</th>
<th>Intervention Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Outcome Measures</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Quality Design)</td>
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<tr>
<td>Roessler &amp; Bredah [2006]</td>
<td>Denmark, Intervention vs.</td>
<td>Non-competitive</td>
<td>30 employees (24 women),</td>
<td>Cardiorespiratory</td>
<td>T-tests; narrative</td>
<td>Individual outcomes: An improvement in cardiorespiratory fitness and positive attitudes to physical activity and a reduction in pain compared to a control group. Qualitative interviews with participants found perceptions of closer working relation in the workplace as a result of team sport.</td>
</tr>
<tr>
<td>(Moderate)</td>
<td>control</td>
<td>physical activity</td>
<td>Intervention group mean age 43, control group mean age 39. Job roles or further demographics not provided</td>
<td>fitness (objective measure)</td>
<td>narrative analysis</td>
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<tr>
<td></td>
<td></td>
<td>and competitive</td>
<td></td>
<td>Qualitative</td>
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<td></td>
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<td>inter-employee</td>
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<td>interviews to</td>
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<td>mixed sport</td>
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<td>explore impact</td>
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<td>(played for 6-</td>
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<td>of intervention</td>
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<td>weeks for 1 hour</td>
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<td>on work</td>
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<td>sessions during</td>
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<td>relations</td>
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<td></td>
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<td>working hours)</td>
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</tbody>
</table>

Reproduced from Brinkley et al. (2017a)
Table 2.2: Non-RCT Intervention Studies (No Control Group)

<table>
<thead>
<tr>
<th>Study and (Quality Appraisal)</th>
<th>Location and Design</th>
<th>Intervention Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Outcome Measures</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thøgersen-Ntoumani et al. [2014] (Moderate)</td>
<td>UK, feasibility trial–16-week intervention.</td>
<td>Three workplace walking groups, non-competitive, (1&lt;sup&gt;st&lt;/sup&gt; ten weeks group led, 2 self-lead, 2&lt;sup&gt;nd&lt;/sup&gt; six weeks all self-lead)</td>
<td>University</td>
<td>75 (92% female) employees, mean age 47.68, who were physically inactive (i.e., under 150mins exercise per week) non-academic employees in desk based roles (e.g., support staff).</td>
<td>Self-report (questionnaire) health, vitality, work performance.</td>
<td>Multilevel modelling</td>
<td>Individual outcomes: Increased perceptions of health, subjective vitality. Decreases in fatigue at work. Changes were sustained four months after the end of the intervention. No changes were identified for enthusiasm, nervousness and relaxation at work. No group benefits reported. Organisational outcomes: Improved self-report work performance.</td>
</tr>
</tbody>
</table>

Reproduced from Brinkley et al. (2017a)
### Table 2.2 continued: Non-RCT intervention studies (no control group)

<table>
<thead>
<tr>
<th>Study and (Quality Appraisal)</th>
<th>Location and Design</th>
<th>Intervention Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Outcome Measures</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soroush et al. [2013] (Moderate)</td>
<td>Sweden and USA, pre-and post-intervention comparison</td>
<td>Team based walking intervention, with step distance competition (over 10000 per day)</td>
<td>University</td>
<td>2118 employees (80% female); mean age 42.4, and 355 graduate-students selected for fitness testing.</td>
<td>Pedometer, anthropometric measures (e.g., height, weight), resting BP, cardiorespiratory fitness, physical activity questionnaire</td>
<td>Repeated measures ANOVA</td>
<td>Individual outcomes: Steps/day decreased to month 6. Significant improvements were observed in Blood pressure and cardiorespiratory fitness. Group and organisational outcomes not assessed</td>
</tr>
<tr>
<td>Scherrer et al. [2010] (Weak)</td>
<td>Australia, Pre, mid and post intervention diary study only</td>
<td>GCC workplace walking competition. greatest number of steps achieved</td>
<td>One company (not described)</td>
<td>56 participants. No demographic data provided</td>
<td>Self-report diary study</td>
<td>Content analysis</td>
<td>Individual outcomes: Increase in physical activity, health and well-being. Group: improved social interactions</td>
</tr>
</tbody>
</table>

Reproduced from Brinkley et al. (2017a)
### Table 2.3: Cross-Sectional Studies

<table>
<thead>
<tr>
<th>Study and Quality Appraisal</th>
<th>Location and Design</th>
<th>Study Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Data Collection Measures</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davey et al. [2009] (Moderate)</td>
<td>New Zealand, Cross sectional</td>
<td>Evaluation of Step It Up Challenge (SIUC)</td>
<td>University</td>
<td>123 employees who participated in the 2007 SIUC, 75% female, large percentage under 45 years of age</td>
<td>Online Survey (motivation to participate, importance of SIUC, physical activity levels)</td>
<td>Factor, cluster and multiple regression analysis</td>
<td>Group outcomes: Team support, teamwork, social gains and competition improved. Individual outcomes: fitness, health, well-being, enjoyment, maintenance, participation improved. Organisational outcomes not measured.</td>
</tr>
</tbody>
</table>

Hartenian [2003] (Moderate) | Unknown, Cross Sectional | Exploring team members acquisition of team knowledge, skills and abilities | One company (not described) | 59 took part, no further demographics provided | Questionnaire - communication, conflict resolution, goal setting, team skills, planning, training, experience and participation in team sports | Multiple regression | Group outcomes: No correlation was found between playing team sports and the possession of team skills. Individual and organisational outcomes not measured. |

Reproduced from Brinkley et al. (2017a)
## Table 2.4: Qualitative Studies

<table>
<thead>
<tr>
<th>Study and Quality Appraisal</th>
<th>Location and Design</th>
<th>Study Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Data Collection Methods</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joubert et al. [2010a, 2011, 2013, 2014b] (strong)</td>
<td>South Africa, Qualitative exploratory design</td>
<td>Exploring employee’s experiences of workplace team sport. Designing an organisational team sport measure</td>
<td>Financial Corporation</td>
<td>72 employees. 11 to 49 males, 23 females from 9 financial corporations Largely Afrikaans speaking, broad range of job roles and departments.</td>
<td>Semi-structured focus groups and individual interviews</td>
<td>Content/Thematic analysis/Factor analysis</td>
<td>Individual outcomes: health improved. Group outcomes: Improved; peer knowledge, communication, relationships, trust, respect, goal sharing/striving, commitment, supporting others, shared knowledge. Hierarchical barriers removed Organisational outcomes: Improved; service, feeling of value, work performance Other findings: Successful Implementation; top-tier management involvement, funding important</td>
</tr>
<tr>
<td>Joubert et al. [2012] (moderate)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Joubert et al. [2010b, 2014a] (weak)</td>
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</tr>
</tbody>
</table>

Reproduced from Brinkley et al. (2017a)
### Table 2.4 continued: Qualitative Studies

<table>
<thead>
<tr>
<th>Study and Quality Appraisal</th>
<th>Location and Design</th>
<th>Study Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Data Collection Methods</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verdonk, Seesing &amp; Rijk [2010] (strong)</td>
<td>Netherlands, Qualitative exploratory design</td>
<td>Exploring health beliefs and workplace physical activities</td>
<td>Business from a range of sectors. No specifics given</td>
<td>13 males, mean age 39.</td>
<td>Semi-structured individual interviews</td>
<td>Thematic analysis</td>
<td>Individual outcomes: Allows high achievement, displays of competence, and a chance to compete. Enjoyment, while improving health and well-being</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study and Quality Appraisal</th>
<th>Location and Design</th>
<th>Study Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Data Collection Methods</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
</table>
| Pichot, Pierre & Burlot [2009] (strong) | France, Qualitative exploratory design (individual interviews and ethnography) | How are management practices in companies effected through sport | Manufacturing and financial corporations | 14 'decision makers' - HR directors, executives, CEO's. No further demographics given | Individual interviews and ethnography | Thematic analysis | Group outcomes: Improved; communication, relationships, peer knowledge, cohesion. Hierarchical barriers removed. 
Individual outcomes: Stress relief, motivation improved 
Organisational outcomes: stimulation at work and performance. Other findings: Watching sport a positive - sharing a good time, improves relationships, sense of belonging |

Reproduced from Brinkley et al. (2017a)
Table 2.5: Studies Retrieved Post-Publication

<table>
<thead>
<tr>
<th>Study and Quality Appraisal</th>
<th>Location and Design</th>
<th>Study Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Data Collection Methods</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barene, Holterman, Oseland, Brekke &amp; Krstrup [2016] (strong)</td>
<td>Norway; Intervention vs. control group (40-week)</td>
<td>Indoor soccer intramural standard, lasting 1 hour twice a week, outside of working hours.</td>
<td>Hospital</td>
<td>118 (107 females/11 males), age: 45.3, average weight: 70.6kg, BMI: 25.3. Physical fitness not discussed, hospital staff.</td>
<td>Objective measures of lean mass, maximal isometric force, maximal jump height, sit-and-reach flexibility, and balance.</td>
<td>Repeated measures ANCOVA</td>
<td>Individual outcomes: Significant improvements demonstrated in intervention group compared to control group in neck extension strength and sit-and-reach flexibility.</td>
</tr>
<tr>
<td>Elbe, Barene, Strahler, Krstrup &amp; Holtermann [2016] (moderate)</td>
<td>Norway; Intervention (soccer) vs. intervention (zumba). No control group. (12-week)</td>
<td>Indoor soccer intramural standard vs. Zumba, lasting 1 hour average twice a week, outside of working hours.</td>
<td>Hospital</td>
<td>79 (65 complete study measures at all-time points) females. As reported in Barene et al., (2013).</td>
<td>Self-reported measure of 'psychological flow'. Objective measures of cardiorespiratory fitness</td>
<td>Repeated and univariate measures ANOVAs</td>
<td>Soccer group characterized as having medium flow. Flow linked with participation in regular physical activity post intervention. Flow states may improve wellbeing, work-engagement and health behavior.</td>
</tr>
</tbody>
</table>
Table continued 2.5: Studies retrieved post-publication

<table>
<thead>
<tr>
<th>Study and Quality Appraisal</th>
<th>Location and Design</th>
<th>Study Description</th>
<th>Workplace Setting</th>
<th>Participant Demographics</th>
<th>Data Collection Methods</th>
<th>Method of Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttley &amp; Lovelance [2016] (Moderate)</td>
<td>UK; Cycle Challenge programme evaluation (2-year follow up)</td>
<td>Cycle Challenge. Departmental competition to achieve the highest volume of participation.</td>
<td>University</td>
<td>488 participants. No demographics provided, other than cycling behaviour pre-programme.</td>
<td>Online survey. Cycling behaviour.</td>
<td>Descriptive statistics, Mann-Whitney U-test.</td>
<td>Individual outcomes: Cycling behaviour positively influenced post challenge (47% of participants encouraged to cycle more).</td>
</tr>
<tr>
<td>Negulescu &amp; Oică [2009] (Weak)</td>
<td>Non-randomized intervention (no control group); Intervention pre-post 8-months. Romania.</td>
<td>78 'practical sessions'. Included soccer, handball and volleyball</td>
<td>Military (barracks)</td>
<td>46 participants. All male, differing specializations and ages. No further demographics provided.</td>
<td>Unclear. Self-report questionnaire data from PF16B and Hardiness test reported.</td>
<td>Dependent bilateral t-test (data not reported)</td>
<td>Individual outcomes: Significant improvement in intelligence emotional stability and self-confidence over time. Anxiety and internal tension significantly reduced over time.</td>
</tr>
<tr>
<td>Evans, Carter, Middleton &amp; Bishop [2016] (Strong)</td>
<td>United Kingdom, Qualitative exploratory design</td>
<td>Exploring a regional Workplace Challenge programme through a figuration framework</td>
<td>One private sector and one public sector organisation</td>
<td>17 participants (15 participation engaging in programme, 2 workplace champions). Age(participants): 40.8.</td>
<td>Semi-structured individual interviews</td>
<td>Thematic analysis</td>
<td>Individual outcomes: Participation in the Workplace Challenge may influence the physical activity behaviour of individuals and groups within the workplace.</td>
</tr>
</tbody>
</table>
Evidence from cross-sectional and qualitative studies suggests that workplace team sport may have additional benefits for the workplace and employers than adopting modes of workplace PA alone. Participation in team sport was found to positively influence perceptions of group and organisational communication, cohesion, interpersonal relationships, team trust and team performance (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Pichot et al., 2009; Roessler & Bredah, 2006; Verdonk et al., 2010). However, these studies mostly rely on the use of qualitative methods (e.g., interviews and focus groups) to explore social group outcomes. Moreover, in some cases (e.g., Joubert et al., 2010b, 2012, 2014a) the methods of data collection were not described to an acceptable degree to ensure trustworthiness. Likewise, the reflexive position of the research was not discussed in sufficient detail and in some cases, data was presented in a quantitative form rather than in rich contextual detail. To date, no studies have investigated these outcomes using experimental designs. Future research is required to explore these outcomes with heterogeneous samples with an acceptable level of trustworthiness and reflexivity.

Social cohesion, interpersonal relationships and communication are key determinates of optimally functioning organisations (Almost et al., 2015; Cannon-Bowers & Bowers, 2006; Hartenian, 2003; Katz, 2001). Team productivity is a dynamic process influenced by social factors such as shared goal identification (i.e., is the task achievable), member construction (e.g., personality, attitudes, behaviours, skills and experience), the degree of interdependence, the presence of stress or conflict and team norms (Salas et al., 1992, 2008). Team building activities in external settings (e.g., away days) has been associated with improved and maintained cohesion, interpersonal relationships, communication and teamwork (Salas et al., 1992, 2008). Therefore, participation in workplace team sport may provide an environment where employees can simulate and develop social group factors contributing to productivity. Previous research exploring these outcomes (e.g., Joubert et al., 2010a, 2010b, 2011, 2012, 2014a, 2014b) has relied on inadequately described homogenous samples. Likewise, it remains unclear if a degree of
participant overlap exists in many of the qualitative studies exploring workplace team sport.

Increased PA levels have been associated with lower sickness absence and higher job satisfaction and job performance (Amlani & Munir, 2014; Faragher et al., 2005; Voit et al., 2001). Improvements in flow (i.e., the psychological state of being immersed, motivated and engaged in an activity) found by Elbe et al. (2016) following participation in workplace soccer may improve global wellbeing (Bryce & Haworth, 2002) and work-engagement (Salanova, Bakker & Llorens, 2006). As group and organisational outcomes were sparsely investigated in the intervention studies (i.e., RCT or non-RCTs), further research is required to provide additional evidence on the efficacy of workplace team sport.

A small number of team sports were identified across the studies implemented either by the researchers (i.e., intervention studies) or by the organisation (i.e., in the cross-sectional and qualitative studies). The most frequently used team sport was soccer followed by competitive activity challenges (containing elements of team sport), team walking, and competitive forms of running and active transport. These were introduced on an either competitive or non-competitive basis. However, no studies to date have investigated a range of sport observed within applied settings such as Workplace Challenge, Corporate Challenge or Sportivate (see Adams et al., 2016). While intensity has been investigated (see Barene et al., 2013, 2014a, 2014b), few studies outlined the duration of the workplace initiative, frequency and length of play and the level the team sport was implemented (e.g., novice, intensity). Likewise, few of the intervention studies reviewed here, used behaviour change theory to underpin the implementation of their interventions. These shortcomings need to be addressed and reported clearly in future studies.

Medical Research Council (MRC) guidelines and evidence suggests interventions guided by behaviour change strategies are more effective and replicable than those without (Craig et al., 2008; Glanz et al., 2008; Webb, et
Motivation can improve participation in interventions and contribute to long-term behaviour changes (Biddle & Foster, 2011; Conn et al., 2009; Marshall, 2004). The quality of motivation is thought to drive the behaviour of individuals (Deci & Ryan, 2000a, 2000b). Therefore, behaviour change strategies should be underpinned by theories incorporating the social and psychological beliefs, attitudes and norms of why individuals change (Glanz, Rimer & Viswanath, 2008; Webb, Foster & Poulter, 2016). The central theory interpreting and underpinning this thesis is self-determination theory (SDT) (Deci & Ryan, 2000a; 2000b). Conceptualisations of social support (see Schaefer, Coyne & Lazarus, 1981) and an ecological model of workplace team sport participation (Sallis, Owen & Fisher, 2008) are also utilised. These concepts are discussed in Chapter 3.

**Workplace physical activity, motivation and behaviour change**

Previous research using team to improve health within a workplace setting has neglected the use of behaviour change theory (Brinkley et al., 2017a). However, motivation and behaviour change theory is widely adopted within the applied promotion of workplace PA (Biddle & Foster, 2011; Gucciardi & Jackson, 2015; Hagger & Chatzisarantis, 2009; Malik et al., 2014; Michie, van Stralen & West, 2011; Sallis et al., 2008).

Motivation can be considered how an individual is moved to do something (Deci & Ryan, 2000a, 2000b). Motivation is influenced by both contextual factors and individual differences; therefore, it remains important to understand why and how individuals change and maintain their behaviour (e.g., physical activity participation) within subjective settings such as the workplace (Deci & Ryan, 2000a, 2000b). Many theories have been tested with empirical research (Biddle & Foster, 2011). These include the theory of planned behaviour (Ajzen, 1992) and the transtheoretical model of behaviour change (Prochaska & DiClemente, 1982), and SDT (Deci & Ryan, 2000a, 2000b).
Theory of planned behaviour (Ajzen, 1992) suggests intention to change behaviour is predicted by attitudes (i.e., affective beliefs regarding activity), normative beliefs (i.e., perceptions of attitudes of others) and perceptions of behavioural control (i.e., control and power of behaviour) (Ajze, 1992). The transtheoretical model likewise focuses on the intention to change (Biddle & Foster, 2011). However, the model suggests individuals move through five distinct stages (precontemplation; contemplation; preparation; action; maintenance) from no intention to change to a degree of maintainable change (i.e., 6-months regular participation) by using cognitive and behavioural change strategies (see Prochaska & DiClemente, 1982 for an overview). Whilst, widely used within PA and health interventions, the strategies encouraging progression through stages which neglect the social context influencing behaviour and focus on controlled motivation. A low-quality form of motivation associated with non-maintainable changes in behaviour (Teixeira et al., 2012).

Whilst well utilised in a PA and health promotion setting (see Biddle & Foster, 2011), critically the concepts such as planned behaviour (Ajzen, 1992) and the transtheoretical model (Prochaska & DiClemente, 1982) examine the intention to be physically activity rather explaining the quality of motivation underpinning this behaviour. In contrast, SDT focuses on the quality of an individual’s motivational regulation towards a given activity (e.g., team sport) (Teixeira et al., 2012).

Moreover, though tested within a workplace PA context, limited research has utilised the theory of planned behaviour (Ajzen, 1992), transtheoretical model (Prochaska & DiClemente, 1982) and COM-B system (Michie et al., 2011) to unpin the design of sports intervention in adult settings (e.g., the workplace). In contrast, SDT and more specifically, needs supportive intervention have been demonstrated to be effective and feasible methods to encourage the adoption and maintenance of high quality motivation (Teixeira et al., 2012).
Self-determination theory and behaviour change

SDT is constructed from six sub-theories (also termed mini-theories within literature) (Deci & Ryan, 1985). Namely, (1) cognitive evaluation theory, (2) organismic integration theory, (3) causality orientations theory, (4) goal contents theory, (5) relationships motivation theory and (6) basic needs theory (BNT) (Deci & Ryan, 1985). The latter forms the central sub-theory of this thesis. Self-determination theorists (e.g., Deci & Ryan, 2000a; 2000b) state that individuals take part in activities across an internally or externally regulated spectrum of behaviour and motivation. Fundamental to SDT is the distinction between amotivation (i.e., no motivation or willingness to participate), controlled motivation (i.e., participation from external pressures) and autonomous motivation (i.e., participation from free will) (see Figure 1.3 for an illustration of SDT) (Deci & Ryan, 2000a, 2000b).

Unique to SDT is the distinction between motivational regulations for an activity (e.g., team sport) (Deci & Ryan, 1985). This regulation spectrum is constructed from amotivation, two controlled forms of motivation (i.e., introjected regulation and external regulation) and three autonomous forms of motivational regulation (i.e., intrinsic motivation, integrated regulation and identified regulation) (Deci & Ryan, 1985).

An individual regulated by amotivation has no extrinsic or intrinsic motivation (Teixeira et al., 2012). Evidence has suggested individuals with amotivation typically report an activity as not fitting with their beliefs or attitudes (e.g., ‘it will do more harm than good’) (Deci & Ryan, 2000a). An individual motivated by external regulation may for example participate in an activity for external reasons (e.g., to please a superior, manager or significant other) (Teixeira et al., 2012). Introjected regulation motivates individuals through beliefs of guilt and ego driven reasons (Teixeira et al., 2012). An individual motivated through introjected regulation may feel they are letting their colleagues down if they do not participate. The first form of autonomous motivation is identified regulation. An individual motivated through identified regulation would recognise the benefits of an activity through self-identified
goals or motivates (e.g., ‘team sport may help me feel less stressed’) (Teixeira et al., 2012).

The second form of autonomous motivation, integrated regulation proposes individuals engage with an activity through beliefs of self-identify and personal values (Teixeira et al., 2012). An individual motivated by the most extrinsic form of autonomous motivation, in the case of team sport, may identify as a sports person or align sport with personal values (Teixeira et al., 2012). The most autonomous form of motivation is intrinsic motivation (Deci & Ryan, 1985). An individual motivated intrinsically towards an activity has an inherent interest in participation and seeks enjoyment and pleasure directly from it (Deci & Ryan, 1985).

Evidence from sport studies with an observational design (e.g., Adie, Duda & Ntoumanis, 2008; Gucciardi & Jackson, 2015), health-related intervention design studies (e.g., Fortier, Sweet, O’Sullivan & Williams, 2007) and workplace intervention studies (e.g., Kinnafick, Thøgersen-Ntoumani, Duda & Taylor, 2014) suggest that fostering autonomous motivation in individuals leads to healthy participation in, and adherence to, new interventions.

In contrast, more controlled forms of motivation predispose inconsistent participation and adherence to new interventions (Pelletier, Fortier, Vallerand, & Brière, 2001). Gucciardi and Jackson (2015) and Teixeira et al. (2012) suggest PA interventions may benefit from the underpinnings of more autonomous forms of motivation to increase participation and adherence. The purpose of interventions underpinned by SDT is to move individuals from controlled forms of motivation to more autonomous forms of motivation (Teixeira et al., 2012). This thesis therefore utilises BNT a sub-theory of SDT (Deci & Ryan, 2000a, 2000b).
<table>
<thead>
<tr>
<th>Type of motivation</th>
<th>Amotivation</th>
<th>Controlled Motivation</th>
<th>Autonomous motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of regulation</td>
<td>Nonregulation</td>
<td>External</td>
<td>Introjected</td>
</tr>
</tbody>
</table>

**“I participate in workplace team sport because…”**

<table>
<thead>
<tr>
<th>Type of regulation</th>
<th>Nonregulation</th>
<th>External</th>
<th>Introjected</th>
<th>Identified</th>
<th>Integrated</th>
<th>Intrinsic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of autonomy</td>
<td>Non-self-determined (controlled motivation)</td>
<td>Self-determined (autonomous motivation)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Figure 2.2: Overview of Self-Determination Theory. Adapted from Deci and Ryan (2000)**
Basic needs theory and participation in team sport

BNT proposes the adoption of behaviour and motivation is influenced by the adoption of the identification, fulfilment and maintenance of innate basic psychological needs (i.e., autonomy, competence and relatedness) (Gillet & Rosnet, 2008; Gucciardi & Jackson, 2015; Sheehy & Hodge, 2015).

Autonomy is the degree to which an individual feels in-control of their environment and the decisions that are made (e.g., choosing to participate in team sport), while competence represents the need to feel capable or to have a skill to complete a task or activity (e.g., having the understanding and skill to execute a pitch in rounders) (Deci & Ryan, 2000a, 2000b). Finally, relatedness is the need to feel supported, understood and valued by a social group (e.g., feeling part of the team and supporting peers) (Deci & Ryan, 2000a, 2000b).

A positive experience of team sport is linked to determinants of autonomous motivation, such as enjoyment, satisfaction and wellbeing (Reinboth & Duda, 2006). During participation in team sport, an emphasis is placed upon competence and the perceived attainability of a task (i.e., being able to complete your role in the team) (Adie et al., 2008). Finally, participation in team sport is underlined by a social environment and therefore relatedness; where relationships and social interactions are sought to provide reasons and volition for participation (Allen, 2006).

Satisfying basic psychological needs fosters physical health and psychological wellbeing, while thwarting basic psychological needs leads to determinants of illbeing, such as reduced self-efficacy and self-esteem (Deci & Ryan, 2000a, 2000b; Gucciardi & Jackson, 2015; Teixeira et al., 2012). Given wellbeing is a determinant of effective human development and optimal human functioning; researchers exploring SDT have examined the role the social environment holds for fulfilment of basic psychological needs (e.g., Adie et al., 2008; Kinnafick et al., 2014). The fulfilment of basic psychological needs through externally led autonomy support leads to the adoption of autonomous behaviours, attitudes and beliefs and therefore improved
motivation, participation and adherence to a given activity (Gucciardi & Jackson, 2015). In contrast, thwarting basic needs through significant others (e.g., coaches, workplace champions, colleagues) predicts low quality motivation (e.g., controlled motivation), maladaptive outcomes (e.g., low self-efficacy) and dropout (Teixeira et al., 2012). When applied to workplace sports promotion, thwarting autonomy may occur when an employee is not offered choice, control or volition over their participation (e.g., sport chosen by organisation, forced during break time, compulsory participation) (Adie et al., 2008; Teixeira et al., 2012). Moreover, competence may be thwarted by promoting competition over enjoyment, not having the perceived skill to participate (i.e., no training or instruction) or critique of peers (Bartholomew, Ntoumanis, Ryan & Thorgersen-Ntoumani, 2011). Finally, relatedness may be thwarted by a lack of support of colleagues and managers, negative feedback on participation and an unsupportive workplace culture (Bartholomew et al., 2011; Teixeira et al., 2012).

**Autonomy support and team sport**

Autonomy (needs) support provides an individual with a meaningful choice, reason and foundation for participation (Adie et al. 2008; Deci & Ryan, 2000b; Kinnafick et al., 2014). Autonomy support is typically provided by an individual in a position of authority (e.g., a workplace champion), who acknowledges the perspective of individuals and minimise the presence of pressure (Adie et al., 2008; Deci & Ryan, 2000b; Kinnafick et al., 2014).

When applied to workplace team sport, a ‘champion’ organising, promoting and delivering team sport sessions may provide autonomy support by encouraging and offering a choice to their peers to decide or adapt the rules of the sport, impart the benefits of team sport, and not impose their own perceptions and experiences upon them (Deci & Ryan, 2000a, 2000b). Evidence has suggested participation is improved because experiences of autonomy support are associated with extrinsic forms of autonomous motivation, such as identified and integrated regulation (Deci & Ryan, 2000a, 2000b; Kinnafick et al., 2014).
The relationship between autonomy support, basic psychological needs and behaviour is well established in a sport, exercise and workplace setting (Niven & Markland, 2016; Silva et al., 2008, 2010; Teixeira et al., 2012). Supporting basic psychological needs is known to be a central determinant of sports participation and sports continuation (Adie et al., 2008; Gucciardi & Jackson, 2015). In contrast, thwarting basic psychological needs is known to predict unstable participation and withdrawal from sports and exercise (Adie et al., 2008; Niven & Markland, 2016; Silva et al., 2008, 2010; Teixeira et al., 2012).

Therefore, recent research has indicated the importance of educating and training ‘leaders’ (e.g., workplace champions) in strategies that foster basic psychological needs (Gucciardi & Jackson, 2015). For example, within a 12-week exercise intervention, autonomy supportive counselling was associated with higher levels of self-reported autonomy mid- and post-intervention (Fortier, Sweet, O’Sullivan & Williams, 2007). Likewise, Fortier et al., (2007) report the fulfilment of autonomy led to improvements in the adoption of self-reported PA post-intervention. A workplace walking intervention found walking leaders supporting basic psychological needs to predict positive changes in subjective vitality and PA behaviour (Kinnafick et al., 2014). Despite this, no research to date has used BNT to underpin a sport or team sport intervention in the workplace.

**Methodological considerations and workplace team sport**

Evaluations from grey literature of Workplace Challenge (WPC) (i.e., A national workplace physical activity schemes promoted by regional sports partnerships, which uses post-work ‘team sport’ events and competitions) indicates that workplaces adopting the WPC may observe increased PA behaviour, wellbeing and interpersonal relationships between colleagues, and reduced absenteeism and presenteeism (Adams et al., 2016; Carter et al., 2014). These evaluations used mixed-methods, observational questionnaires and case studies to explore the efficacy and feasibility of WPC. Similarly, an early study and qualitative evaluation in the USA found participation in a
variety of workplace team sports to positively influence interpersonal relationships, networking and team productivity (Lee, 1991). These evaluations whilst useful, lacked robust study designs, control groups and objective measures of health, and therefore are limited in the cause and effect they can infer on the efficacy of workplace team sport on individual, social group and organisational health outcomes. However, despite the shortcomings of their methodology, these studies do identify positive relationships worthy of further investigation. For example, it would be useful to empirically examine the impact workplace team sport holds on group outcomes such as social interactions and teamwork given their association with organisational outcomes such as productivity and work-engagement.

The quality of the studies reviewed was mixed. The selection bias, attrition, blinding process and controlling of confounders was reported to an acceptable degree by most studies with RCT and non-randomized design (Barene et al., 2013, 2014a, 2014b, 2016; Elbe et al., 2016; Roessler & Bredah, 2006; Scherrer et al., 2010; Soroush et al., 2013; Thøgersen-Ntoumani et al., 2014). In contrast, selection bias and poor attrition may have confounded the findings of Negulescu and Oicâ (2016) and Uttley and Lovelace (2016). Most of the qualitative research included in this review lacked the quality associated with trustworthy and reflexive qualitative research (e.g., methods of data collected, reflexivity, analysis, contextual information, sampling) (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b).

Whilst many intervention studies used validated measures of individual health (e.g., Barene et al., 2013, 2014a, 2014b, 2016; Elbe et al., 2016; Roessler & Bredah, 2006; Scherrer et al., 2010; Soroush et al., 2013; Thøgersen-Ntoumani et al., 2014), this review found a lack of validated measures of social cohesion and interpersonal relationships, work performance, and job satisfaction, particularly in studies implementing interventions. Moreover, the results reported in this review were based on
samples with a high percentage of female participants (>70%) and therefore a balance of gender is also required in future studies.

Whilst workplace team sport may have the capacity to influence individual, social group and organisational health outcomes, the evidence supporting these claims lacks the use of validated measures, accurate descriptions of the sport played and interventions with strong theoretical underpinnings. This lack of evidence leads to a lack of support for workplace team sport schemes and programmes, and employer’s considering implementing workplace team sport within their organisation. Furthermore, there is also a lack of evidence exploring how employees negotiate participation in workplace team sport. Interestingly, there has been a low number of studies which investigate the efficacy of providing workplace team sport within the UK using comprehensive intervention designs. Likewise, no research to date has rigorously evaluated the promotion of workplace team sport using robust process evaluations. Certainly, these limitations challenge employers considering offering team sport to their employees and policy advocating the use of team sport to promote individual, social group and organisational health. This thesis aims to address these limitations.
Chapter 3  ‘What are the Facilitators and Obstacles in Workplace Team Sport? A Qualitative Study’ (Study 2)
Study 2

What are the Facilitators and Obstacles to Participation in Workplace Team Sport? A Qualitative Study

Introduction

Chapter 2 presented the benefits of workplace team sport for employees and organisations (see Chapter 2; Brinkley et al., 2017a). However, despite the potential benefits, the adoption of interventions and programmes by employees and organisations is low. Critically, there is a lack of qualitative evidence exploring why employees participate in workplace team sport, and the facilitators and obstacles these individuals encounter. While extensive high-quality evidence discussing the enablers and barriers faced by children and young adults is available in a sporting context, the same cannot be said for working age adults (Keegan et al., 2016). This gap in research may limit the effectiveness and sustainability of future team sport programmes, schemes and interventions. Good evidence suggests prior to implementing interventions in applied settings such as the workplace, the contextual psychosocial and organisational factors influencing participation must be understood and accounted for with behaviour change strategies (Craig et al., 2008).

Seven qualitative studies have explored the facilitators and obstacles associated with participation in workplace team sport (Adams et al., 2016; Caperchione et al., 2015; Carter et al., 2014; Evans et al., 2016; Joubert et al., 2014b; Keegan et al., 2016; Lee, 1991). For example, Keegan et al (2016) found that employee low self-perceptions in their competence in PA hindered them from playing football with their colleagues (Keegan et al., 2016). Interviews with employees who took part in the ‘Workplace Challenge’ (i.e., a national workplace health promotion scheme focusing on team sport) suggests the attitudes of employees and workplace champions can influence workforce participation in team sport (Adams et al., 2016; Carter et al., 2014; Evans et al., 2016). Likewise, a study of workplace wellness schemes (some of which contained workplace team sports) suggests participation was influenced by the culture within the workplace (Caperchione et al., 2015).
Finally, the management and communication of opportunities may create acceptance within peer-groups (Lee, 1991), and result in the provision of sports facilities and appointment of sports coordinators (Joubert et al., 2014b). A further RCT study has indicated flow states (i.e., intrinsic immersion in an activity) may have a positive influence on attendance over time (Elbe et al., 2016). While this evidence offers some insight, these studies present a gap in research as they broadly investigated participation in workplace PA rather than team sport directly.

For the promotion of workplace team sport to be successful, the specific obstacles and facilitators must be considered. A comprehensive understanding of these factors may allow researchers and practitioners to successfully tailor team sport into a workplace setting. The primary aim of this exploratory study was therefore to gain an understanding on what determinants facilitate and challenge participation in workplace team sport. The purpose of this study was to inform what behaviour change strategies would be needed to support employees participating in a workplace team sports intervention. Previous research has suggested interventions underpinned by behaviour change theory and strategies are more effective than those without (Craig et al., 2008; Glanz et al., 2008; Webb, et al., 2016). This study was published in February 2017 (Brinkley et al., 2017b).

**An ecological perspective**

PA behaviour in activities such as workplace team sport can be understood through an ecological approach (Sallis et al., 2008). An ecological approach suggests the behaviour underpinning participation is influenced by intrapersonal, interpersonal, organisational, environmental and societal determinants (Sallis et al., 2008). *Intrapersonal* determinants reflect how psychological and biological factors enable or challenge behaviour (McLeroy, Bibeau, Steckler, 1988). A psychological influence may be perceptions of competence, while a biological influence may be a chronic health condition (Golden & Earp, 2012). *Interpersonal* determinants refer to socially desirable factors. For example, employees are known to seek the support of colleagues or conform to the attitudes of managers (Keegan et al., 2016). *Organisational* determinants are influences on a workplace, departmental or cultural level.
(Sallis et al., 2008). For example, individual behaviour may be influenced by the working practises of an organisation (Bennie, Salmon & Crawford, 2010). Environmental determinants reflect logistics and structural factors that influence behaviour. For example, facilities may encourage or discourage participation in workplace team sport (Carter et al., 2014; Evans et al., 2016). Societal determinants refer to how policy and society driven attitudes (e.g., gender inequality) influence individual behaviour and experiences and perceptions of sport (Sallis et al., 2008). Participation in workplace team sport is a complex process that may be influenced from a societal, organisational, social and psychological standpoint (Adams et al., 2016; Caperchione et al., 2015; Carter et al., 2014; Evans et al., 2016; Joubert et al., 2014b; Keegan et al., 2016; Lee, 1991). This study adopted an ecological approach to understand the facilitators and obstacles reported by participants (Sallis et al., 2008).

To assist the interpretation of this ecological approach, the current study uses theories and concepts which focus upon the social environments influence on motivation and behaviour. These include SDT (Deci & Ryan, 2000a, 2000b) and a conceptualisation of social support (Schaefer et al., 1981). SDT proposes that supporting innate needs for autonomy, competence and relatedness can promote wellbeing and regulate autonomous motivation, while thwarting needs leads to illbeing and controlled forms of motivation (Deci & Ryan, 2000a, 2000b). Schafer et al. (1981) suggests an individual’s wellbeing and self-efficacy for an activity (e.g., team sport) is regulated by emotional, esteem, network, information and tangible support.

Methods

Research Design
An exploratory design, using semi-structured face-to-face and telephone interviews, explored what facilitates participation and what creates obstacles for participation in workplace team sport (Alvesson & Ashcraft, 2012). The trustworthiness of face-to-face interviews is well established (Alvesson & Ashcraft, 2012), while telephone interviews allow the researcher to collect data around the demands balanced by participants (Hanna, 2012).
To allow participants the opportunity confidentially disclose information about their workplace, colleagues and employer interviews were selected over focus groups (Alvesson & Ashcraft, 2012; Sparkes & Smith, 2014). Ethical approval was granted from Loughborough University’s Human Participants sub-committee (see proposal number SSEHS-1771).

**Sampling**

Purposive sampling (see Patton, 2002) was used to recruit employees participating and not participating in workplace team sport (Patton, 2002). Participants were recruited from a range of small, medium and large private and public organisations in the UK (i.e., manufacturing and sales; public services; and educational services). Organisations were identified through the FTSE 100 and 500 lists and through their involvement in workplace team sport events, schemes or programmes (e.g., lunchtime and post-work soccer, WPC, Last Man Stands). A representative from the organisation’s occupational health section was contacted by email and/or telephone by the researcher to explain the purpose of the study. Employees were recruited by the researcher through email and telephone. Participants received information detailing the study and its purpose. Participants were invited to attend an interview at their place of work, or where they participated in workplace team sport. To collect trustworthy and translatable data, employees actively participating in team sport and those not currently participating in workplace team sport were selected. Employees who were not permanently contracted members of staff (e.g., agency staff) were excluded from participation. To ensure a variety of experiences regarding workplace team sport was explored in the interviews; employees, line managers and workplace champions were sent an invite to participate in the study from each organisation. Participants were recruited from one public services, one high education institute and two manufacturing organisations in the UK.

**Procedure**

An interview schedule guided data collection (see Table 3.1). This explored, (i) PA participation; (ii) workplace PA and team sport motivation; (iii) workplace team sport participation; (iv) workplace team sport facilitators and obstacles; and (v) the set-up, maintenance and adherence to workplace team
sport. From January to August 2015, twenty-four face-to-face individual interviews and five telephone interviews were conducted during working hours in café’s, offices, meeting spaces and conference rooms by two of the researchers trained in interview techniques\textsuperscript{1}. With the knowledge and consent of participants, interviews were recorded on a digital voice recorder (Olympus VN-7700). Open-ended questions were asked to encourage discourse while probes were used to encourage participants to expand on interesting responses. Interviews lasted between 30 and 50 minutes ($M=36$ minutes).

\textsuperscript{1} Both researchers had experiences within an organisational setting. AB had previously managed within the retail industry, while JF undertook a placement in a HR department within the manufacturing industry. AB is white British male aged 26, while JF is a white British female aged 22. By virtue of a lack of experience, both considered themselves naïve to the experiences faced throughout full-time employment and the impact of participating in workplace team sport.
### Table 3.1: Interview Schedule - Study 2

<table>
<thead>
<tr>
<th>Content</th>
<th>Topics for discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Activity Participation</strong></td>
<td>Do you currently take part in physical activity? (Sport; exercise; occupational). How often do you take part? (Regularly, occasionally)</td>
</tr>
<tr>
<td></td>
<td>Where do you take part? (Inside or outside work?) (With or without colleagues?)</td>
</tr>
<tr>
<td></td>
<td>Perceptions of physical activity. (Do you do enough?)</td>
</tr>
<tr>
<td><strong>Physical Activity and Workplace Team Sport Motivation and Benefits</strong></td>
<td>What do you enjoy about physical activity?</td>
</tr>
<tr>
<td></td>
<td>What motivates you to take part (facilitators) in physical activity/workplace team sport?</td>
</tr>
<tr>
<td></td>
<td>What restricts your involvement (obstacles) physical activity/workplace team sport?</td>
</tr>
<tr>
<td></td>
<td>How does physical activity benefit you?</td>
</tr>
<tr>
<td></td>
<td>How does physical activity/workplace team sport benefit your working life?</td>
</tr>
<tr>
<td></td>
<td>What can your company gain from having physically activity employees?</td>
</tr>
<tr>
<td><strong>Workplace Team Sport Participation</strong></td>
<td>Do you take part in workplace team sport?</td>
</tr>
<tr>
<td></td>
<td>What are your thoughts on workplace team sport?</td>
</tr>
<tr>
<td></td>
<td>Better or worse than physical activity? (prefer physical activity on your own?)</td>
</tr>
<tr>
<td></td>
<td>Would you want to participate with your colleagues?</td>
</tr>
<tr>
<td><strong>Workplace Team Sport Benefits</strong></td>
<td>What benefits does or could workplace team sport hold for you (individual), your team (group) and workplace (organisation)?</td>
</tr>
<tr>
<td><strong>Workplace Team Sport Facilitators and Obstacles</strong></td>
<td>What would motivate you to attend? (facilitators)/What would stop you attending? (obstacles)</td>
</tr>
<tr>
<td></td>
<td>Do you think there would be any workplace enablers or barriers associated with workplace team sport? (culture; external; environments; facilities; funding; time; resources)</td>
</tr>
<tr>
<td></td>
<td>What times would work best?</td>
</tr>
<tr>
<td></td>
<td>What sports would you like?</td>
</tr>
<tr>
<td><strong>Set-up, Maintenance and Adherence</strong></td>
<td>How should workplace team sport be set-up, maintained and managed? (HR; individual; committee)</td>
</tr>
<tr>
<td><strong>Closing Statements</strong></td>
<td>Overall do you think workplace team sport would hold positive/negative health benefits for the company or a worthwhile venture?</td>
</tr>
<tr>
<td></td>
<td>Do you have any further thoughts on the idea or anything else to add?</td>
</tr>
</tbody>
</table>
Analysis
Recorded interviews were transcribed verbatim and a template analysis was undertaken (Brooks, McCluskey, Turley & King, 2015). An overview of template analysis is provided in Chapter 2. The initial priori themes used in the template were based on the ecological model (Sallis et al., 2008). Themes were grouped into first (e.g., factors that facilitate taking part in workplace team sport); second (e.g., interpersonal factors influencing participation in workplace team sport); third (e.g., social approval, understanding and support); and fourth (e.g., shared experience and group membership) level themes. All members of the research team gave their consensus on the data by reviewing the identified themes.

Findings

Participant demographics
Twenty-nine employees with a range of job roles took part in this study (72% in a position of superiority over their colleagues). Additional demographics are available in Table 3.2. These participants (58% female) were aged between 22 and 57 (36±7.71), had worked at their organisation from 2 months to 28 years (6±6.12) and all worked within teams.

All the participants reported being in a good state of health and participated in PA in their leisure time or workplace (e.g., soccer, exercise classes, yoga). All the participants in this study worked in office based roles.

Team sport participation
Fifty five percent of the sample participated in team sports in their workplace. These workplace team sports can be categorised as office-based team sports, traditional team sports and individual-team sports. Of these sixteen employees, six women participated in workplace team sport.
Table 3.2: Participant Demographics - Study 2

<table>
<thead>
<tr>
<th>Organisation (Industry)</th>
<th>Workplace Team Sport organisation and support</th>
<th>Number of Participants</th>
<th>Gender</th>
<th>Age</th>
<th>Qualifications Held</th>
<th>Marital Status</th>
<th>Dependants</th>
<th>Department</th>
<th>Business Size</th>
<th>Job Role</th>
<th>Work in a Team/Number in a Position of Superiority or Management</th>
<th>Contract Type</th>
<th>Tenure (Months- Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>Cycling and squash encouraged by the organisation, but self-organised. Facilities offsite. Participation outside of working hours. Information not provided if activity was funded or self-funded.</td>
<td>10</td>
<td>6 Females (60%)</td>
<td>27 - 43 (37.1± 4.93)</td>
<td>Not Provided</td>
<td>Not Provided</td>
<td>HR (10%), Operations (10%), Legal (20%), Retail (20%), Group Development/Communications (10%), Public Relations (10%), IT (10%), Admin (10%)</td>
<td>Large</td>
<td>Manager (40%), Coordinator (20%), Solicitor (10%), Head of Department (20%), Personal Assistant (10%)</td>
<td>All Full-time</td>
<td>1/3 to 23 (M=9)/90% in a position of superiority or management</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manufacturing 2</td>
<td>Participants self-funded and organised soccer offsite outside of working hours. Swimming was funded, organised, supported and participated in during working hours at a facility offsite.</td>
<td>7</td>
<td>3 Females (43%)</td>
<td>27 – 57 (37.4± 10.17)</td>
<td>Further Education (14%) Degree (43%), Higher Degree (43%)</td>
<td>Single (43%), Married (47%)</td>
<td>Yes (47%)</td>
<td>Retail (14%), IT (14%), Design (28%), Product Development (14%), Ecommerce (14%), Marketing (14%)</td>
<td>Large</td>
<td>Manager (43%), Analyst (14%), Marketer (20%), Product Developer (14%)</td>
<td>All Full-time</td>
<td>1 to 6/3 to 16 (M=6.4)/56% in a position of superiority or management</td>
</tr>
</tbody>
</table>

53
Table 3.2 continued: Participant demographics – Study 2.

<table>
<thead>
<tr>
<th>Organisation (Industry)</th>
<th>Workplace Team Sport organisation and support</th>
<th>Number of Participants</th>
<th>Gender</th>
<th>Age</th>
<th>Qualifications Held</th>
<th>Marital Status</th>
<th>Dependants</th>
<th>Department</th>
<th>Business Size</th>
<th>Job Role</th>
<th>Work in a Team/Number of People/In a Position of Superiority or Management</th>
<th>Contract Type</th>
<th>Tenure (Months-Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Services</td>
<td>Workplace challenge encouraged by the organisation, funded externally, participated in outside of working hours. Soccer, softball, rock climbing and cycling self-funded by participants, participated in outside working hours. Table tennis provided by organisation, played during lunch hours. All facilities offsite.</td>
<td>6</td>
<td>3 Females (50%)</td>
<td>22-41 (34±7.58)</td>
<td>Not Provided</td>
<td>Not Provided</td>
<td>Not Provided</td>
<td>Human Resources (16%), Health Promotion (16%), Development (50%), Corporate Communication (16%)</td>
<td>Small/Medium (50%) Large (50%)</td>
<td>Advisor (15%), Practitioner/Consultant (15%), Manager (40%), Officer (30%)</td>
<td>All Full-Time</td>
<td>11 Months-12 Years (5.9±4.57)</td>
<td></td>
</tr>
<tr>
<td>Education (Higher)</td>
<td>Netball, badminton and squash was self-funded. Played outside of working hours. Seasonal sports competitions (e.g., soccer), played during working hours. Organised in workplace, self-funded participation. All facilities on site.</td>
<td>6</td>
<td>5 Females (83%)</td>
<td>24-48 years (35, 6±9, 6)</td>
<td>Higher Degree (50%), PhD (50%)</td>
<td>Engaged (17%), Single (50%), Married (33%)</td>
<td>Yes (50%), No (50%)</td>
<td>Sport, Exercise and Health Science</td>
<td>Large</td>
<td>Researcher/Consultant (17%), Researcher (33%), Senior Lecturer (33%), Project Manager (17%)</td>
<td>All Full-time</td>
<td>2 Months – 16 Years (4.03±5.97)</td>
<td></td>
</tr>
</tbody>
</table>
Office-based team sports can be conceptualised as team sports that take place in an office space or breakout area. These sports were organised by groups of employees and often the organisation provided equipment to participate (e.g., a table tennis table). Office-based sports were played during breaks in the day, and included ‘badminton and table tennis [P14]’. Traditional team sports such as ‘basketball [P5]’, ‘ultimate frisbee [P1]’, ‘touch-rugby [P18]’, ‘softball [P19]’, ‘indoor/beach volleyball [P1]’, ‘squash [P2]’, ‘soccer [P29]’ and ‘rounders [P22]’ were played by participants. These team sports were encouraged, communicated and promoted by the organisation, however not directly funded. Therefore, participants passionate about sport often self-funded and organised these forms of team sport. In the organisations sampled these team sports took place offsite during lunchtime or after-working hours. Team sports were played as part of stand-alone workplace events, tournaments and sports programmes.

Finally, individual-team sports took place in a workplace setting. These can be defined as individual sports with a competitive team goal such as ‘swimming [P28]’ and ‘cycling [P19]’. The organisation funded and organised competitions and a programme of events for their employees. Individual-team sports took place offsite at funded facilities (e.g., local sports centres) during breaks in the working day or after-working hours.

Participants playing team sport with their colleagues reported the facilitators and obstacles they encountered (i.e., denoted with TS in quotations). In contrast, participants not playing team sport (i.e., denoted with NP in quotations) typically described their barriers to participation. However, in some cases these participants were considering playing workplace team sport, and therefore discussed what motivated them to contemplate participation.

**Overview of themes**

The facilitators and obstacles underpinning participation in workplace team sport are represented by intrapersonal, interpersonal, organisational, environmental and societal themes (see Table 3.3), as outlined by the ecological model (Sallis et al., 2008). These themes emerged across the data.
regardless of job role, superiority or the industry they worked within. The findings representing these themes are presented below.

**Intrapersonal Factors Influencing Participation in Workplace Team Sport**

*Motivated by self-interest*

Intrinsic factors such as a preference for the type of team sport offered (e.g., ‘I do it because I like the activity [P1, female health promotion manager aged 34, TS]’) and feelings of enjoyment (e.g., ‘I like that volleyball is quite novel, I like that it’s quite fun [P6, female researcher aged 24, TS]’) could autonomously motivate participation in team sport. The satisfaction participants associated with ‘sport’ appeared to motivate participants to play workplace team sport from their own free will (e.g., ‘I love most sports to be honest. My love of sport gets me there [P2: female researcher aged 28, TS]’).

In contrast, having no interest or intrinsic connection with the team sport offered within the workplace could create amotivation for workplace team sport and an obstacle to participation:

‘Yeah it’s not going to be enjoyable enough to do purely for the sake of enjoyment. So, it’s not something I want to do on a regular basis’ [P4: female, aged 48, NP]

*Motivated by external factors*

External factors such as competition and incentives were frequently reported to positively influence participation in workplace team sport. Competitions typically took place between departmental teams, while incentives were offered to employees who were playing team sport. Rewards and competition created controlled motivation to participate:

‘There is awards and stuff like that. Again, you make it a little more competitive to try and get more people involved because there’s got to be a carrot at the end of it’ [P12: female personal assistant aged 42, TS].
## Table 3.3: Template Analysis - Study 2

<table>
<thead>
<tr>
<th>Ecological factors</th>
<th>Sub-theme</th>
<th>Facilitators (enablers) to team sport (+)</th>
<th>Obstacles (barriers) to team sport (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrapersonal factors</td>
<td>Motivated by self-interest</td>
<td>+ Enjoyment</td>
<td>- Amotivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+ Preference for type of team sport</td>
<td>- Lack of enjoyment in team sports</td>
</tr>
<tr>
<td>Motivated by external sources</td>
<td></td>
<td>+ Incentives to participate</td>
<td>- Unhealthy competition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+ Schemes with rewards</td>
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<td></td>
<td>+ Positive competition</td>
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<tr>
<td>Competence and self-efficacy</td>
<td></td>
<td>+ High perceptions of competence</td>
<td>- Low perceptions of competence</td>
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<td></td>
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<td>+ High self-efficacy</td>
<td>- Low perceptions of fitness</td>
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<td></td>
<td></td>
<td>+ Modified rules and adapted sports</td>
<td>- Low self-efficacy</td>
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<tr>
<td></td>
<td></td>
<td>+ Novelty of sports</td>
<td>- Low perceptions of body image</td>
</tr>
</tbody>
</table>
However, obstacles were created for workplace team sport by the behaviours associated with unhealthy competition, such as aggression, criticism and ‘banter’:

‘People get very competitive, like you did that wrong. That direct criticism, I don’t like that’ [P10: female ledger controller aged 34, NP].

**Competence and self-efficacy**

Participants not playing workplace team sport were challenged by their perceptions of competence in team sport. Low-efficacy was attributed to diminished perceptions of competence and this created an obstacle to participation. In some cases, undesirable comparisons with the ability of a colleague were described to reduce perceptions of competence and diminish self-efficacy:

‘When you get something like football you start thinking I wonder how good everybody else is and that just puts a bit more worry about joining in [P23: female personal assistant aged 42, NP]’.

Furthermore, a fear of social judgements and a challenging experience of team sport may diminish perceptions of competence, self-efficacy and create an obstacle for regular participation in team sport:

‘I have never been very confident at competitive sport, which probably pins down why I feel pressure from others. You don’t want to let your team members down [P26: female marketing employee aged 28, NP]’.

However, positive perceptions of competence were linked with higher self-efficacy. It emerged that low perceptions of competence and self-efficacy could be positively influenced by tailoring the rules of the sport and the style of play to the employees participating. Frequently, a workplace champion prompted this change and created a facilitator to participation:

‘So, the workplace champions took the basic rules, rather than some of the intricacies, which stop the game flowing and they ignored some of the minor infringements, so it was just the major infringements that got called up. It made it a more enjoyable game and a more flexible game,'
but it still had the feel of the sport. It made things easier to achieve and understand. An easy game to play and a more enjoyable game ultimately’ [P18: male sports development manager aged 41, TS].

Removing the rules and structure traditionally recognisable with team sports could improve perceptions of competence and self-efficacy. Sports that were absent from participants were reported to have similar positive influence on perceptions of competence and self-efficacy:

‘What we found was the sports that no one had played before or the least amount of people had played before, that had the biggest enjoyment factor. I think people felt equal going into it. It was new to everybody, so everyone was one the same starting point. Potentially team sports which people haven’t experienced at school’ [P18: male sports development manager aged 41, TS].

Sports that were not regularly played were not associated with the same diminished perceptions of competence which are perhaps related with regularly offered team sports. Further, the novelty of these sports may create more equal perceptions of competence and therefore facilitate participation within the workplace:

‘With rounders, you get people that you wouldn’t normally pick up doing something traditionally sporty, say a football match or whatever, because I think rounders you pick up people because they are like rounders is not a proper sport, it’s more of a game and they’re like if I come along and I’m rubbish it doesn’t matter, whereas with football they think if I come along I’m going to be the worst, and it’s going to be embarrassing. The advantage of rounders is that it gets people who might not get involved because of competence reasons’ [P22: male project manager aged 46, TS].

Body image also challenged some of the female participants in this study. Body image consciousness and social comparisons may reduce self-efficacy and create an obstacle to participation:

‘It’s a body image thing. Exercising in a group, it can be quite
intimidating. Getting sweaty in front of other people. Then it’s a vicious cycle then because you really want to lose weight’ [P8: female team coordinator aged 27, NP].

**Interpersonal factors influencing participation in workplace team sport**

**Support from colleagues and managers**

The attitudes and behaviour of colleagues and managers provided support for team sport within the workplace. For example, some participants supported their colleagues through the psychosocial (e.g., lack of self-efficacy) and organisational (e.g., job demands and expectations) obstacles associated with participation:

‘People are more comfortable playing with their peers than playing on their own for the first time. It’s perhaps easier. I think they’re more likely to be active if their playing alongside people they know like their colleagues’ [P18: male sports development manager aged 41, TS].

**Group involvement, cohesion and relatedness**

Participation in workplace team sport created social relationships and friendships within the workplace. The appeal of developing social relationships and the membership of a social group motivated some employees to participate in workplace team sport:

‘If I were to play sport for work then that would be for social reasons. So, I think the main reason you would have like organised team sport in the workplace would be for the social interaction side of it’ [P15: male IT support manager aged 38, NP].

The attendance and support of these social groups provided relatedness and motivated participants to regularly participate:

‘I loved doing it as a team because it encourages you. When we were finishing here, and it’s been a busy day I would have been tempted to say, you know what I won’t do it tonight. With the team, it’s like let’s do this’ [P9: female solicitor aged 34, TS].
Table 3.3 continued: Template Analysis – Study 2

<table>
<thead>
<tr>
<th>Ecological factors</th>
<th>Sub-theme</th>
<th>Facilitators (enablers) to team sport (+)</th>
<th>Obstacles (barriers) to team sport (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interpersonal factors</strong></td>
<td>Psychosocial support from colleagues and managers</td>
<td>+ Acceptance and social support</td>
<td>- Lack of social support</td>
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<td></td>
<td></td>
<td>+ Shared experiences and group membership</td>
<td></td>
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<tr>
<td></td>
<td>Group involvement, cohesion and relatedness</td>
<td>+ Group cohesion</td>
<td></td>
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<td></td>
<td>Family, work-life balance and the influence on perceptions of available time</td>
<td>+ Functional work-life balance</td>
<td>- Family, work-life balance and perceptions of no available time</td>
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<tr>
<td></td>
<td></td>
<td>+ Time, scheduling, work-life balance and multiple options</td>
<td>- Workplace commitments and demands and the job</td>
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<td></td>
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<td></td>
<td>- Time of sport not fitting in with work and lifestyle</td>
</tr>
</tbody>
</table>

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Family, work-life balance and the influence on perceptions of available time

Participants described how balancing family, social and workplace commitments influenced the time available for participation in workplace team sport. Prioritising workplace demands and personal commitments above participation created a lack of motivation for workplace team sport where participants viewed their participation as extra time at the workplace:

‘If I’m going to spend the time on an activity outside work, I would rather spend it outside with family or where I am with friends. I am spending enough time at work already’ [P4: female, aged 48, NP].

Time based obstacles to participation could be addressed when team sport was managed organisationally through a consistent programme of events and interpersonally through scheduling of the working day:

‘As long as it’s regularly in the calendar, then people can normally change their schedules. It’s when it hops between days and times where I think it becomes hard’ [P5: female academic aged 36, TS].

Participation during the day offered a form of team sport that enabled most members of staff to attend workplace team sport:

‘So, if it was incorporated into the working day. So, having like inter-centre competitions and stuff like that. That would be quite good for everyone’ [P16: female business improvement manager aged 36, NP].

However, participation during the day (e.g., during lunch-hours) was challenged by social comparisons made with the behaviours of colleagues and superiors (e.g., working non-stop). For example, maintaining a professional image and the time taken to return to work created obstacles such as job stress and a loss of productivity for some participants:

‘The hour for the sport, plus showering and everything thing else afterward. That’s a barrier for me. I have to make time up for it’ [P5: female researcher aged 36, TS].

Addressing these obstacles led participants to play team sport with
their colleagues outside of working hours:

‘We played at the end of the day so earliest we do it is say four o’clock. So, most people are done, so we’re not getting in the way of work. To do something that actually becomes quite physical and you’re going to get sweaty, and then you’re going to need a shower and all of that. You hopefully get more people because you’re not going to have meetings and things like that’ [P2: female researcher aged 28, TS].

Although, this challenged participants with childcare commitments. Frequently the PA behaviour underpinning participation in workplace team sport could be challenged by the presence of children and associated responsibilities:

‘Free time went when I had kids. I use to be able to nip off for forty-five minutes to go to the gym but now it’s kind of finish work get home and get the kids their tea and play with them for a bit’ [P23: male IT analyst aged 34, NP].

Organisational factors influencing participation in workplace team sport

Support

Frequently, superiors were supportive of participation (e.g., ‘yeah, our manager is very accepting of us wanting to do it’ [P26: female marketer aged 28, NP]). However, in some cases the attitudes of superiors (e.g., ‘managers, they end up clock watching [P28, male manager aged 39, TS]’ and the attitudes of colleagues (e.g., ‘you’re seen as not working by your peers [P5: female researcher aged 36, TS]’) created obstacles to participation.

The demand employers place upon their workforce may indirectly influence the adoption of negative attitudes towards workplace team sport. For example, unsupportive attitudes from higher-tier management can discourage participation in workplace team sport:

‘Senior management have commented about it not looking particularly good if people come into the building and there’s people playing table tennis’ [P21: female development manager aged 33, TS].
Table 3.3 continued: Template Analysis – Study 2

<table>
<thead>
<tr>
<th>Ecological factors</th>
<th>Sub-theme</th>
<th>Facilitators (enablers) to team sport (+)</th>
<th>Obstacles (barriers) to team sport (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organisational factors</strong></td>
<td>The level of support for team sport</td>
<td>+ Support of colleagues, managers</td>
<td>- Lack of support and perception of</td>
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<td></td>
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<td>and the organisation</td>
<td>not working from colleagues,</td>
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<td>managers and the organisation</td>
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<td></td>
<td>The organisation and management of</td>
<td>+ Sharing responsibilities</td>
<td>- No clear organisation or</td>
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<td></td>
<td>team sport</td>
<td></td>
<td>management</td>
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<td></td>
<td></td>
<td>+ The importance of champions</td>
<td>- Time burdened and constrained</td>
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<td></td>
<td>+ Committees and a shared voice</td>
<td>workplace champions</td>
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<td></td>
<td>+ Organisational ownership and</td>
<td>- Informal organisation and in-</td>
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<td>support</td>
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<td>+ HR and occupational health</td>
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<tr>
<td>Funding team sport</td>
<td>+ Organisational funding</td>
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<td>- Lack of funding</td>
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<td>+ Willingness to self-fund</td>
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<td>- The public sector and</td>
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<td>accountability</td>
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Managers who understood the benefits sport provided acceptance and motivation to participate, and support to adhere to these opportunities within the workplace:

‘If you have got a leader who is fairly active, fairly sporty and kind of says I want to put this together and I’m going to be there, then more people will go. As they think, oh the boss is going, I’ll go.’ [P13: male, aged 42, TS].

Likewise, a duty of care for the health and wellbeing of the workforce provided support, acceptance, investment and a facilitator for participation in workplace team sport:

‘You spend all of your time, all your day at work, it’s part of your life experience. If they want you enjoy being at work and be productive and stay with the company then they should provide an environment that encourages that and funding and organising some sort of sports activity, is one way of creating a nice culture’ [P22: male project manager aged 46, TS].

**Organising and managing team sport**

Workplace champions, sports committees or the organisation delivered team sport to employees. A structured method of organisation created an enabler for participation, while a lack of management, structure and organisation created obstacles for participants.

An enthusiastic and committed workplace champion motivated participants to play workplace team sport: ‘I do it because I have a particularly supportive champion [P1: female health promotion manager aged 34, TS]’.

However, obstacles were created when the demands of employment challenged a workplace champion’s effectiveness. For example, champions lacked the time and resources to effectively manage workplace team sport:

‘In reality, I have to do it, I would basically have to turn up every week and collect the money, make the booking, organise and pick the team, and I’m not going to do it, I’m not, I don’t want to do that basically, I don’t want to commit myself. I don’t even live near here, I work across
the county, I’m not going to be here till eight o’clock, for them to play football, for me then to drive forty miles back home. Practically it’s not going to happen. It’s important to have a group of staff members which are willing to put the effort in to make it work’ [P17: male workplace health advisor aged 40, NP].

Therefore, the pressure placed on champions could be shared through a sports committee-based approach:

‘If HR are telling you what’s been chosen, then others might not want to do that [sport]. But, if representatives are saying that they’ve made a joint decision across the company of what is going to be run for the year. They can get ideas from people about what they actually want’ [P8: female team coordinator aged 27, NP].

Sharing the demands of organising and delivering team sport created a professional approach and a sense of control for the employer. This sense of control provided investment and support for an effective programme to be implemented, and therefore acted as a facilitator to participation. In some cases, this input was delegated within the remit of human resourses:

‘It would have to have someone in HR maybe you’d appoint someone to be a manager or something. It would need careful running because otherwise it could very quickly fall apart’ [P14: male head of public relations aged 40, NP].

**Funding**

A lack of funded opportunities could demotivate participants from playing workplace team sport. However, it was the public-sector organisations sampled in this study that are most frequently challenged by financial austerity and public accountability. For example, participation in an activity outside the traditional working practises may be perceived negatively by staff facing redundancy or presented unfavourably within the media:

‘Money is a real challenge, and it’s probably not the same for many organisations you talk to but also that it’s public money. You’ve got to have a strong belief to say we’re all going to go off and spend public
money to play 5-a-side football. This is public money, and if you’re going to spend £1000 on a sports hall for a year, so staff can go and play 5-a-side football, that’s £1000 that’s could have been spent on whatever. So, we do have to be accountable, we were concerned with what messages this will give out in the media’ [P17: male workplace health advisor aged 40, NP].

Participation in self-funded informal groups could facilitate participation when funding was unavailable:

‘So, with football, we pay ourselves. It’s only £4, it’s not a big expense. We get the balls and equipment. People are comfortable paying for it’ [P24: male technical leader aged 35, TS].

**Communication**

Effective strategies that raised awareness and facilitated participation included a variety of visual (e.g., notice boards) and digital (e.g., staff intranet; social media) methods of raising awareness. A frequent communication method mentioned was virtual spaces (e.g., ‘Yammer’, social media and digital message boards). These virtual spaces enabled participation due to the level of flexibility, personal interaction and two-way communication they offered. In contrast, forms of communication without this two-way communication were reported to demotivate participation and create obstacles due to a lack of flexibility and availability offsite. The intranet presented these obstacles to participation:

‘It’s a one-way portal, so unlike with an email where you can reply to it, you can’t reply to it on the intranet. We put something out to the entire workforce. We are just pushing the message out there. There’s no dialogue, no conversation there, you can’t have a discussion about something or anything like that, so it doesn’t work well for organising events. You can get two colleagues sat next to each other reading a thing about a softball match, and they’ll be no action out of it because there’s no discussion there’ [P19: male senior corporate communication manger aged 27, TS].
Workplace culture

The culture within the workplace predisposed the adoption of workplace team sport. Organisational determinants (i.e., practices; attitudes; behaviours), social norms (i.e., acceptance; understanding; support) and beliefs surrounding PA influenced the culture within the workplace.

A culture of acceptance created support, encouragement and a facilitator for workplace team sport (e.g., ‘You should embrace the company values of staying healthy and feeling fit’ [P24: male technical leader aged 35, TS]). Adopting the health promoting beliefs of the organisation led some participants to play in team sport. Within a positive workplace culture, flexible working and the notion of ‘quality work over the quantity of work’ was encouraged.

Furthermore, a culture which encouraged flexible working was discussed with long-term participation in workplace team sport. Reinforcing flexible working led participants to perceive they had the freedom to take breaks during the working day to participate in activities such as team sport: ‘They’re fantastic here, they’re all about flexible working [P23: male IT analyst aged 34, NP]’. Likewise, with a positive workplace culture, flexible working was frequently promoted and supported by supervisors:

‘It’s about output, rather than sitting at your desk, you have to manage people according to their needs [P7: female HR manager aged 35, TS].’

A workplace culture encouraging flexible working provided trust, reinforcement and support for employees to take time out of the working day to participate in workplace team sport. Further, participants described how it was their employer’s role to establish such a culture and their superior’s role to reinforce this culture within the organisation:

‘It comes back to my point of the manager setting the culture of an organisation. You know if the culture is that people work hard when they’re at their desks, but they’re allowed to get up from their desks and you know move about the office and take part in activities’ [P21:
Alternatively, the culture within the workplace could create obstacles for participation in team sport. While, workplace team sport was not discouraged in any of the organisations sampled, a culture that encouraged ‘working non-stop’ was described:

‘I don’t think that I anticipate that I will likely to be participating. When I’m at work, I’m there to work. I just get as much done as possible then I can get home’ [P4: female academic aged 48, NP].

Within this culture, participation in team sport was an additional recreational activity and therefore outside the remit of the working day. Moreover, an obstacle was created as finishing work before playing team sport was frequently reinforced through social norms:

‘There is always that expectation that you do your work first, it is kind of an unsaid rule here’ [P9: female solicitor aged 34, TS].

Likewise, a workplace culture that encouraged working non-stop was often reinforced by the attitudes and behaviour of superiors:

‘If your manager turns up at eight and goes home a six, and never has a break. That’s going to dictate the culture of your team to a degree. You’ve got a lot of pressure around that’ [P17, male workplace health advisor aged 40, NP].

Environmental Factors Influencing Participation in Workplace Team Sport

Sporting and changing facilities

The availability and quality of sporting and changing facilities either motivated or demotivated participants from playing workplace team sport. A lack of facilities within the workplace created a key obstacle for employees considering participation:

‘It’s actually physically doing it in the building or around the building. That is ultimately our biggest barrier’ [P17: male workplace health advisor aged 40, NP].
### Table 3.3 continued: Template Analysis – Study 2

<table>
<thead>
<tr>
<th>Ecological factors</th>
<th>Sub-theme</th>
<th>Facilitators (enablers) to team sport (+)</th>
<th>Obstacles (barriers) to team sport (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organisational factors</strong></td>
<td>Communication of team sport</td>
<td>+ Tailoring communication style to the structure of the organisation</td>
<td>- Informal groups and communication</td>
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<tr>
<td></td>
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<td>+ Modern communication and social media</td>
<td>- Limitations of intranet</td>
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<td>- Lack of two-way communication</td>
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<td></td>
<td>Workplace culture and team sport</td>
<td>+ A supportive workplace culture</td>
<td>- A discouraging workplace culture</td>
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<td></td>
<td></td>
<td>+ A flexible working culture</td>
<td>- Working non-stop</td>
</tr>
<tr>
<td><strong>Environmental factors</strong></td>
<td>Sports and changing facilities</td>
<td>+ Available sports and changing facilities.</td>
<td>- Inaccessible facilities</td>
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<td></td>
<td></td>
<td>+ Accessible sports facilities</td>
<td>- Health and safety challenges</td>
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<td>+ Utilizing the natural environment surrounding the workplace</td>
<td>- Logistical and pragmatic obstacles</td>
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<td></td>
<td></td>
<td>+ Acceptance for changing time</td>
<td>- Unavailable facilities</td>
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<td></td>
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<td>- Poor weather</td>
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</table>
Inaccessible facilities (e.g., ‘I’ve got to get over there, I’ve got to do this and that, it’s too long [P25]’); health and safety protocols (e.g., ‘the mountain of health and safety requirements, you would have to go through would be a nightmare [P4]’); and unhygienic facilities created obstacles to participation (e.g., ‘I know we have gyms, but they’re a bit minging and I know the showers are crap [P19, TS]’).

In contrast, utilising the accessible green space surrounding the workplace could overcome challenges with a lack of sporting facilities:

‘Yeah so we’re quite lucky. Where we are based there is a massive country park with a massive cricket ground there, which we have free reign over. The rugby club is round the back, we have access to their fields, there’s a tennis court as well. So, on a summers night you just step out the back of HQ and you’re there’ [P19: male senior corporate communication manager aged 27, TS].

However, during the winter months these spaces became an obstacle to participation:

‘Asking non-sports people to come out in the pouring rain and freezing cold to go play netball outside is going to be quite unlikely’ [P1: female, aged 34, TS].

**The support of external sporting organisations**

In some cases, the organisations sampled in this study had a relationship with an external sporting organisation such as a national governing body, regional sports partnership or local sports club. These networks enabled an individual within the workplace to deliver team sport to their colleagues. Often, financial constraints and a lack of resources led organisations to seek support from external sporting organisations. External sporting organisations offer support by proving resources, sports leaders and education to deliver team sport:

‘So, we worked with four governing bodies that brought someone in to deliver it on the day. That person was a coach, because we recognised that not all people would have played the sports before. So, they
organised it on the night, and delivered a short coaching session before’ [P18: male sports development manager aged 41, TS].

Societal factors influencing participation in workplace team sport

Bias and inequality in sport

Historical teaching practices and policy created a negative experience of physical education’ (PE), a negative attitude towards team sport and obstacles to participation. The style that PE was delivered reduced perceptions of competence, self-efficacy and satisfaction with sport:

‘I think an experience of school sports, has put me off sport. At school, I had asthma, and when I was young when you had asthma you didn’t do sports or only for a little bit in the summer so I was also the youngest in my year by quite some way. So, I was rubbish at sports, the rare times I did any and sports are all competitive, you did more if your good at it’ [P4: female academic aged 48, NP].

In some cases, workplace champions created inequality in the delivery of workplace team sport by stereotyping the age and gender within their organisation:

‘Well if we look at the demographic of what our employees’ are, and we are a heavily female organisation, something in the region of eighty odd percentage are female and our average age is around the high thirty mark, say forty for the sake of argument. So, that in itself is a bit of a barrier’ [P17: male, aged 40, NP].

Experiences of inequality perhaps explain why females in this study described intrapersonal obstacles such as a lack of perceived competence and reduced self-efficacy:

‘I think it’s more of a confidence thing. I don’t think I would necessarily go, yeah I’ll play football, as I’m terrible and I think for a woman you wouldn’t necessarily feel confident doing it with work’ [P10: female, aged 34, NP].
Table 3.3 continued: Template Analysis – Study 2

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Environmental factors</td>
<td>The support of external sporting organisations</td>
<td>+ The positive impact of external sporting organisations</td>
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<tr>
<td>Societal factors</td>
<td>Bias and inequality in sport</td>
<td>- Experience of school/youth sport and bias</td>
<td>- Sporting demographic ideals, everyday sexism and bias</td>
</tr>
</tbody>
</table>
Discussion

Semi-structured interviews with employees were used to explore the complexity of participating in workplace team sport. Template analysis interpreted through an ecological model revealed participation in workplace team sport is influenced by (i) intrapersonal, (ii) interpersonal, (iii) organisational, (iv) environmental and (v) societal factors.

The influence of intrapersonal factors

Intrapersonal factors can facilitate and challenge participation in workplace team sport. Factors such as diminished perceptions of competence, a negative experience of school sport, fear of failure, embarrassment, a lack of self-efficacy and state anxiety, challenges surrounding body image, peer expectations, over competitiveness and social comparisons were identified as obstacles to participation in team sport (Adie et al., 2008; Conroy & Elliot, 2004; Evans et al., 2016).

These factors thwart needs for competence and relatedness (Deci & Ryan, 2000a, 2000b). Thwarted needs for competence and relatedness are associated with the presence of illbeing, inconsistent participation, low adherence, and introjected controlled forms of motivation (Gucciardi & Jackson, 2015; Kinnafick et al., 2014a). Consistent with previous evidence, the current study found enjoyment and a passion for sport to predispose autonomous motivation in employees participating in workplace team sport (Gucciardi & Jackson, 2015; Kinnafick et al., 2014; Teixeira et al., 2012). Supporting autonomy fosters psychological functioning, autonomous motivation and maintained behaviour (Deci & Ryan, 2000a, 2000b; Gucciardi & Jackson, 2015; Kinnafick et al., 2014; Teixeira et al., 2012).

Researchers developing workplace team sport programmes should therefore use strategies which support needs for autonomy, competence and relatedness. Autonomy support may provide a useful tool for researchers implementing team sport programmes (see Kinnafick et al., 2014). Autonomy support provides an individual with a meaningful choice, reason and foundation for participation (Gucciardi & Jackson, 2015). Within workplace team sport, autonomy support could be provided by champions who

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Chapter 3: Study 2 – The Facilitators and Obstacles to Workplace Team Sport

Discussion

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The influence of intrapersonal factors

Intrapersonal factors can facilitate and challenge participation in workplace team sport. Factors such as diminished perceptions of competence, a negative experience of school sport, fear of failure, embarrassment, a lack of self-efficacy and state anxiety, challenges surrounding body image, peer expectations, over competitiveness and social comparisons were identified as obstacles to participation in team sport (Adie et al., 2008; Conroy & Elliot, 2004; Evans et al., 2016).

These factors thwart needs for competence and relatedness (Deci & Ryan, 2000a, 2000b). Thwarted needs for competence and relatedness are associated with the presence of illbeing, inconsistent participation, low adherence, and introjected controlled forms of motivation (Gucciardi & Jackson, 2015; Kinnafick et al., 2014a). Consistent with previous evidence, the current study found enjoyment and a passion for sport to predispose autonomous motivation in employees participating in workplace team sport (Gucciardi & Jackson, 2015; Kinnafick et al., 2014; Teixeira et al., 2012). Supporting autonomy fosters psychological functioning, autonomous motivation and maintained behaviour (Deci & Ryan, 2000a, 2000b; Gucciardi & Jackson, 2015; Kinnafick et al., 2014; Teixeira et al., 2012).

Researchers developing workplace team sport programmes should therefore use strategies which support needs for autonomy, competence and relatedness. Autonomy support may provide a useful tool for researchers implementing team sport programmes (see Kinnafick et al., 2014). Autonomy support provides an individual with a meaningful choice, reason and foundation for participation (Gucciardi & Jackson, 2015). Within workplace team sport, autonomy support could be provided by champions who
acknowledge the perspective of individuals and minimise the presence of pressure. Researchers should consider adopting autonomy support strategies by encouraging champions to adapt the rules of sport, promoting novel sports and imparting the benefits of team sport to employees (Adie et al., 2008; Edmunds & Clow, 2015; Gucciardi & Jackson, 2015). Moreover, future research may consider investigating the feasibility and impact of this strategy.

**The influence of interpersonal factors**

Participants playing or contemplating participation in the current study reported interpersonal factors to positively and negatively influence their participation. Consistent with evidence, social relationships were found to support needs for relatedness and encouraged participation (Adie et al., 2008; Gucciardi & Jackson, 2015; Kinnafick et al., 2014). The findings of the current study suggest these markers of relatedness (e.g., group cohesion, identity and membership) are known to be effective during the uptake and adherence to an activity (Gucciardi & Jackson, 2015; Kinnafick et al., 2014). Given supporting needs for relatedness is associated with fostered wellbeing and the adoption of autonomous motivation (see Deci & Ryan, 2000a, 2000b), researchers should be aware of the social environments impact on participation when designing interventions. Researchers may consider further exploring the role of relatedness on workplace team sport participation and its impact on the maintenance of behaviour.

Consistent with evidence, balancing work and personal life was a factor employees’ contemplating participation in workplace team sport negotiated (Audrey & Proctor, 2015; Fletcher, Behrens & Domina, 2008; Mailey, Hubert, Dinkel & McAuley, 2014). Evidence has indicated parents attribute their participation in PA to feelings of guilt and responsibility (Audrey & Proctor, 2015; Fletcher et al., 2008; Gucciardi & Jackson, 2015; Mailey et al., 2014). Offering team sport across a range of time-points, through autonomy-supportive participation (e.g., flexibility to attend) and accounting of the individual challenges balanced by their employees may improve participation and adherence. Researchers implementing team sport should tailor not only to the needs of the organisation, but moreover to the personal demands that individual employees negotiate through a participatory approach.
Future research may consider understanding the efficacy and feasibility of a participatory approach when implementing team sport into a workplace setting.

**The influence of organisational factors**

This study and previous evidence found employees seek understanding, acceptance and support from their colleagues, superiors and employer due to the demands shared by the workforce (e.g., job expectations, workloads) (Adams et al., 2016; Carter et al., 2014; Cole, Tully & Cupples, 2015; Evans et al., 2016). Employers attitudes appear to shape the perceptions and opinions of key decision makers, such as senior leadership team members and manager (Carter et al., 2014; Grossmeier & Hudsmith, 2015). Likewise, an employer’s willingness to fund, communicate and support workplace health promotion enables a workplace champion or an occupational health team’s ability to set-up, manage and deliver team sport (Adams et al., 2016; Audrey & Procter, 2015; Caperchinea et al., 2015; Pronk & Kottke, 2009). Therefore, evidencing the efficacy of workplace team sport may be an effective method to raise an employer’s awareness of the benefits of workplace team sport for their organisation. Likewise, given the current study was unable to recruit employers, future research may consider exploring the attitudes and perceptions of these key stakeholders.

In some case, colleagues and superiors did not support team sport. Evidence suggests workplace cultures, where the quantity of work is valued above the health of employees discourages participation in health promotion programmes (Cole et al., 2015; Keegan et al., 2016). Altering workplace may be an effective method of promoting team sport within a workplace setting (Cooper & Barton, 2015; Edmunds, Stephenson & Clow, 2013). Indeed, a workplace culture that encouraged participation in team sport, believed in the benefits of PA and promoted flexible working (Edmunds & Clow, 2015). Future research implementing team sport into a workplace setting may consider further exploring the role and effect of workplace culture on health and PA promotion.
Accounting for the intricacies within organisations is vital in the design of workplace team sport interventions. As mentioned, a participatory approach can be recognised by researchers and practitioners as a method to implement workplace team sport intervention (Nielsen et al., 2010). Adopting a participatory approach may secure support for the intervention (i.e., preparation phase), allow the researcher to address specific enablers and barriers (i.e., screening phase), develop the intervention around the necessary support (i.e., action planning phase) and implement the intervention with the required support (i.e., implementation phase) (Nielsen et al., 2010). Further, given the apparent complexity of implementing team sport into workplaces, a participatory approach provides researchers an opportunity to appraise and learn from the interventions implementation and effectiveness (Dzewaltowski et al., 2004; Nielsen et al., 2010; Sørensen & Holman, 2014).

The influence of environmental factors

Consistent with previous research, sporting and changing facilities predisposed participation in workplace team sport (Barene et al., 2013, 2014a, 2014b, 2016; Halonen et al., 2015). The findings of the current expand on this evidence by suggesting sports and changing facilities are deemed inaccessible if they are unprofessional, unattainable or challenge the health and safety policy of the organisation. Moreover, sports and changing facilities are determined by the level of funding, employer’s attitude to PA and culture within the workplace (van Bekkum, Williams & Morris, 2011).

The time taken to shower, change and return to work created obstacles to participants playing and considering participating in workplace team sport, more so than actual sport itself. Creating acceptance for extended breaks within the culture of the workplace and exploiting the environment surrounding the organisation (e.g., leisure centres, sports complexes or outdoor spaces) may form a pragmatic solution to this obstacle (Caperchione et al., 2015).

The findings of this study indicate external stakeholders (e.g., sports governing bodies) can assist in the set-up and delivery of workplace team sport. Pragmatically, an external sporting organisation can offer equipment, resources and knowledge within the remit of committee sports development.
Creating networks with these external sporting organisations may also be a wise step for researchers implementing workplace team sport. Future research may consider exploring the capability and knowledge these organisations have implementing team sport in workplace settings.

**The influence of societal factors**

Participants identified a negative experience of school sport as an obstacle to participation. The delivery, structure and content of PE is thought to reduce perceptions of competence and self-efficacy (Bocarro et al., 2008; Green, 2014; Kirk, 2005). Given the apparent impact of youth sports experiences on adult PA behaviour, future research may consider further exploring this issue over time with both qualitative and longitudinal designs.

Likewise, inequality driven attitudes of individuals organising and delivering workplace team sport, may challenge the participation of employees. Workplace champions, although not all, believed that women within their workplace do not enjoy team sports. These attitudes go a way to explain why female participants in this study reported a lack of self-efficacy and made negative social comparisons surrounding performance with their peer group (Harry, 1995; McGinnis, McQuillan & Chapple, 2005).

However, it remains interesting to note that workplace champions reported these attitudes, rather than the six female participants who took part in workplace team sport themselves. While there was no evidence to suggest a ‘masculine’ culture existed within the workplaces sampled, it should be noted that most the participants were male (i.e., 62.5% of team sport participants were male) despite the organisations sampled being a relatively equal split of genders. While inconclusive, participation levels and these reports from champions may highlight more serious questions of how team sport is promoted to female employees and if inequality exists in workplace health promotion. Future research therefore may consider investigating the existence and impact of inequality within workplace health and PA promotion.

Despite this lack of clarity, these attitudes go a way to explain why female participants in this study reported a lack of self-efficacy and made negative social comparisons surrounding performance with their peer group.
(Harry, 1995; McGinnis, McQuillan & Chapple, 2005). Researchers using team sport to promote the health of the workforce should consider designing interventions that are underpinned by motivation theories such as SDT, where an emphasis is placed upon the social environments' influence on competence, relatedness and autonomy (Adie et al., 2008; Edmunds & Clow, 2015; Kinnafick et al., 2014).

**Limitations**

Previous qualitative research exploring participation in workplace team sport has been limited by homogenous samples (Brinkley et al., 2017a). Whilst this study aimed to address this by sampling from a range of industries in the UK, unavoidably their perceptions and opinions may not be representative of all employees. Moreover, participants were recruited from large organisations. Due to the size of the organisations sampled, it is plausible themes may be more prominent within smaller enterprises. Moreover, the participants sampled were considered physically active. Therefore, it is likely these participants may report different barriers to their inactive colleagues (Keegan et al., 2016). While many of the challenges reported within this study may be reported by inactive employees (e.g., low perceived competence), future research may be wise to consider this limitation when applying these findings.

**Conclusion**

This study explored the facilitators and obstacles associated with participation in workplace team sport. Findings indicates intrapersonal, interpersonal, organisational, environmental and societal factors enable or challenge participation. A participatory approach would allow researchers to tailor the intervention towards the necessary and required support within the organisation (Nielsen et al., 2010). A team sport intervention guided by SDT has the potential to train workplace champions in providing a needs supportive programme (e.g., offering choice to participants, adapting sport, providing sports with transferable skills) (Adie et al., 2008). Interventions using a needs supportive behaviour change strategy are known to lead to regulated PA behaviour and autonomous motivation (Kinnafick et al., 2014a, 2014b).
Chapter 4  ‘Changing the Game’: A 12-Week Team Sport Programme for the workplace – Methods and Results at T0-T1 (Study 3)
Study 3

‘Changing the Game’: A 12-Week Team Sport Programme for the Workplace – Methods and Results

Introduction

Chapter 2 demonstrated that participation in workplace team sport has the capacity to improve individual, social group organisational health (Barene et al., 2013, 2014a, 2014b, 2016; Brinkley et al., 2017a; Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b). Likewise, Chapter 3 suggests that adopting a participatory approach (i.e., tailoring interventions to the organisation) and needs supportive strategies (e.g., adapting sport, tailoring sessions to participant needs, offering choices to participants) which support basic psychological needs for autonomy, competence and relatedness may encourage participation in workplace team sport.

The literature underpinning workplace team sport is limited by methodological flaws (e.g., failure to measure social-group and organisational health outcomes), the use of non-validated measures (e.g., qualitative data) to assess group-cohesion, making it difficult to observe changes overtime (Brinkley et al., 2017a). Likewise, the team sport investigated by past research has been inadequately described (i.e., Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b). The type of sport played has been listed rather than the intensity, duration, volume and frequency that have been participated in. These challenge researchers in determining what ‘dose’ of team sport equals the benefits reported by literature (Brinkley et al., 2017a). Finally, many of the interventions lack strong theoretical underpinnings (Brinkley et al., 2017a) that is recommended by the Medical Research Council (MRC) (Craig et al., 2008).

The evidence presented in this thesis indicates workplace team sport interventions would benefit from a participatory approach to implementation (Nielsen et al., 2010; Sørensen & Holman, 2014) and the adoption of behaviour change theories with a focus on the social environment (Gucciardi & Jackson, 2015).
Chapter 1 and 2 suggests research to date has not examined the effectiveness of multi-team sport programmes on individual, social group or organisational health outcomes. There are no intervention studies using behaviour change theory that have examined the direct effect of multiple-workplace team sports on objectively measured VO₂ Max and self-reported physical behaviour and organisational group outcomes such as teamwork, communication and social cohesion. The aim of this study is therefore to implement a pilot workplace team sport intervention and assess its feasibility and acceptability, and to examine whether it improves health, wellbeing, PA behaviour and organisational group outcomes.

Theoretical underpinnings

Satisfying basic psychological needs through a programme of workplace team sport

The importance of supporting basic psychological needs within workplace team sport was identified in Chapter 3 and by Brinkley, McDermott and Munir (2017b). This study highlighted the importance of supporting a participant’s basic psychological needs, and the emphasis participants place upon their enjoyment of sport, competence in sport and the social networks and group membership associated with sport (Brinkley et al., 2017b).

Autonomous motivation and participation may be fostered by accounting for the situational psychosocial obstacles hindering participation (Silva et al., 2008). This intervention is therefore tailored from identified obstacles to engagement (e.g., perceived competence; lack of facilities; workplace commitments) and towards facilitators of participation (e.g., social support; adaption of sport; novel activities; return to work process). Supporting basic psychological needs through the design of the intervention is known to promote wellbeing, and therefore provide autonomous motivation and the improved likelihood of participation (Deci & Ryan, 2000a, 2000b).

Additionally, the adoption of activities (e.g., team sport sessions) may promote perceptions of, and support needs for competence (Adie, Duda & Ntoumanis, 2012). Likewise, team sports with transferable skills (e.g., throwing, catching, passing, spatial awareness) have been shown to improve
perception of competence (Standage, Duda & Ntoumanis, 2005). Theoretical debates indicate improved perceptions of competence are associated with increased self-efficacy (Deci & Ryan, 2000a). Given self-efficacy predisposes autonomous forms of motivation (see Deci & Ryan, 2000b), it is argued that participation would likely increase if needs for competence is effectively supported (Adie et al., 2008; Deci & Ryan, 2000a, 2000b). Furthermore, the provision of taster or pre-education sessions prior to interventions, have been argued to alleviate challenges surrounding perceptions of skill and ability, support positive perceptions of competence, provide self-efficacy and therefore promote more autonomous forms of motivation (Fortier et al., 2012).

Supporting needs for relatedness has been previously achieved through the social support provided during peer-led interventions (Standage et al., 2005; Teixeira et al., 2012). As Edmunds and Clow (2015) discuss in their qualitative study exploring the role of workplace champions, social support fosters perceptions of relatedness, and promotes feelings of group identity and membership. Evidence has suggested PA behaviour is closely associated with and fluctuated by the social environment (Deci & Ryan, 2000a, 2000b). Teixeira et al. (2012) suggest a supportive and positive environment between peers may support needs for relatedness, promote more autonomous forms of motivation and therefore improve participation.

**Study Aims, Objectives and Hypothesis**

**Aims**

To conduct and evaluate CTG, a 12-week workplace team sport pilot efficacy trial aimed at improving health, PA, wellbeing, work and organisational group outcomes among employees.

**Objectives**

The primary objective of the current study is to test the effectiveness of providing a workplace team sport programme over the short-term (i.e., 12-weeks) on objectively estimated VO₂ Max. This is the primary outcome measure. Secondary objectives are as follows:
• To investigate whether providing workplace team sports improves self-reported PA behaviour, job performance, job satisfaction, work engagement, occupational fatigue, physical and emotional health over the short-term (i.e., 12-weeks).

• To investigate whether providing workplace team sports improves teamwork, communication and cohesion over the short term (12-weeks).

• To identify the strategies and the support that underpins a successful and sustainable workplace team sport intervention through a process evaluation (See Chapter 5).

• To undertake interviews at 12-weeks with a sub-sample of participants in the intervention. To provide additional insight and feedback a mixed methods process evaluation will identify how and why changes in work-related processes (e.g. teamwork) and outcomes (e.g. improved work productivity) occur (See Chapter 5).

• To measure primary and secondary outcomes at baseline, and 12-weeks using an objective test for physiological fitness and a range of validated psychometric and self-report measures for the secondary outcomes.

Hypothesis

Primary hypothesis

(H1) Participation in team sport will improve estimated maximal oxygen uptake (VO₂ Max) over the short-term (i.e., 12-weeks).

Secondary hypothesis

(H2) Participation in team sport will improve PA participation outside the programme over intervention period.

(H3) Participation in team sport will improve markers of individual health such as subjective vitality, quality of life, ratings of physical and mental health, and reduce stress, sickness absence and presenteeism, body composition, and occupational fatigue over the short-term (12-weeks).

(H4) Participation in team sport will improve group cohesion, relationships with superiors and colleagues, communication, job satisfaction,
individual and team job performance, and work engagement will improve over the short term (i.e., 12-weeks) as a result of participation in workplace team sport.

Methods

Design

The intervention was a 12-week non-randomized study (quasi-experimental design), which comprised two regional worksites from the same large service organisation (located an estimated 130 kilometres apart). This study can be considered a pilot efficacy trial (Craig et al., 2008; Moore et al., 2015). Therefore, a 12-week intervention was adopted to investigate the acceptability, feasibility and efficacy prior to implementation over the medium (i.e., 6-month) or long (i.e., 12-month) term (Moore et al., 2015). One worksite was assigned to the CTG (intervention group), while the other continued with normal working conditions (control group). While RCT designs are considered the most robust design by the MRC (Craig et al., 2008), non-randomized intervention designs in health promotion are frequently adopted where feasibility and practicality issues challenge implementation (Des Jarlais et al., 2004; Schelvis et al., 2015). Furthermore, arguments within the literature suggest quasi-experimental designs are effective at evaluating the efficacy of interventions in the initial stages, and may be preferred due to feasibility and practicality of conducting a controlled design (Des Jarlais et al., 2004; Schelvis et al., 2015). In the current study, access to a local sport facility determined the intervention site. The participants were measured pre- (T₀) and post- (T¹) intervention at their respective workplaces. A schematic overview of the study’s design, recruitment and attrition rate is provided in Figure 4.1. Ethical approval was obtained from the researchers’ university. This intervention follows the guidelines outlined in TREND Statement (Des Jarlais et al., 2004). Loughborough University’s human participant’s sub-committee (see proposal number R16-P069) participating organisation granted ethical approval for this study to take place. The study conforms to, and was conducted in accordance to, the Declaration of Helsinki.
Pre-intervention tasks
Organisation recruited; consultation interviews on facilitators/obstacles to team sport; consultation group established; workplace champions recruited and trained in basic needs/autonomy support.

Enrolment
Participant recruitment and screening

Inclusion/exclusion criteria applied
Included: Over 18 years of age; fixed-term contract; employed for 3-days a week; situated on one worksite.
Excluded: Not meeting inclusion criteria; chronic condition worsened by physical activity; unable to provide informed consent.

Screening/clustering
Participants clustered based on worksite
Worksite 1 – Intervention group
Worksite 2 – Control group

(T₀) Baseline measures (at participant’s worksite)
Estimated VO₂ Max; PA behaviour; group cohesion psychological wellbeing; health; anthropometrics; workplace experiences.

Measures

Team sport (Worksite 1)
- ‘Taster’ session
- Six team sports, repeating twice over 12-weeks.
- Sessions last 60 minutes
- Led by workplace champions
- Process evaluation

Control group (Worksite 2)
- Normal working practices
- No team sport
- Advice after T₁ on team sport post-intervention period.
- Feedback provided if desired.
- Process evaluation

Dropouts at T₁ calculated

(T₁) Outcome measured (at participant’s worksite) and analysed (ITT)
VO₂ Max; PA behaviour; group cohesion; psychological wellbeing; health; anthropometrics; workplace experiences.

Figure 4.1: Schematic Overview of ‘Changing the Game’
Participants

Participants

Large (>1000 employees) organisations with multiple worksites (n=103) were contacted by email and telephone regarding participation in this study (34% responded). Organisations were sent an overview of the study. A Financial Times and London Stock Exchange (FTSE) 100 multi-site services organisation, located in the Midlands, UK participated in the current study. This organisation was recruited through emails, followed by a meeting and presentation detailing the study to the occupational health senior leadership team. This organisation's selection was based on its size (i.e., >1000 employees) and structure (i.e., multiple worksites, which operate remotely). The organisation lists its workforce as 7048 employees; of which 5080 currently operate in the UK. The organisation has employees in a variety of remote working engineering roles and fixed location desk-bound roles. The employees in a fixed location with desk-bound job roles were the participants in the current study. Previous research (e.g., Eriksen et al., 2015; Owen et al., 2010; del Pozo-Cruz et al., 2013) has indicated desk-bound employees (e.g., office workers) are at a substantial risk of sedentary behaviour and low occupational PA, and therefore the associated increased risk-ratio for non-communicable diseases and ill-health. Therefore, desk-bound employees were sampled over employees in a role with high level of occupational PA and low sedentary behaviour (e.g., engineering staff).

Consultation group and a participatory approach

A consultation group of employees, managers, workplace champions and employer representatives guided the implementation of the intervention through a participatory approach (Neilson et al., 2010). Following the guidelines of Neilson et al. (2010), the consultation group met regularly during the design and implementation phase of CTG. The role of the consultation group was to advise on challenges specific to the participating organisation, and discuss the implementation, delivery and evaluation of the programme within their organisation. The consultation group offered ‘real world’ information on the organisations, employees and workplace cultures readiness to change. With insight to the data collected in consultation
interviews and focus groups; the consultation group evaluated the potential acceptability, feasibility and sustainability of the intervention.

More specifically, during the preparation phase, the researcher established the ‘core’ of the consultation group. Stakeholders (i.e., senior leadership team members) were recruited (through phone and email) from HR, occupational health and wellbeing teams. The establishment of this group allowed for support to be secured from the board level of the organisation, a facilitator identified within Chapter 3 and previous research (see Audrey & Procter, 2015; Caperchinea et al., 2015; Pronk & Kottke, 2009). Moreover, this group contributed to the recruitment of the remainder of the consultation group. During the preparation phase, the consultation group provided the researcher contextual information on key issues such as study worksites (i.e., with limited contact), regional information (e.g., sports facilities), worksite specific challenges (e.g., working practises), previous workplace PA programmes and organisational policies and relevant information. During the screening and action planning phase with access the themes identified in the pre-intervention focus group, the consultation group advised the researcher on the specific enablers and challenges faced within the workplace (e.g., workplace culture, attitudes to health promotion, time for intervention sessions). During this phase, the consultation group advised on aspects of the study presented to the group by the researcher (e.g., outcome measures, sports, recruitment strategies, implementation of CTG, roles of workplace champions). Finally, throughout the duration of CTG (i.e., implementation phase) the consultation group provided feedback on the acceptability, feasibility and efficacy of the programme. For example, the consultation group provided contextual detail which informed the design of the post-CTG interview schedule (see Chapter 5).

Sample Size Calculation

Coherent with the guidelines outlined by the MRC (see Craig et al., 2008), this intervention was considered a pilot efficacy trial with the objectives of examining the acceptability of the protocol, compliance to data collection and the sample size required to detect a difference in the primary outcome measure. As a part of the participatory approach adopted (Nielsen et al.,
2010), the participating organisation was consulted regarding realistic participation rates. Despite the strength of this argument, a power calculation was conducted. While research is yet to examine the impact of participation of a multi-team sport programme upon physiological function, objectively estimated measures of physiological fitness have been used to assess workplace PA interventions, and small effect sizes have been reported (Conn et al., 2009). A priori power calculation based on the meta-analysis of Conn et al. (2009) was therefore conducted using G*Power (see Faul, Erdfelder & Buchner, 1991). This meta-analysis found mean effect sizes ranging from $d= .47$ to $.57$ for fitness tests using pre-post two-group study designs (Conn et al., 2009). Based on this evidence, a medium effect size was likely to be observed in the intervention (i.e., team sport programme) group on the primary outcome measure (i.e., estimated VO$_2$ Max). The power calculation determined for two group study using a within-between interaction analysis of variance (mixed-ANOVA), thirty-six participants (18 participants per worksite) were required to observe a medium effect in the primary outcome (i.e., estimated VO$_2$ Max), where $f=.25$, power is .95 and the error of probability is set at .05. Given the logical argument of dropouts occurring in a workplace setting, a 35% attrition rate was applied. Therefore, 48 participants (24 per worksite) were required to observe a medium effect in the primary outcome measure.

Participant recruitment

Following a participatory approach, meetings with a consultation group indicated that email, social media notifications and posters that outlined the purpose of the study would be the most appropriate methods of communication and participant recruitment. These methods were therefore adopted one-month (May – June 2016) prior to the study beginning. More specifically, emails (i.e., one per-week during recruitment period) were sent to all employees working at the intervention and control worksites. Additional social media notifications were placed on both ‘yammer’ and the participating organisations internal intranet message board for the duration of the recruitment period. Finally, posters were placed in social spaces such as cafés, kitchens, meeting spaces, wellbeing rooms and lifts. The advertisement
of the study was dictated by HR from the participating organisation. To ensure participants were motivated to participate, employees in both the intervention and control groups were recruited under the assumption they may be receiving team sport through their workplace. Following respective organisational policy, participant recruitment was coordinated by the researcher across two worksites of the participating organisation. Initial advertisement and recruitment was followed by presentations to interested groups of staff (i.e., covering benefits of participation, types of sport played, testing, lay rationale for the study). To prevent contamination, isolated worksites that rarely have formal day-to-day contact were selected. Neither the intervention or control worksite (i.e., group) was informed of the others participation in the study. Estimates from the participating organisation state 1000 employees work at the intervention site, whilst 500 employees work at the control site. Employees interested in participating were sent an information sheet, informed consent form, HSQ and waiver from their organisation (see Appendix 2). Participants were excluded if they did not meet the inclusion criteria. Informed consent was obtained from all individual participants included in the study.

**Inclusion and exclusion criteria**

**Inclusion criteria**

Participants were required to meet the following inclusion criteria to be included in the study:

- Be over 18 years of age
- Be contracted by the participating organisation
- Be on a permanent contract in a desk-bound role
- Be employed for at least three-days a week throughout the duration of the study
- At work during intervention period
- Be predominately situated on one worksite
**Exclusion criteria**

Participants were excluded from sampling if they met any one of the following criteria:

- Under 18 years of age
- Sub-contracted by another organisation (e.g., temporary/agency staff)
- Contracted to work less than three-days a week (e.g., retirement, flexi-working, maternity cover)
- Away during intervention period (i.e., planned leave or business)
- Contracted to work remotely or across multiple worksites or in a role with high occupational PA (e.g., engineering)
- Suffering from a condition worsened by participation in PA
- Unable to provide written informed consent

**Participant groups and demographics**

Two worksites were allocated to either the intervention (i.e., team sport programme) (n=1000 employees) or control (n=500 employees) group (i.e., normal working conditions). Data on the participants’ age; gender; tenure; job roles and organisational (i.e., structure; department size; culture) demographics was collected.

**Baseline demographics**

Twenty-eight participants (n=8 females) in the intervention group were aged between 24 to 56 years (39.59±9.11). Twenty participants (n = 12 females) in the control group age ranged between 24 to 64 years (40.75±11.92). The participants in both groups represented a range of qualifications, departments, positions of superiority (25% were superiors) and job roles. All participants worked within a team, while participants with and without dependents (54% in a position of dependency) took part in this study. The proportion of female participants (i.e., 29%) reflects the proportion of females working within the organisation (i.e., 30% reported in the 2016 Annual report).
Intervention components

Team sport intervention: ‘Changing the Game’

CTG offered employees the opportunity to participate in a programme of six different team sports. The intervention is based on the findings of a systematic review (See Brinkley et al., 2017a) and the evidence presented in Chapters 1-3. The feasibility of the intervention content was debated with the consultation group prior to participation.

Team sport sessions

The CTG programme consisted of weekly one hour sessions of team sport for 12 weeks. These sessions were participated during lunch breaks in an indoor sports hall (30 metres x 18 metres) which was located 400 metres walk from the participating organisation. The sessions were supervised by sports centre staff, but led by workplace champions from the participating organisation. Six team sports repeated twice were organised for participants. Participants played a game of rounders (weeks 1-7); netball (weeks 2-8); basketball (weeks 3-9); soccer (weeks 4-10); cricket (weeks 5-11); and handball (weeks 6-12). Prior to the start of the intervention, participants were invited to a familiarisation session, where they were provided a short ‘taster’ of each sport. The sessions consisted of a 10-minute warm-up and familiarisation period, and a 40-minute multi-period game (breaks given when requested by participants). Participants played at a self-selected intensity. During each intervention session, the estimated breaks time ranged between five and ten minutes. The number of participants differed on a week-by-week basis, however between 9 and 27 participants attended (see Chapter 5 for a detailed overview of adherence data). The sessions were funded by the researcher’s university.

Workplace champions

Evidence presented within Chapter 3 indicates peer leaders such as workplace champions may support basic psychological needs for autonomy, competence and relatedness and facilitate the adoption of autonomous motivation (Edmunds & Clows, 2015; Standage et al., 2005). Therefore, to support basic psychological needs and improve the likeliness of the
programme content being sustained post-intervention, workplace champions delivered intervention sessions to their peers. Two female full time junior employees kindly volunteered to be workplace champions. The workplace champions were 31 and 36 years of age, worked in a team, were not in a position of superiority and had worked at the participating organisation for 1 year and 6 years.

Champions were trained in fostering basic psychological needs through the providing autonomy support. In a similar approach to past research (e.g., Kinnafick et al., 2014), the champions took part in a one-hour workshop delivered by the researcher and received a training manual and resources to assist the delivery of each team sport (See Appendix 3 for training material and resources). This workshop and resources provided an overview of the differences between controlled and autonomous motivation; the health benefits associated with autonomous participation in workplace team sport; and how to satisfy basic psychological needs through the delivery of team sports. Following a participatory approach, the champions were encouraged to ask questions and suggest how the content could be effectively delivered to their peers through supporting needs for autonomy, competence and relatedness.

**Behaviour Change Strategies**

Supporting needs for autonomy, competence and relatedness were identified within Chapter 3. Supporting basic psychological needs are known to facilitate autonomous motivation, therefore this formed the theoretical basis of this intervention (See SDT and BNT; Deci & Ryan, 2000a, 2000b). An overview of the theoretical underpinnings of ‘CTG’ is provided in Table 4.1. To standardise the description of behaviour change strategies used in CTG, terminology consistent with the Capability, Opportunity and Motivation Behaviour System (COM-B) (i.e., The Behaviour Change Wheel) (Michie, van Stralen & West, 2011) is presented within Table 4.1 where appropriate.

Broadly, to support the basic psychological needs of participants; novel, adaptable and social sports were selected. The sports chosen use a series of transferable skills, which evidence from a physical education setting
has indicated is linked to improved perceptions of competence (Standage et al., 2005). For example, rounders and cricket require coordination to hit the ball, while spatial awareness is required in soccer and handball.

Autonomy was promoted when champions reinforced the benefits of participating in team sport, promote ownership of the session content, provided the choice to take part or opt out of any element of a session, and promoted enjoyment throughout sessions. Evidence has supported these determinants of an autonomy supportive leadership style, in facilitating autonomous forms of motivation (Conroy & Coatsworth, 2007; Rocchi, Pelletier & Couture, 2013).
### Table 4.1: Theoretical Underpinnings of 'Changing the Game'

<table>
<thead>
<tr>
<th>Theoretical underpinning</th>
<th>Addressed through (Behaviour Change Taxonomy Strategy)</th>
<th>Addressed by</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy, competence, relatedness. Participatory Approach</td>
<td>Pre-intervention consultation interviews and focus groups <em>(problem solving, information about others approval, restructuring physical and social environment, pros/cons)</em></td>
<td>Tailoring to needs, demands and concerns of participants (basic psychological needs satisfaction)</td>
<td>Understanding the obstacles (e.g., time, competence, returning to work) faced by participants allowed the intervention to be tailored towards facilitators to autonomy, competence and relatedness</td>
</tr>
<tr>
<td>Autonomous motivation and adherence</td>
<td>Consultation group <em>(problem solving, pros/cons, restructuring physical and social environment)</em></td>
<td>Leading the implementation of the intervention, through an autonomy supportive approach.</td>
<td>By accounting for the needs, demands and concerns in the workplace. The consultation group could implement and guide the intervention. The consultation group was constructed from employees from all hierarchical levels.</td>
</tr>
<tr>
<td>Competence</td>
<td>Intervention content <em>(focus on past success, goal setting, instruction on how to perform, habit formation)</em></td>
<td>Sports choice</td>
<td>The sports constructing the intervention content require transferable skills. It is plausible; the adoption of sports with transferable skills can reduce challenges faced with perceived competence.</td>
</tr>
</tbody>
</table>
Table 4.1 continued: Theoretical Underpinnings of ‘Changing the Game’

<table>
<thead>
<tr>
<th>Theoretical underpinning</th>
<th>Addressed through <em>(Behaviour Change Taxonomy Strategy)</em></th>
<th>Addressed by</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy, competence, relatedness</td>
<td>Workplace champion training <em>(social support, instruction and information about behaviour and consequence)</em></td>
<td>Education sessions covering; autonomous motivation, supporting basic psychological needs and leading intervention sessions</td>
<td>Training champions in autonomy support <em>(i.e., accounting for needs and demands of participants, providing a choice/option)</em> has been linked to supporting basic needs and autonomous motivation</td>
</tr>
<tr>
<td>Autonomous motivation and adherence</td>
<td>Workplace champion training <em>(social support, instruction and information about behaviour and consequence)</em></td>
<td>Education sessions covering; autonomous motivation, needs support and leading intervention sessions</td>
<td>Training champions in supporting basic psychological needs and sports delivery can promote adherence to workplace team sport post-intervention.</td>
</tr>
<tr>
<td>Competence</td>
<td>‘Come and try’ session <em>(pros/cons, problem solving, focus on past success, skills training)</em></td>
<td>Champion led autonomy supportive coaching</td>
<td>Prior to the intervention, employees participated in a ‘taster’ session. The purpose of this session was to positively facilitate perceived competence. Champions ‘coached’ participants through the key skills required for each sport.</td>
</tr>
</tbody>
</table>
### Table 4.1 continued: Theoretical Underpinnings of ‘Changing the Game’

<table>
<thead>
<tr>
<th>Theoretical underpinning</th>
<th>Addressed through (Behaviour Change Taxonomy Strategy)</th>
<th>Addressed by</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence</td>
<td>Team sport session <em>(problem solving, outcome goal setting, skills training, focus on past success, incentive)</em></td>
<td>Champion coaching and intervention content</td>
<td>Champions led adapted and novel sports to facilitate perceived competence. The sports were adapted through changes to rules. Novel sports were adopted.</td>
</tr>
<tr>
<td>Autonomy</td>
<td>Team sport session <em>(social support, problem solving, goal setting, feedback, instruction, self-incentive)</em></td>
<td>Champions coaching</td>
<td>Champions placed an emphasis on enjoyment rather than competition during sessions. Further, the needs, demands and requirements of participants were accounted for to support autonomy. Moreover, participants were encouraged to master the skills required for the sport.</td>
</tr>
<tr>
<td>Relatedness</td>
<td>Team sport session <em>(social support, social comparison, social reward)</em></td>
<td>Champions providing social support, peer encouragement, respect</td>
<td>Champions promoted relatedness in the intervention content. Vicarious participation by champions promotes social support and peer encouragement.</td>
</tr>
</tbody>
</table>
Competence was supported by adapting team sports. All team sports were adapted through changes to their respective rules and traditions. For example, the offside rule was removed in soccer, and overarm bowling was switched for a more acceptable underarm option in cricket. In a youth sport setting, Amorose and Anderson-Butcher (2007) suggest initially adapting sports supports needs for competence, promotes self-efficacy and more autonomous forms of motivation. Given the importance of autonomy and relatedness in the motivation process champions encouraged participants to adopt a level of ownership and alter sports to fit their needs and preferences (Harwood, Keegan, Smith & Raine, 2015).

Finally, relatedness was supported through workplace champions leading team sport sessions and the attendance of peers. Edmunds and Clow (2015) state the importance of peer led sessions in providing determinants of relatedness such as social support, group membership and identity, which may promote more extrinsic forms of autonomous motivation. Further, evidence has suggested the attendance of a participant’s peer group acts as means to meet needs for relatedness, by fostering social support and group identity, membership and cohesion (Kinnafick et al., 2014).

**Control condition**

Participants in the control group continued normal working practises. Following the completion of the study, the participants were offered feedback on the data they provided and guidance on how to set-up and participate team sport and PA at their worksite.

**Outcome measures**

**Primary outcome measure**

A Chester Step Test (CST) was conducted to record an estimate of VO$_2$ Max (ml/kg/min) (Sykes & Roberts, 2004). The CST was developed to provide a sub-maximal estimate of VO$_2$ Max, and is widely used by health authorities and within a workplace setting (Buckley, Sim, Eston, Hession & Fox, 2004; Sykes & Roberts, 2004). Under safe and practical sub-maximal conditions, a step test offers a feasible and ecologically valid means to examine maximal oxygen uptake (Buckley et al., 2004; Bennett, Parfitt,
Davison & Eston, 2015). The CST was selected over objective markers of cardiorespiratory fitness due to feasibility (Bennett et al., 2015). More specifically, whilst gas analysis provides a gold-standard marker of VO₂ Max, the testing protocol is invasive and often requires travel to a specialised laboratory (Bennet et al., 2015). Moreover, the qualitative study (see Chapter 3) outlined the challenges participants negotiate with perceived competence (e.g., fitness) and work-life balance, therefore to avoid dejecting participants a validated field test (i.e., the CST) was adopted (see Sykes & Roberts, 2004; Bennet et al., 2015).

The CST is one of many sub-maximal field tests (e.g., Astrand Cycle test, Canadian Step Protocol) which provides an estimate of VO₂ Max (Bennet et al., 2015). In an adult population, the CST has demonstrated a strong level of statistical and ecological validity and reliability (Bennett et al., 2015). More specifically, Sykes and Roberts (2004) demonstrated the CST to strongly correlate ($r = .92$) with the findings of Treadmill Gas Analysis. Further, a systematic review examining the validity of a variety of submaximal step tests to estimate maximal oxygen uptake in healthy adults indicates the CST offers the most valid, reliable and feasible test to predict VO₂ Max and is advocated in community settings such as the workplace (Bennett et al., 2015).

The CST was conducted in accordance with the validated protocol of Sykes and Roberts (2004). Participants stepped on/off a 30cm high step to a metronome set at 15-steps per-minute, for a period of 2 minutes (i.e., Level 1). After this stage, exercise heart rate was measured by a Polar™ T31 monitor and watch and rate of perceived exertion (RPE) was indicated with the 15-point Borg scale (see Borg, 1990). Participants continued to step for a further 2 minutes, at 20-steps per-minute (i.e., Level 2). On completion exercise heart rate and RPE were recorded. The step rate followed this linear progression (+5 step/per 2 minutes) (i.e., Levels 3-5) until the participant’s heart rate reached 80% of predicted max (220 – age), or the participant indicated a perceived exertion score of over 15 (80% effort), or showed signs of distress. The test ended after 10 minutes (i.e., Level 5). To provide an accurate prediction of VO₂ Max all participants completed levels 1-3. Mean and standard deviation heart rate at each level is displayed in Table 4.2.
### Table 4.2: Mean and Standard Deviation Heart Rate Recorded at Each Step Level

<table>
<thead>
<tr>
<th>Group</th>
<th>Team Sport</th>
<th>Control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Heart Rate Level 1 $T_0$</td>
<td>112.10</td>
<td>14.39</td>
<td>111.70</td>
</tr>
<tr>
<td>Heart Rate Level 2 $T_0$</td>
<td>114.92</td>
<td>34.50</td>
<td>120.10</td>
</tr>
<tr>
<td>Heart Rate Level 3 $T_0$</td>
<td>117.85</td>
<td>4.52</td>
<td>137.85</td>
</tr>
<tr>
<td>Heart Rate Level 4 $T_0$</td>
<td>131.71</td>
<td>5.02</td>
<td>147.12</td>
</tr>
<tr>
<td>Heart Rate Level 5 $T_0$</td>
<td>143.28</td>
<td>4.6</td>
<td>154</td>
</tr>
<tr>
<td>Heart Rate Level 1 $T_1$</td>
<td>104.67</td>
<td>21.46</td>
<td>115.15</td>
</tr>
<tr>
<td>Heart Rate Level 2 $T_1$</td>
<td>116.96</td>
<td>24.58</td>
<td>129.88</td>
</tr>
<tr>
<td>Heart Rate Level 3 $T_1$</td>
<td>112.44</td>
<td>6.77</td>
<td>138.28</td>
</tr>
<tr>
<td>Heart Rate Level 4 $T_1$</td>
<td>134.00</td>
<td>7.95</td>
<td>146.33</td>
</tr>
<tr>
<td>Heart Rate Level 5 $T_1$</td>
<td>146.14</td>
<td>5.55</td>
<td>154.00</td>
</tr>
<tr>
<td>Predicted 80% Max Heart Rate</td>
<td>143.75</td>
<td>7.78</td>
<td>143.35</td>
</tr>
</tbody>
</table>
Twenty-two participants completed level 4 and 12 participants completed level 5 at T¹. Twenty participants completed level 4 and 8 participants completed level 5 at T⁰. An estimation of VO₂ Max was then predicted by plotting stepping heart rate against a pre-prepared datasheet (see Sykes & Roberts, 2004). Rather than using an equation (used to predict VO₂ Max in other sub-maximal tests; see Bennet et al., 2015), the CST plots a line of best fit (with Microsoft Excel) through each maximal heart rate at each ‘stepping stage’. A regression line was plotted using a liner graph extrapolation technique (stage completed and stage max heart rate) between all data points. At the max stage achieved, a vertical line was plotted down to the x-axis, therefore projecting a participant’s maximum aerobic capacity.

**Secondary outcome measures**

Secondary outcome measures of self-reported PA behaviour; group interaction, communication and engagement; psychological wellbeing; health; and workplace experiences were used to examine the impact of workplace team sport upon individual, group and organisational health. These measures were included on a self-report questionnaire (See Appendix 4)

**Self-reported PA behaviour**

The International Physical Activity Questionnaire (Short-Form) (IPAQ) captured the duration and frequency of PA participants engaged in outside of the intervention (Craig et al., 2003). The IPAQ is constructed of seven self-reported items examining the extent and duration of time spent participating in vigorous and moderate PA; walking and sitting (Craig et al., 2003). Estimates of total and mean MET per-day and per-week were calculated across each mode and accumulative total (Craig et al., 2003). The IPAQ is well established and utilised in a workplace health promotion setting (Caperchione et al., 2015; Dishman et al., 2009). Previous research has demonstrated an acceptable Cronbach alpha (.60) (Mannocci et al., 2010).

Throughout the duration of the intervention, participants were provided a 12-week diary to record the day-to-day variation, frequency and duration in their PA behaviour (e.g., exercise, team sport) (see Appendix 5). Participants were asked to recall the type, duration and intensity of their PA for a 7-day
period, throughout the 12-week intervention. During analysis, time spent participating in CTG was removed from analysis to observe changes in PA participation outside the intervention.

The type of PA a participant engaged in outside the intervention at T⁰ and T¹ was understood with a single open-ended question (“Please describe any PA you do outside of work at least once a week”). Recently, data collected through PA diaries has correlated with the output with objective measures (i.e., ActiveGraph and SenseCam) of PA on indicators of intensity ($r=67$) and duration ($r=82$) (Connor, McCaffrey, Whyte & Moran, 2016).

**Group interaction, communication and engagement**

**Group cohesion**

The extent participants experienced between cohesion in the workplace was measured using the ‘social community’ sub-scale of the Copenhagen Psychosocial Questionnaire-II (CPS2) (Kristensen, 2001). This sub-scale of the CPS2 uses three 6-point Likert scale items (“always” to “hardly ever”) to capture the presence and extent of cohesion, cooperation and community in workplace teams (example item: “Do you feel part of a community at your place of work?”). During analysis, a mean score was calculated and converted to a 0-100 score. Higher scores denote greater perceptions of cohesion, cooperation and community within workplace teams. A strong Cronbach alpha score (.89) was demonstrated by research examining the psychometric properties of this sub-scale in Spanish workplaces (Moncada et al., 2014).

**Relationships with colleagues and superiors**

The ‘social support from colleagues’ (example item: “How often do you get help and support from your colleagues?”) and ‘social support from superiors’ (example item: “How often do you get help from your nearest superior?”) sub-scales from the CPS2 captured the strength of relationships with colleagues and superiors (Kristensen, 2001). Each sub-scale is constructed from three 5-point Likert scale items (“always” to “never/hardly ever”). A mean score for relationships with colleagues and superior was
converted to 0-100 scores. Higher scores denote strong relationships with colleagues or superiors respectively. Research has found Cronbach alpha scores for colleagues (.70) and for superiors (.73) (Thorsen & Bjorner, 2010).

Communication

Communication in the workplace was captured using five recently designed items from González-Romá and Hernández (2014). These five items (example item: “To what extent is the communication among the members of your team clear?”) were assessed using 5-point Likert scales (“not at all” to “very much”). During analysis, a mean score was calculated and converted to a 0-100 score. Higher scores denote greater perceptions of communication within workplace teams. When examining the impact an organisational climate had on communication, team performance and conflict in the workplace, this scale demonstrates a strong Cronbach alpha score (.95) (González-Romá & Hernández, 2014).

Psychological wellbeing

Subjective wellbeing was measured with the Subjective Vitality Scale (SVS) (State Version) (Frederick & Ryan, 1993). The SVS is constructed from seven 7-point Likert scale items (“not at all” to “very true”). An example item includes, “At this moment I feel alive and vital”. A mean score was calculated and converted to a 0-100 score. Higher scores denote greater perceptions of subjective wellbeing. The SVS is extensively used in research (e.g., Thøgersen-Ntoumani et al., 2014). Further, a strong Cronbach alpha score (.89) was found when validating the SVS (Bostic, McGartland, Rubio & Hood, 2000).

Quality of life

The Satisfaction with Life Scale (SLS) understood a participant’s quality of life (Diener, Emmons, Larsen & Griffin, 1985). Global cognitions and judgements regarding quality of life are assessed with five 7-point Likert scale items (“strongly agree to strongly disagree”). An example item includes, “I am satisfied with my life”. During analysis, a mean score was calculated and converted to a 0-100 score. Higher scores reflect higher perceptions of quality
of life. The SLS has demonstrated an acceptable level of internal consistency (.87) (Arrindell, Meeuwesen & Huyse, 1991).

**Stress**

The Perceived Stress Scale (short form) (PSS) examined experiences of stress (Cohen, Kamarck & Mermelstein, 1983). This measure is constructed from four 5-point Likert scale items (“never” to “very often”). An example item includes, “How often have you felt things were going your way”. Items 1 and 4 are reversed scored, and following the recommendations of Cohen et al. (1983), the precursor to these items (i.e., “in the last the month”) was altered to “in the past week”. This was to observe changes in perceived over the short-term. Cohen et al., (1983) argues this will have no noticeable changes to the psychometric properties of the measure. During analysis, a total score is calculated and converted to a 0-100 score. Lower scores reflect higher perceptions of stress. The PSS has demonstrated a strong internal consistency score (.85) during validation (Cohen et al., 1983).

**Health**

**Sickness absenteeism and presenteeism**

Days spent absent or attending work feeling unwell (i.e., presenteeism) were assessed with two self-report questions designed for this study. Participants recalled the number of days they had taken sick or attended work feeling unwell over preceding three-month period. Recently self-reported measures and annually recorded sickness absence have been moderately correlated ($r=.48$) (Jenkins, 2014).

**Occupational fatigue**

The extent occupational fatigue was experienced post-work was measured using with the Need for Recovery Scale (NRS) (Veldhoven & Broersen, 2003). The NRS is constructed from eleven dichotomous response (Yes/No) questions (example item: “By the end of the working day, I feel really worn out”). Unfavourable responses are scored with a value of 1, while favourable responses are scored with a value of 0. A total of score of the 11
items is recoded and converted as a 0-100 score. A lower score denotes greater occupational fatigue and therefore a need for recovery (Veldhoven & Broersen, 2003). When investigating the occupational fatigue and recovery with white water raft guides, Wilson, McDermott and Munir (2016) report Cronbach Alpha scores of .73 to .82 across the duration of the commercial season.

**Perceptions of health**

Self-perceptions of physical and mental health were examined with two items developed by Hendriksen et al. (2010). These two 5-point Likert scale items (“excellent” to “poor”) ask a participant to rate their perceptions of physical and mental health (e.g., “How would you evaluate your……health”) over the preceding two-week period. Bowling (2005) suggests single items of physical and mental health can be adopted for practical reasons, where other measures of health can triangulate phenomena. The current study adopted single-items to avoid adding to a lengthy questionnaire, therefore limiting the time-based burden placed on the participant (Bowling, 2005). During analysis, mean scores for both items was calculated and converted to 0-100 scores. Higher scores reflect greater perceptions of physical and mental health.

**Anthropometrics**

Objectively measured height and weight was recorded to determine BMI (kg/m²). BMI was calculated using height at T₀ and weight at T₀ and T¹ respectively. Height was measured at T₀ to the nearest Millimetre by a Leicester Height measure™ following the stretch stature protocol (see Marfell-Jones, Olds, Stewart & Carter, 2006). Weight in kilograms was measured at T₀ and T¹ by a Marsden™ M550 GP digital scale. Following the protocol outlined within Madden and Smith (2014), participants were asked to remove heavy clothing, socks and shoes, and empty their pockets prior to all measurements.
Workplace experiences

Job satisfaction

The Single-Item of Job Satisfaction examined the extent the participant was satisfied with their job (Warr, Cook & Wall, 1979). This item (i.e., “Taking everything into consideration, how do you feel about your job as a whole?”) captures global job satisfaction through a 7-point Likert scale (“extremely dissatisfied” to “extremely satisfied”). The output of this item was converted a 0-100 score. A higher score indicates job satisfaction. When examining the reliability and validity of job satisfaction scales, Dolbier et al. (2004) found an adequate level of internal reliability for the single item of job satisfaction (.73).

Job performance

Self-rated job performance was assessed using four 5-point four Likert scale items (“almost never” to “almost always”) developed by previous research (Williams & Anderson, 1991). An example item included is, “I go out of my way to help other colleagues”. Unfavourable responses are indicated with a lower score (e.g., 1), while favourable responses are denoted with a higher score (e.g., 5). A mean score was calculated and converted to a 0-100 score. Higher scores denote greater perceptions of job performance. Recently, Munir et al. (2015) demonstrated an acceptable alpha co-efficient (.77), while examining the impact of work engagement and occupational sitting time.
Team performance

Self-rated workplace team performance was examined using three 5-point Likert scale items ("strongly disagree" to "strongly agree") from the ‘team effectiveness’ sub-scale of the Aston Team Performance Inventory (West, Markiewicz & Dawson, 2006). An example item included is, “My team is often told by others that it is performing well” (West et al., 2006). During analysis, a mean score was calculated and converted to a 0-100 score. Higher scores reflect greater perceptions of team effectiveness and performance. Previous organisational research has found acceptable Cronbach alpha scores (.66 and .73) (Callea, Urbini, Benevene & West, 2014).

Work engagement (vigour, dedication, absorption)

The Utrecht Work Engagement Scale (short form) (UWES) captured a participant’s perceptions of their engagement in the workplace (Schaufeli, Bakker & Salanova, 2006). Nine (i.e., three items per factor) 7-point Likert scale items (‘1’ never to always ‘7’) assess vigour (example item: “At work I feel bursting with energy”), dedication (example item: “My job inspires me”) and absorption (example item: “I am immersed in my role”). During analysis mean scores were calculated and converted to 0-100 scores across each factor and as a total score. A study examining the psychometric properties of the UWES found Cronbach Alpha scores ranging from .75 to .90 (Seppälä et al., 2009), while Munir et al. (2015) indicated the UWES has a strong level of internal reliability (.90).

Demographics

Fourteen self-designed items examining age; gender; education; marital and dependency status; ethnicity; tenure; contacted hours; job role; department; teamwork; and leadership responsibilities explored the demographic of the sample.

Ethics

University ethical approval

This study complies with the guidelines, and is approved by the, Loughborough University Ethical Advisory Panel in relation to research with
human participants (see R16-P069 for confirmation of approval). All participants were required to provide informed consent and complete a health screen questionnaire (See Appendix 2). All data in the current study and publications regarding this study are presented in an anonymised form.

**Insuring the safety and confidentiality of participants**

*Safety of participants*

Participation in team sport and CST may be associated with a minor risk of injury (Fernández-Morales, Otero & Castillo, 2002; Joseph and Finch, 2014; Sammito, 2011). Examples of such injury include, but are not limited to, collision with other participants and musculoskeletal strain from overuse (Joseph and Finch, 2014). Following the guidance of Sammito (2011), throughout the design of this intervention, attempts were made to manage such risks for participants. More specifically, the sports selected were considered non-contact, and participants were reminded of associated risks of participation in team sport prior to the start of the study, during baseline measures and at the beginning of each intervention session. Moreover, at the beginning of each intervention session and the CST, participants were encouraged to warm up. Additionally, during team sport participants were reminded they are playing with their peers, for the purposes of enjoyment and not competition.

*Confidentiality of participants*

To protect the confidentiality and anonymity of participants, during data collection all names were replaced with a participant assigned code. Further, participants were given the right to remove themselves from the study until the point the data is published. The current study’s information sheet and informed consent detailed the nature of anonymity and confidentiality; what was involved when taking part in this research; and how data was to be reported. Participants had the opportunity to ask any questions prior to the study. There were no incentives in participating in this research.
Chapter 4: Study 3 - A Workplace Team Sport Pilot Efficacy Intervention

Reporting findings

The findings of this study are disseminated in peer-reviewed publications (Brinkley et al., 2017c; Brinkley et al., 2017d), presented to the wider community and reported to the participating organisation. In all cases, all information regarding individual participants is presented sensitively. More specifically, data is presented in an unidentifiable format, and not in an individual manner. Reports for individual participants were prepared, when requested. Such reports reflected individual data and not a comparison with either the intervention or control group.

Procedure

Following pre-intervention tasks and consultations with the consultation group, participants were recruited and screened. One worksite was assigned the intervention condition (i.e., ‘CTG’ programme), while the other the control condition (i.e., continue with normal working practices), however participants were not informed of their respective condition until T0 measures had been conducted. Consistent with best practise recommendations (i.e., Des Jarlais et al., 2004; Schelvis et al., 2015) the worksite with greater accessibility and proximity was assigned the intervention condition. Participants were invited to take part in a one-hour testing session at their workplace where T0 measures were administered. This was conducted one-week prior to the start of the intervention taking place. In all cases, participants completed the anthropometrics measures to prevent any changes through perspiration and associated sweat loss. The CST followed this, and following a short break to ‘refresh’, all participants completed the questionnaire measure. Once complete, the purpose of the self-report diary was explained and intervention content provided (i.e., map/directions to sports hall, schedule of sports – intervention group only), participants were given a contact of the researcher to ask any questions they may have had post T0 measurements. Following T0 measurements, workplace champions led a short taster session followed by the twelve team sport sessions (one-per week; 12-weeks) to the intervention group. The control group continued with normal working conditions. Following the 12-week intervention period T1 measurements were collected from both groups at their respective worksites. These measurements follow the same
protocols outlined in $T^0$. Throughout the intervention, process evaluation data was collected from participants using a mixed-method approach (see Chapter 5 for a detailed overview).

**Process evaluation**

In accordance to the guidelines outlined by the MRC (See Craig et al., 2008), a process evaluation was conducted. Given the complex design of this intervention, it remained important to understand the acceptability and feasibility of the intervention in an organisational setting (Nielsen & Randall, 2013). Therefore, a RE-AIM guided evaluation was conducted to understand the reach, effectiveness, adoption, implementation and maintenance of the intervention (Dzewaltowski, Glasgow, Klesges, Estabrooks & Brock, 2004). Further details of this evaluation are provided in Chapter 5.

**Data management and analysis**

**Data management**

Data collected from participants in the form of output from the CST, self-reported diary data, questionnaire data and anthropometrics from both time points was inputted into Microsoft Excel and then converted into IBM SPSS (version 23). All analysis was conducted using SPSS and $P<.05$ was considered statistical significant. The magnitude of change is represented by a 95% confidence interval. All questionnaire data was converted to 0-100 score, whereby a higher score represents a positive outcome (e.g., higher work-engagement). The data was screened for data entry error against the raw data collected from participants. Consequently, the data was screened for missing data, and outliers in the form of data entry error, measurement error or values which proved to be genuine. All data was treated under the 'Intention-to-Treat' (ITT) principle, whereby all participants are included in analysis regardless of intervention participation, adherence or dropout at $T^1$ (Elkins & Moseley, 2015). Missing data was treated with the last observation carried forward method (i.e., missing data at $T^1$ replicated with data from $T^0$).

**Statistical analysis**

Data is represented by mean±standard deviation. Data was tested for normality using a Shapiro-Wilk test, homogeneity of variance using Levene’s
test and for homogeneity of covariance using Box’s test. Outliers were winsorized to the nearest non-outlying value. Subsequently, descriptive statistics (M±SD) were conducted on demographic (e.g., age, gender, average working hours, tenure) and outcome data (e.g., VO2 Max, Total MET value per week, stress, work-engagement). The data representing estimated VO2 Max (relative and absolute), quality of life, stress, subjective vitality, BMI, sitting time, group cohesion, relationships with superiors, job performance, team performance and work-engagement (total score, dedication and absorption) was normally distributed and had homogeneity of variance and covariance. Typically, data was normally distributed, however where this is not the case, this is indicated in tables with a ▼. However, it should be noted that ANOVAs are considered robust enough to analysis non-normally distributed data (Schmider, Ziegler, Danay, Beyer & Bühner, 2010). Given the lack of a non-parametric alternative to mixed method ANOVAs, a main analysis using these tests was conducted on all outcome variables.

A series of independent sample t-tests were used to identify any differences between the demographics and T0 measures of participants in the intervention and control group. The primary outcome (i.e., estimated VO2) was examined using a mixed design (within-between) ANOVAs under the ITT principle. Additional mixed design (within-between) ANOVAs under the ITT principle were conducted to investigate the impact of the intervention on all secondary outcome measures. Significant findings were followed up with paired sample t-tests. For clarity, data was also examined with a series of mixed design ANCOVAs controlling for gender, age, BMI and average working hours. These returned no contrasting findings. Additionally, PA behaviour over the duration of the intervention was examined using a mixed design ANOVA. A series of one-way ANOVAs investigated differences in week-by-week PA behaviour. Tables 4.4-4.6 demonstrates the output from all mixed ANOVAs conducted in the current study. Where a non-significant interaction was identified, a post-hoc power analysis was conducted using G*Power to determine if sufficient power was achieved (Faul et al., 1991).
Results

Recruitment Rate
Recruitment took place on the intervention and control worksites for one month between May and June 2016. Participants were recruited through email, social media notifications and posters through both worksites. In total 248 participants on the intervention site and 200 participants on the control site expressed an interest in the study. The exact reach of the poster and social media notifications is unknown. In the intervention group, 103 participants were considered eligible to participate, while in the control group, 20 participants were considered eligible to participate. Due to health and safety concerns regarding the number of participants in the sports hall, 28 participants on the intervention site were selected on a first-come, first-severed basis.

Attrition rate
No participants dropped out before the intervention or control condition began. Please refer to Chapter 5, for a detailed discussion on intervention session attendance. One participant, dropped out of the intervention condition, citing workplace demands. At T1 eight participants dropped out. Reason for attrition included workplace demands and not returning several attempts of contact. No participants dropped out of the control group at T1. Under the ITT principle, all participants (n=48) were included in analysis. Missing data was treated with the last-observation-carried-forward method. No significant differences in age, gender, tenure, average team size, number of teams, superiority, VO2 Max, BMI, subjective vitality, stress, quality of life, absenteeism and presenteeism, health ratings, MET minutes of PA, sitting time, job and team performance, work-engagement, cohesion and communication were observed between those who completed the study and those who withdrew. Figure 4.2 provides an overview of study attrition and recruitment.

Participant demographics
Forty-eight employees (n = 20 female) participated in the current study. The 28 participants (n = 8 females) in the intervention group ages ranged
from 24 to 56 years (39.59±9.11). While the 20 participants (n = 12 females) in the control group ages ranged from 24 to 64 years (40.75±11.92).
Figure 4.2: Changing the Game - Recruitment and Attrition Data
The participants in both groups had a range of qualifications ranging from GCSE to undergraduate degrees. Most participants in the intervention (86%) and control (80%) groups had a partner or were married. The participants in both groups differed on the level of dependency held, with 61% of the intervention group having dependents, while only 45% of the control had a dependent.

The majority of participants were white British (90%); however, a range of ethnicities were also represented. More specifically, 4% of participants were Asian, 4% were Pakistani, 1% was British Indian and 1% was white German. The average tenure of the intervention group was 9.9 years and 11.61 years in the control group. All participants worked within a team, while 25% of the samples were in positions of superiority. The intervention group worked in a variety of office based roles within health, safety and wellbeing (11%), IT support (43%), credit and finance (11%), HR (7%), performance (11%) and commercial and quality (10%). Likewise, the control group worked within office based roles within insolvency (5%), customer care and billing (20%), credit and finance (30%), back office (5%), litigation, enforcements and transformation (20%) and commercial and quality (20%). The typical number of workplace teams was 1.7, while the average size of teams was 9.29 and 11.45 in the intervention and control group respectively. Additional demographics are provided in Table 4.3.

A series of independent samples t-tests confirmed that the groups did not significantly differ in age, height, tenure, average team size, number of workplace teams or superiority. However, the groups did significantly differ on gender (P<.03) and average hours worked (P<.034). More specifically, 29% of the intervention group were female, while 60% of the control group were female. Further, the control group worked 4.09 hours less per-week than the intervention group. Participants were not matched at T0.
## Table 4.3: Participant demographic and T0 data.

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Team Sport</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>39.59</td>
<td>9.11</td>
</tr>
<tr>
<td>Gender</td>
<td>M= 20, F = 8</td>
<td>M =8, F =12</td>
</tr>
<tr>
<td>Body Mass Index (BMI) (Kg/M²)</td>
<td>27.71</td>
<td>4.49</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>172.35</td>
<td>86.45</td>
</tr>
<tr>
<td>Tenure (Months)</td>
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<td>123.01</td>
</tr>
<tr>
<td>Average Working Hours</td>
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<td>7.15</td>
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<tr>
<td>Average Number of Teams</td>
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<tr>
<td>Average Team Size</td>
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<td>6.68</td>
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<tr>
<td>Number of Superiors</td>
<td>18</td>
<td>10</td>
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</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001. M=Male, F=Female. Kg=Kilogram. Cm=Centimetre.
Table 4.4: Individual health outcomes for the team sport (intervention) and control groups assessed using a mixed ANOVA at baseline (T0) and at the end of the intervention (T1).

<table>
<thead>
<tr>
<th></th>
<th>T0</th>
<th>T1</th>
<th>T0-T1</th>
<th>95% CI</th>
<th>F Statistic</th>
<th>Group x Time</th>
<th>Time</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VO₂ Max (ml/kg/min)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>39.68</td>
<td>42.04</td>
<td>1.925</td>
<td>0.307-3.543</td>
<td>10.258**</td>
<td>5.733*</td>
<td>4.983*</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>37.40</td>
<td>36.75</td>
<td>-0.65</td>
<td>-2.299-4.169</td>
<td>6.426*</td>
<td>8.292**</td>
<td>8.846**</td>
<td></td>
</tr>
<tr>
<td><strong>Absolute VO₂ Max (L/min)</strong></td>
<td>3.13</td>
<td>3.37</td>
<td>0.24</td>
<td>0.062-.348</td>
<td>6.246*</td>
<td>8.292**</td>
<td>8.846**</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>3.37</td>
<td>3.75</td>
<td>0.38</td>
<td>0.186-5.86</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Control</td>
<td>2.79</td>
<td>2.81</td>
<td>-0.02</td>
<td>1.83-2.31</td>
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<tr>
<td><strong>Total MET minutes per week</strong></td>
<td>2878.38</td>
<td>2830.58</td>
<td>-21.819</td>
<td>-512.33-555.97</td>
<td>.472</td>
<td>.007</td>
<td>1.110</td>
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<tr>
<td>Team Sport</td>
<td>2474.08</td>
<td>2678.18</td>
<td>228.26</td>
<td>582.53-990.72</td>
<td>.437</td>
<td>.169</td>
<td>.919</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>3444.40</td>
<td>3283.94</td>
<td>-160.46</td>
<td>-839.93-519.01</td>
<td>.136</td>
<td>.493</td>
<td>.492</td>
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<tr>
<td><strong>Subjective Vitality</strong></td>
<td>71.18</td>
<td>72.91</td>
<td>11.59</td>
<td>1.877</td>
<td>-824-4.577</td>
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<td>Team Sport</td>
<td>71.41</td>
<td>72.40</td>
<td>13.39</td>
<td>.990</td>
<td>-1.823-3.803</td>
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<tr>
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<td>8.74</td>
<td>2.764</td>
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<tr>
<td><strong>Quality of Life</strong></td>
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<td>70.41</td>
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<td>-939</td>
<td>-3.674-1.797</td>
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<td>Team Sport</td>
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<td>69.69</td>
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<td>-2.755-5.0</td>
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<td>Control</td>
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<td>71.24</td>
<td>17.63</td>
<td>3.0</td>
<td>-6.819-8.19</td>
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<tr>
<td><strong>Stress</strong></td>
<td>67.97</td>
<td>69.66</td>
<td>18.81</td>
<td>1.384</td>
<td>-3.269-6.037</td>
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<td>64.95</td>
<td>68.97</td>
<td>19.72</td>
<td>1.250</td>
<td>-8.818-6318</td>
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<tr>
<td>Control</td>
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<td>70.62</td>
<td>17.92</td>
<td>4.018</td>
<td>-1.999-10.035</td>
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<td><strong>Occupational Fatigue</strong></td>
<td>70.84</td>
<td>74.06</td>
<td>25.36</td>
<td>3.279</td>
<td>-7.798-1.240</td>
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<td>69.49</td>
<td>27.90</td>
<td>2.922</td>
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<td>Control</td>
<td>76.82</td>
<td>80.45</td>
<td>20.27</td>
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<td>-10.454-3.182</td>
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</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001. ml/kg/min = Millilitres/kilogram/minute. MET=metabolic equivalent of task.
Table 4.4 continued. Individual health outcomes for the team sport (intervention) and control groups assessed using a mixed ANOVA at baseline (T⁰) and at the end of the intervention (T¹).

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>T⁰-T¹</th>
<th>95% CI</th>
<th>Group x Time</th>
<th>Time</th>
<th>Group</th>
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<tbody>
<tr>
<td>Weight (Kg)</td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Team Sport</td>
<td>79.68</td>
<td>15.64</td>
<td>80.88</td>
<td>14.69</td>
<td>1.20</td>
<td>-2.215--.532</td>
<td>6.330*</td>
<td>10.790**</td>
<td>1.957</td>
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<tr>
<td>Control</td>
<td>75.50</td>
<td>15.53</td>
<td>77.93</td>
<td>13.50</td>
<td>2.43</td>
<td>.577-4.273</td>
<td></td>
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</tr>
<tr>
<td>BMI (Kg/M²)</td>
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</tr>
<tr>
<td>Team Sport</td>
<td>27.12</td>
<td>4.75</td>
<td>27.58</td>
<td>4.42</td>
<td>.533</td>
<td>.237-.830</td>
<td>6.788*</td>
<td>13.091***</td>
<td>.608</td>
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<tr>
<td>Control</td>
<td>26.28</td>
<td>5.09</td>
<td>27.20</td>
<td>4.52</td>
<td>2.425</td>
<td>.577-4.273</td>
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<tr>
<td>Total MET minutes Vig PA per week</td>
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<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Team Sport</td>
<td>1260.35</td>
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<td>1569.16</td>
<td>1972.84</td>
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<td>17.433-603.732</td>
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<td>4.548*</td>
<td>.074</td>
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<tr>
<td>Control</td>
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<td>1808.79</td>
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<td>127.846-770.246</td>
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<td>Total MET minutes Mod PA per week</td>
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<tr>
<td>Team Sport</td>
<td>591.25</td>
<td>983.08</td>
<td>468.75</td>
<td>806.26</td>
<td>-122.14</td>
<td>-441.96-197.68</td>
<td>.000</td>
<td>.591</td>
<td>1.992</td>
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<tr>
<td>Control</td>
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<td>642.00</td>
<td>1103.06</td>
<td>-120.00</td>
<td>-808.622-568.622</td>
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</tbody>
</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001. Kg=kilogram. MET=metabolic equivalent of task.
Table 4.4 continued. Individual health outcomes for the team sport (intervention) and control groups assessed using a mixed ANOVA at baseline (T⁰) and at the end of the intervention (T¹).

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>T⁰-T¹</th>
<th>95% CI</th>
<th>Group x Time</th>
<th>Time</th>
<th>Group</th>
</tr>
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<tbody>
<tr>
<td>Total MET minutes</td>
<td></td>
<td></td>
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<tr>
<td>walking per week</td>
<td>890.59</td>
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<td>832.83</td>
<td>807.47</td>
<td>-54.47</td>
<td>-334.861-225.908</td>
<td>.020</td>
<td>.153</td>
<td>1.240</td>
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<tr>
<td>Team Sport</td>
<td>801.91</td>
<td>818.59</td>
<td>727.76</td>
<td>823.65</td>
<td>-74.143</td>
<td>-402.979-254.694</td>
<td>.020</td>
<td>.153</td>
<td>1.240</td>
</tr>
<tr>
<td>Control</td>
<td>1014.75</td>
<td>1016.27</td>
<td>979.94</td>
<td>780.88</td>
<td>-34.810</td>
<td>-541.088-471.468</td>
<td>.020</td>
<td>.153</td>
<td>1.240</td>
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<tr>
<td>Total Sitting minutes per day</td>
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<td>1.245</td>
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<td>-55.020-44.306</td>
<td>.020</td>
<td>.153</td>
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<td>1.816</td>
<td>.228</td>
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<td>58.03</td>
<td>22.62</td>
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<td>-4.940-10.298</td>
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<td>1.816</td>
<td>.228</td>
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<tr>
<td>Control</td>
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<td>62.50</td>
<td>27.50</td>
<td>5.0</td>
<td>-3.983-13.983</td>
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<td>1.816</td>
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<tr>
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<td>57.14</td>
<td>31.81</td>
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<td>-20.559-6.273</td>
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<td>.563</td>
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<td>61.25</td>
<td>28.64</td>
<td>-8.750</td>
<td>-24.528-7.028</td>
<td>.026</td>
<td>2.514</td>
<td>.563</td>
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</tbody>
</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001. MET=metabolic equivalent of task
Table 4.5: Social group outcomes for the team sport (intervention) and control groups assessed using a mixed ANOVA at baseline (T0) and at the end of the intervention (T1).

<table>
<thead>
<tr>
<th></th>
<th>T0 M</th>
<th>SD</th>
<th>T1 M</th>
<th>SD</th>
<th>T0-T1</th>
<th>95% CI</th>
<th>F Statistic</th>
<th>Group x Time</th>
<th>Time</th>
<th>Group</th>
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<tr>
<td>Group Cohesion</td>
<td>60.61</td>
<td>13.51</td>
<td>62.81</td>
<td>12.43</td>
<td>2.170</td>
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<td>.014</td>
<td>2.018</td>
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<td>13.48</td>
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<td>11.81</td>
<td>2.350</td>
<td>-2.225-6.925</td>
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<tr>
<td>Control</td>
<td>59.40</td>
<td>13.81</td>
<td>61.39</td>
<td>13.42</td>
<td>1.990</td>
<td>-1.808-5.788</td>
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<tr>
<td>Relationship Superiors</td>
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<td>12.40</td>
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<td>1.220</td>
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<td>.091</td>
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<tr>
<td>Team Sport</td>
<td>51.25</td>
<td>10.09</td>
<td>49.32</td>
<td>10.92</td>
<td>-5.690</td>
<td>-13.074-1.694</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>52.08</td>
<td>15.51</td>
<td>46.39</td>
<td>17.50</td>
<td>-1.929</td>
<td>-4.545-1.631</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Communication</td>
<td>76.50</td>
<td>11.33</td>
<td>77.16</td>
<td>11.66</td>
<td>.200</td>
<td>-2.491-2.891</td>
<td>4.386*</td>
<td>.022</td>
<td>.495</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>74.42*</td>
<td>10.74</td>
<td>77.42*</td>
<td>12.03</td>
<td>3.000</td>
<td>-.446-6.446</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>79.40</td>
<td>11.71</td>
<td>76.80*</td>
<td>11.43</td>
<td>-2.600</td>
<td>-7.033-1.833</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001.
## Table 4.6: Organisational health outcomes for the team sport (intervention) and control groups assessed using a mixed ANOVA at baseline (T0) and at the end of the intervention (T1).

<table>
<thead>
<tr>
<th></th>
<th>T0</th>
<th>SD</th>
<th>T1</th>
<th>SD</th>
<th>T0-T1</th>
<th>95% CI</th>
<th>F Statistic</th>
<th>Group x Time</th>
<th>Time</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job Satisfaction</strong></td>
<td>75.59</td>
<td>9.75</td>
<td>77.08</td>
<td>8.19</td>
<td>1.174</td>
<td>-1.579-3.926</td>
<td>1.906</td>
<td>.737</td>
<td>.556</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>75.51</td>
<td>9.41</td>
<td>78.57</td>
<td>9.11</td>
<td>3.061</td>
<td>-.740-6.863</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>75.71</td>
<td>10.46</td>
<td>75.00</td>
<td>6.34</td>
<td>-.714</td>
<td>-4.758-3.330</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Job Performance</strong></td>
<td>83.22</td>
<td>9.91</td>
<td>83.33</td>
<td>9.96</td>
<td>.089</td>
<td>-2.730-2.909</td>
<td>.687</td>
<td>.004</td>
<td>.597</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>83.57</td>
<td>10.44</td>
<td>84.64</td>
<td>9.51</td>
<td>1.071</td>
<td>-5.400-2.900</td>
<td>.181</td>
<td>.166</td>
<td>.267</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>82.75</td>
<td>9.38</td>
<td>81.50</td>
<td>10.52</td>
<td>1.250</td>
<td>-7.386-8.386</td>
<td>.650</td>
<td>.068</td>
<td>.172</td>
<td></td>
</tr>
<tr>
<td><strong>Team Performance</strong></td>
<td>65.36</td>
<td>14.92</td>
<td>64.83</td>
<td>13.60</td>
<td>-.646</td>
<td>-3.834-2.543</td>
<td>.181</td>
<td>.166</td>
<td>.267</td>
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</tr>
<tr>
<td>Team Sport</td>
<td>63.27</td>
<td>14.70</td>
<td>63.30</td>
<td>14.80</td>
<td>.29</td>
<td>-3.558-3.615</td>
<td></td>
<td></td>
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<tr>
<td>Control</td>
<td>68.29</td>
<td>15.11</td>
<td>66.97</td>
<td>11.74</td>
<td>-1.320</td>
<td>-7.274-4.634</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Absence (days)</strong></td>
<td>.333</td>
<td>.952</td>
<td>.770</td>
<td>1.801</td>
<td>.468</td>
<td>-.036-.971</td>
<td>.530</td>
<td>.068</td>
<td>.172</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>.214</td>
<td>.686</td>
<td>.500</td>
<td>1.201</td>
<td>.286</td>
<td>.160-732</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Control</td>
<td>.500</td>
<td>1.23</td>
<td>1.15</td>
<td>2.39</td>
<td>.650</td>
<td>-.416-1.716</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Presenteeism (days)</strong></td>
<td>6.08</td>
<td>15.70</td>
<td>5.04</td>
<td>15.6</td>
<td>.468</td>
<td>-.036-.971</td>
<td>.600</td>
<td>.058</td>
<td>.147</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>4.78</td>
<td>12.54</td>
<td>1.92</td>
<td>2.62</td>
<td>-2.857</td>
<td>-7.554-1.840</td>
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<tr>
<td>Control</td>
<td>7.9</td>
<td>19.51</td>
<td>9.4</td>
<td>23.64</td>
<td>1.5</td>
<td>-10.756-13.756</td>
<td></td>
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</tbody>
</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001.
Table 4.6 continued: Organisational health outcomes for the team sport (intervention) and control groups assessed using a mixed ANOVA at baseline (T₀) and at the end of the intervention (T₁).

<table>
<thead>
<tr>
<th></th>
<th>T₀</th>
<th>SD</th>
<th>T₁</th>
<th>SD</th>
<th>T₀-T₁</th>
<th>95% CI</th>
<th>F Statistic</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td></td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>Group x Time</td>
</tr>
<tr>
<td><strong>Work Engagement</strong></td>
<td>69.06</td>
<td>15.13</td>
<td>67.30</td>
<td>15.99</td>
<td>-1.716</td>
<td>-4.304 to 0.873</td>
<td>.631</td>
</tr>
<tr>
<td>Team Sport</td>
<td>71.23</td>
<td>15.28</td>
<td>70.53</td>
<td>15.77</td>
<td>-.694</td>
<td>-4.317 to 2.929</td>
<td>.412</td>
</tr>
<tr>
<td>Control</td>
<td>66.04</td>
<td>14.77</td>
<td>63.30</td>
<td>15.72</td>
<td>-2.737</td>
<td>-6.446 to 0.971</td>
<td></td>
</tr>
<tr>
<td><strong>Work Vigour</strong></td>
<td>63.50</td>
<td>17.38</td>
<td>58.02</td>
<td>15.89</td>
<td>-2.715</td>
<td>-6.161 to 0.730</td>
<td></td>
</tr>
<tr>
<td>Team Sport</td>
<td>64.69</td>
<td>19.60</td>
<td>63.07</td>
<td>20.91</td>
<td>-1.619</td>
<td>-5.542 to 2.304</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>61.83</td>
<td>14.01</td>
<td>60.96</td>
<td>18.96</td>
<td>-3.812</td>
<td>-10.188 to 2.565</td>
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<tr>
<td><strong>Work Dedication</strong></td>
<td>72.31</td>
<td>19.84</td>
<td>65.25</td>
<td>20.61</td>
<td>-1.981</td>
<td>-5.653 to 1.691</td>
<td>.113</td>
</tr>
<tr>
<td>Team Sport</td>
<td>76.38</td>
<td>16.32</td>
<td>73.79</td>
<td>18.89</td>
<td>-2.595</td>
<td>-7.528 to 2.337</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>66.62</td>
<td>23.16</td>
<td>70.23</td>
<td>19.89</td>
<td>-1.367</td>
<td>-7.024 to 4.291</td>
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<tr>
<td><strong>Work Absorption</strong></td>
<td>71.38</td>
<td>14.45</td>
<td>70.00</td>
<td>16.71</td>
<td>-1.618</td>
<td>-4.837 to 1.602</td>
<td>.783</td>
</tr>
<tr>
<td>Team Sport</td>
<td>72.61</td>
<td>14.41</td>
<td>72.41</td>
<td>16.80</td>
<td>-.202</td>
<td>-6.654 to 5.87</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>69.65</td>
<td>14.69</td>
<td>66.62</td>
<td>16.41</td>
<td>-3.033</td>
<td>-5.127 to 4.722</td>
<td></td>
</tr>
</tbody>
</table>

Significant interactions indicated with *P<.05, **P<.01, ***P<.001.
Observations of T⁰ data
A series of independent samples t-tests confirmed that at T⁰ the intervention and control groups did not significantly differ on the primary outcome of estimated VO₂ Max (relative and absolute); and secondary outcomes of BMI, subjective vitality, stress, quality of life, sickness absence, sickness presenteeism, physical and mental health ratings, need for recovery, MET minutes PA, vigorous PA, moderate PA, sitting time and walking, and job satisfaction, job performance, team performance, cohesion, communication and work engagement (total score, vigour, absorption, dedication). The groups did differ on markers of relationships with superiors (P<.036). Table 4.3 provides an overview of observations at T⁰.

Main analysis

Does participation in CTG improve estimated maximal oxygen uptake over the short-term (12-weeks)? (H1)

Participation in workplace team sport significantly improved estimated relative VO₂ Max (P<.002, η²_p=.182), when compared to the control group (see Figure 4.3). A mixed design ANOVA captured a group (intervention/control) x time (T⁰/T¹) interaction for mean estimated relative VO₂ Max. A follow-up paired samples t-test observed a significant (P<.0001, d=.774) increase in estimated relative VO₂ Max of 4.5±5.80 ml/kg/min (95% CI 2.248-6.752) in the intervention group. However, a non-significant reduction (P<.568, d=.129) of .65±5.00 ml/kg/min (95% CI -2.299-1.694) was observed in the control group. Moreover, participation in workplace team sport significantly improved absolute VO₂ Max (P<.014, η²_p=.123), when compared to the control group (see Figure 4.4). A mixed design ANOVA captured a group (intervention/control) x time (T⁰/T¹) interaction for mean estimated absolute VO₂ Max. A follow-up paired samples t-test observed a significant (P<.0001, d=.75) increase in estimated relative VO₂ Max of .386±.515 L/min (95% CI .585-.186) in the intervention group. There was a minor non-significant increase (P<.811, d=.055) of .024±.442 L/min (95% CI .231-.183) observed in the control group.
Does participation in CTG improve PA behaviour outside of the programme over time (12-weeks)? (H2)

Does CTG influence total MET minutes PA per week?

Data suggests participation in CTG has the capacity to improve PA behaviour over time. A modest increase was observed in the intervention group’s MET· per week as measured by the IPAQ. In contrast, the control
group’s MET’ per week decreased over the duration of the intervention. A mixed design ANOVA captured a non-significant group (intervention/control) x time ($T^0/T^1$) for total MET-minutes per week of PA ($P<.920, \eta^2_p=.0001$) (see Figure 4.5). Post-hoc power analysis revealed total MET-minutes per week of PA was underpowered ($1-\beta=.0521$).

![Figure 4.5: Interaction Effect from Intervention and Control Group on MET’ PA per week. Standard Error is Displayed.](image)

**Does CTG improve vigorous MET minutes PA per week?**

Vigorous PA MET’ per week improved in the intervention group and in the control group over time. A mixed design ANOVA captured a non-significant group (intervention/control) x time ($T^0/T^1$) for total MET-minutes per week of vigorous PA ($P<.942, \eta^2_p=.0001$) (see Figure 4.6). Post-hoc power analysis revealed total MET-minutes per week of vigorous PA was underpowered ($1-\beta=.0521$).
Figure 4.6: Interaction Effect from Intervention and Control Group on MET' Vigorous PA per week. Standard Error is Displayed.

Does CTG improve moderate MET minutes PA per week?

Moderate PA MET' per week decreased in both groups over time. A mixed design ANOVA captured a non-significant group (intervention/control) x time (T₀/T₁) interaction for total MET-minutes per week of moderate PA (P<.989, η²_p=.0001) (see Figure 4.7). However, this was underpowered (1-β=.0521).

Figure 4.7: Interaction Effect from Intervention and Control Group on MET’ Moderate PA per week.

Does CTG improve walking MET minutes per week?
Walking MET' per week marginally decreased in both groups over time. A mixed design ANOVA captured a non-significant group (intervention/control) x time (T0/T1) for total MET-minutes per week of walking (P<.888, η²_p=.0001) (see Figure 4.8). Post-hoc power analysis revealed total MET-minutes per week of moderate PA was underpowered (1-β=.0521).

![Figure 4.8: Interaction Effect from Intervention and Control Group on MET' Walking per week. Standard Error is Displayed.](image)

Does CTG influence PA behaviour over time?

Participation in workplace team sport did significantly improve participation in accumulative week-by-week PA measured when measured by self-reported diaries. A mixed design ANOVA revealed a significant difference group (intervention/control) x time (weeks 1-12) interaction (P<.002, η²_p=.071) (see Figure 4.9). The intervention group participated in significantly (P<.006) more PA per-week than the control group (154.74 minutes) (95% CI 47.36-261.85). Further, a series of univariate ANOVA’s indicates no significant difference between the groups at week 1-3 (P>.05), significant positive differences towards the team sport group between weeks 4 (P<.003, η²_p=.175), 5, (P<.001, η²_p =.220), 6 (P<.001, η²_p =.225), 7 (P<.0001, η²_p = .284), 8 (P<.010, η²_p =.135), and no significant differences between the groups at weeks 9-12 (P>.05).
Figure 4.9: Interaction Effect from Intervention and Control Group on week-by-week PA duration (minutes). Standard Error is Displayed.
Chapter 4: Study 3 - A Workplace Team Sport Pilot Efficacy Intervention

Does CTG influence sitting time?

Sitting time per day decreased in both groups over time. A mixed design ANOVA captured a non-significant group (intervention/control) x time (T0/T1) interaction for total time spent sitting per day (P<.367, η²p =.018) (see Figure 4.10). Post-hoc power analysis revealed total time spent sitting per day was underpowered (1-β=.451).

![Figure 4.10: Interaction Effect from Intervention and Control Group on Sitting Time per day. Standard Error is Displayed.](image)

Does CTG improve markers of individual health? (H3)

Does CTG improve psychological wellbeing?

CTG did not improve significantly markers of psychological wellbeing. While modest improvements were observed in the intervention group over time on subjective vitality, quality of life, stress and occupational fatigue, these changes remained non-significant. More specifically, a series of mixed design ANOVAs did not capture any group (intervention/control) x time (T0/T1) interactions for subjective vitality (P<.484, η²p =.011) (see Figure 4.11), quality of life (P<.136, η²p =.048) (see Figure 4.12), stress (P<.260, η²p =.027) (see Figure 4.13) and occupational fatigue (P<.874, η²p =.001) (see Figure 4.14). Moreover, post-hoc power analysis revealed that subjective vitality (1-β=.298), stress (1-β=.617) and occupational fatigue (1-β=.071) were under-powered. Quality of life was sufficiently powered (1-β=.861).
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Figure 4.11: Interaction Effect from Intervention and Control Group on Subjective Vitality. Standard Error is Displayed.

Figure 4.12: Interaction Effect from Intervention and Control Group on Quality of Life. Standard Error is Displayed.
Figure 4.13: Interaction Effect from Intervention and Control Group on Stress. Standard Error is Displayed.

Figure 4.14: Interaction Effect from Intervention and Control Group on Occupational Fatigue. Standard Error is Displayed.

Does CTG reduce sickness absence or sickness presenteeism?

The data indicates sickness absence marginally increased over time in both groups (see Figure 5.15).
While, presenteeism decreased in the intervention group, and increased in the control group over time (see Figure 5.16).

These changes were however non-significant. A mixed design ANOVA indicated no significant interactions between group (intervention/control) x time \( T^0/T^1 \) on sickness absenteeism (\( P<.470, \eta^2_p = .011 \)) and sickness presenteeism (\( P<.443, \eta^2_p = .013 \)). Post-hoc power analysis revealed that
sickness absence (1-β=.298) and sickness presenteeism (1-β=.343) were under-powered.

*Does CTG influence body composition?*

Contrary to the hypothesis, participation in workplace team sport did not significantly reduce body composition when compared to the control group. The results however indicate team sport may have a protective effect on body composition over a 12-week period. A mixed design ANOVA confirmed a group (intervention/control) x time (T0/T1) interaction for mean BMI (P<.012, \(\eta^2_p = .130\)) (see Figure 5.17).

![Figure 4.17: Interaction Effect from Intervention and Control Group on BMI (kg/m²). Standard Error is Displayed.](image)

A follow-up paired samples t-test observed a minor non-significant (P<.203, d=.246) increase in BMI of .146±.593 kg/m² (95% CI .0837-.3765) in the intervention group. However, a significant (P<.008, d=.658) increase in BMI of .920 kg/m² (95% CI .2659-1.574) was observed in the control group.

*Does CTG improve perceptions of physical and mental health?*

Modest increases for physical health ratings were observed in the intervention and control group. While decreases in mental health ratings were noted in both groups. However, these observations remained non-significant when tested. A mixed design ANOVA for each variable revealed a non-significant group (intervention/control) x time (T0/T1) interaction for physical
health ($P<.686, \eta_p^2 = .004$) (see Figure 4.18) and mental health ($P<.873, \eta_p^2 = .001$) (see Figure 4.19) ratings respectively. Post-hoc power analysis revealed that physical health ratings ($1-\beta = .138$) and sickness presenteeism ($1-\beta = .071$) were under-powered.

Figure 4.18: Interaction Effect from Intervention and Control Group on Physical Health Ratings. Standard Error is Displayed.

Figure 4.19: Interaction Effect from Intervention and Control Group on Mental Health ratings. Standard Error is Displayed.
Does CTG improve social group and organisational health outcomes over the short term (i.e., 12-weeks)? (H4)

Does CTG improve social group outcomes?

The intervention group improved on scores for group cohesion and relationships with superiors. However, opposing the hypothesis participation in CTG these interactions were non-significant. A series of mixed design ANOVAs did not capture any group (intervention/control) x time (T0/T1) interactions for group cohesion (P<.907 $\eta^2_p = .0001$) (see Figure 4.20), relationships with superiors (P<.104, $\eta^2_p = .056$) (see Figure 4.21), relationships with colleagues (P<.228, $\eta^2_p = .031$) (see Figure 4.22). However, a significant interaction was identified on relationships with colleagues over time only (P<.045, $\eta^2_p = .085$).

![Figure 4.20: Interaction Effect from Intervention and Control Group on Group Cohesion. Standard Error is Displayed.](image)
Figure 4.21: Interaction Effect from Intervention and Control Group on Relationships with Superiors. Standard Error is Displayed.

Figure 4.22: Interaction Effect from Intervention and Control Group on Relationships with Colleagues. Standard Error is Displayed.

Post-hoc power analysis revealed that group cohesion ($1-\beta=0.0521$) and relationships with colleagues ($1-\beta=0.679$) were under-powered. Relationships with superiors was sufficiently powered ($1-\beta=0.91$). A mixed design ANOVA detected a significant group x time interaction on communication ($P<0.042$, $\eta^2_p=0.087$) (see Figure 4.23). A follow-up paired samples t-test observed a non-significant improvement ($P<0.85$, $d=0.337$) of 3.0 in interpersonal communication within workplace teams (95% CI -0.446-6.446) in the
intervention group and a non-significant (P<.235, $d=.274$) decrease of 2.6 (95% CI -7.033-1.833) in the control group.

![Figure 4.23: Interaction Effect from Intervention and Control Group on Communication. Standard Error is Displayed.](image)

**Does CTG improve organisational performance outcomes?**

Individual and team job performance, and job satisfaction improved in the intervention group, while work-engagement (vigour, dedication, absorption) marginally decreased. However, these interactions were non-significant when tested.

![Figure 4.24: Interaction Effect from Intervention and Control Group on Job Satisfaction. Standard Error is Displayed.](image)
A series of mixed design ANOVAs captured non-significant group (intervention/control) x time (T^0/T^1) interactions for job satisfaction (P<.884, \( \eta^2 = .0001 \)) (see Figure 4.24), job performance (P<.884, \( \eta_{p}^2 = .0001 \)) (see Figure 4.25), team performance (P<.605, \( \eta_{p}^2 = .006 \)) (see Figure 4.26), (P<.525, \( \eta_{p}^2 = .009 \)), work-engagement (vigour) (P<.525, \( \eta_{p}^2 = .009 \)) (see Figure 4.27), work-engagement (dedication) (P<.738, \( \eta_{p}^2 = .002 \)) (see Figure 4.28), work-engagement (absorption) (P<.381, \( \eta_{p}^2 = .017 \)) (see Figure 4.29) and work-engagement (total score) (see Figure 4.30) scores respectively. Post-hoc power analysis revealed that job satisfaction (1-\( \beta = .0521 \)), job performance (1-\( \beta = .0.183 \)), team performance (1-\( \beta = .183 \)), work-engagement (vigour) (1-\( \beta = .252 \)), work-engagement (dedication) (1-\( \beta = .093 \)) and work-engagement (absorption) (1-\( \beta = .43 \)) were under-powered.

Figure 4.25: Interaction Effect from Intervention and Control Group on Job Performance. Standard Error is Displayed.
Figure 4.26: Interaction Effect from Intervention and Control Group on Team Performance. Standard Error is Displayed.

Figure 4.27: Interaction Effect from Intervention and Control Group on Work-Engagement (Vigour). Standard Error is Displayed.
Figure 4.28: Interaction Effect from Intervention and Control Group on Work-Engagement (Dedication). Standard Error is Displayed.

Figure 4.29: Interaction Effect from Intervention and Control Group on Work-Engagement (Absorption). Standard Error is Displayed.
Discussion

This non-randomized (i.e., quasi-experimental) intervention study examined the impact of participating in workplace team sport upon a primary outcome of estimated VO\textsubscript{2} Max and secondary outcomes of individual, social group and organisational health. The study compared participation in team sport to normal working practise.

Summary of findings

Confirming the primary hypothesis (H1), a +10.32% increase in relative VO\textsubscript{2} Max was observed in the intervention group. This finding is consistent, with other workplace team sport intervention studies (+5%, workplace soccer; 15-19%, PA programme incorporating team sport sessions) (Barene et al., 2013, 2014b; Burn et al., 2017). Improvements in both absolute and relative values indicate VO\textsubscript{2} Max increased due positive changes in cardiorespiratory fitness rather than a reduction in weight alone (Barene et al., 2013, 2014b; Krustrup et al., 2010; Wenger & Bell, 1986). Prolonged exposure to high-intensity PA (e.g., team sport) is known to contribute to improvements in cardiorespiratory fitness (Barene et al., 2013, 2014b; Krustrup et al., 2010; Wenger & Bell, 1986). A minor non-significant decrease in VO\textsubscript{2} Max of 1.75% was observed in the control group. Although this cannot be directly attributed to the working practises of the control group, office based roles can contribute
to the detraining of the cardiorespiratory system and reduce cardiac output (Ekelund et al., 2016; Hamilton et al., 2008; Santos et al., 2013).

Observable increases in both group’s total MET minutes of PA (+101.57 MET minutes in the intervention group), provides modest support for the hypothesis (H2). While a mode-by-mode analysis of PA suggests the groups did not differ on vigorous PA, moderate PA and walking MET minutes, data collected from the self-reported diary indicates the intervention group participated in significantly more PA on a weekly basis than the control group. Sitting time decreased marginally over time in both groups. However, it should be noted the IPAQ was statistically underpowered.

Partial support for the hypothesis (H3) is evidenced by a 3.5% increase in BMI in the control group and minor .43% increase in BMI in the intervention group despite no significant difference of BMI or PA observed at T0. A protective effect may have been observed over time (Pavey, Peetersm Gomersall & Brown, 2016; Sigel et al., 2009; Varela-Mato et al., 2017). These findings are consistent with previous workplace team sport studies which found reductions on body fat mass and body fat percentage over the short-and long-term (Adams et al., 2016; Barene et al., 2013, 2014b; Burn et al., 2017). Reduced markers of body composition such as weight loss, abdominal adiposity and subcutaneous skinfolds are attributable to prolonged and routine exposure to HIPA (Tremblay et al., 1990; Varela-Mato et al., 2017; Warburton, Nicol & Bredin, 2006). While inconclusive, increases in BMI the control group from T0 to T1 may be explained by a routine of sedentary workplace practises (Eriksen et al., 2015; Hamilton et al., 2008).

Modest increases in subjective vitality, stress and occupational fatigue scores provides partial support for the hypothesis (H3). A post-hoc power analysis revealed the measures of subjective vitality, stress and occupational fatigue were underpowered and therefore were unable to detect a significant interaction. Quality of life was sufficiently powered. Findings indicate the intervention group’s quality of life increased, while the control group’s quality of life decreased over time. However, a small effect size indicates team sports impact on quality of life is marginal. Given quality of life is subjective state
which is perceived and contextualised differently by each participant, a larger effect may be confounded by factors internal (e.g., salary, working practices) and external to the workplace (e.g., personal relationships, lifestyle choices) (Gill et al., 2013).

With regard to sickness absenteeism and presenteeism, the findings of this study provide limited support for the hypothesis (H3). More specifically, consistent with the findings of previous evidence (i.e., Adams et al., 2016; Amlani & Munir, 2014) found limited evidence for PA's impact on sickness absence over the short-term (12-weeks). However, the measures of absenteeism and presenteeism were unpowered and therefore unable to detect a significant interaction.

The findings of this study provide partial support for the hypothesis regarding rating of physical and mental health (H3). More specifically, ratings of physical health improved over time, while ratings of mental health decreased in the intervention group. Whilst findings regarding ratings of physical activity are consistent with previous evidence (Thøgersen-Ntoumani et al., 2014), the findings regarding mental health ratings contrast that of other empirical studies which suggest PA has a positive impact on mental health (Adie et al., 2008; Frederick & Ryan, 1993; Roeessler & Bredah, 2006; Thøgersen-Ntoumani et al., 2014). However, it should be noted these measures were unpowered and therefore unable to detect a significant interaction.

The findings of the current study provide the first empirical support for several qualitative studies investigating the impact of team sport within a workplace setting on social group health outcomes (Adams et al., 2016; Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Lee, 1991). Confirming the hypothesis (H4), a 3% increase was observed in the intervention group communication scores, while the control group's communication score decreased over time. Improvements in communication may be explained by the time employees spent together participating in an activity of common interest with shared goals (Joubert, 2012). It is likely participation in team sport alleviated social and hierarchical communication
barriers, increased interpersonal knowledge of colleagues and promoted work-related conversations (Joubert et al., 2010, 2011 2014a).

Limited evidence is available to support the hypothesis (H4) regarding interpersonal relationships and group cohesion. Relationships with colleagues and superiors improved non-significantly over time in the intervention group, while group cohesion decreased over time in both groups. These findings are not consistent with the findings of previous qualitative studies (e.g., Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Lee, 1991) which consistently demonstrate improvements in interpersonal relationships and group cohesion. However, the employees in this study did not exclusively participate with their day-to-day colleagues (work-team), rather there ‘work group’ (see Cannon-Bowers, 2006; Salas et al., 1992) and therefore the effect on working relationships, cohesion and team productivity may have been confounded. Furthermore, measures of group cohesion and relationships with colleagues were unpowered and therefore unable to detect a significant interaction.

Participation in team sport was hypothesised to improve organisation health outcomes over time. The organisational outcome measures in the current study were not sufficiently powered to detect significant interactions. Increases in job and team performance and job satisfaction provided partial support for the hypothesis (H4). In contrast, the hypothesis (H4) was rejected regarding work-engagement (i.e., absorption, dedication and satisfaction) which did not improve over time. These findings, are contrasting to those of Thøgersen-Ntoumani et al. (2014), Pichot et al. (2009) and Joubert (2011) who found participation in workplace walking and team sport (e.g., netball, cricket) respectively to positively influence workplace performance.

Consistent with previous evidence (Conn et al., 2009; van Berkel, Proper, van Dam, Boot & Bongers, 2013) and rejecting the hypothesis, work-engagement (absorption, dedication and vigour) decreased over time in both groups. The evidence supporting the efficacy of workplace PA on work-engagement is mixed (Conn et al., 2009). It may be that the addition of an intervention (i.e., team sport) may not be sufficient enough to influence
Chapter 4: Study 3 - A Workplace Team Sport Pilot Efficacy Intervention

changes in a subjective state influenced by factors internal (e.g., workplace pressure) and external (e.g., lifestyle demands) to the workplace (Bakker, Albrecht & Leiter, 2011; van Berkel et al., 2013).

Limitations

Although non-randomized (quasi-experimental) designs are well-established to be sufficiently robust in evaluating the efficacy of workplace health promotion programmes at the initial stages, and may be preferred due to feasibility, challenges practicality of conducting a controlled design (Des Jarlais et al., 2004; Schelvis et al., 2015). To prevent contamination, care was taken to select two isolated regional worksites.

However, given the absence of a RCT, causal assumptions cannot be drawn from the evidence presented (Craig et al., 2008). Although limitations challenge the feasibility of RCTs within an organisational setting (see Des Jarlais et al., 2004; Schelvis et al., 2015), future research should consider the use of a cluster-design RCT due to their effectiveness in drawing causal assumptions and due to the measurement of social-group health outcomes (see Chapter 4) (Craig et al., 2008). Drawing definitive answers to research questions is fundamental to translate knowledge to employers, policy makers and practitioners implementing team sport within workplaces. To further influence the creation of translatable data, future research should consider investigating workplace team sport using a mixed-methods approach, empirical research and comprehensive process evaluations designs (e.g., RE-AIM framework).

A further limitation of the current study was its sample size. More specifically, several secondary measures in Chapter 4 lacked the power to detect a significant interaction and the assumptions required for a robust mixed design ANOVA. Given the absence of a non-parametric option, mixed-ANOVAs were conducted despite the violation of the assumptions. These included; total MET-minutes per week of PA, vigorous PA, moderate PA, walking, sitting time per day, subjective vitality, occupational fatigue, sickness absence and presenteeism, physical and mental health ratings, group
cohesion, relationships with colleagues, job and team performance, job satisfaction and work-engagement (absorption, dedication, vigour). Although ANOVAs are considered a robust design capable to analyse non-normally distributed data (Schmider et al., 2010), future research should treat these findings with caution. Future research may consider replicating the design of the current study, with a sample which is sufficient to detect a difference in these outcomes.

A strength of this study is the use of validated measures to assess individual, social group and organisational health outcomes. However, to avoid dejecting employees from participation in CTG, anthropometric measures of height and weight were adopted to estimate BMI. This approach is well-established and used frequently in research (Caperchione et al., 2016; O’Connell et al., 2015). However, the findings indicate participation in team sport has a protective effect on BMI, and therefore body composition. The use of skinfold measures, biomarkers (e.g., blood and lipid profiles), nutritional intake and in-vivo examinations such as DEXA scanning may provide more conclusive evidence of workplace team sports impact on soft tissues, fat and bone mass and content (Ellis, 2000). The use of such measures would add to the findings of Barene et al. (2013, 2014b) who also adopted this approach when examining the efficacy of providing a workplace soccer programme to female hospital employees.

Whilst the CST presents a statistical and ecological valid tool to assess aerobic fitness within the of the workplace, and was adopted to avoid adding additional logistic burden participation (i.e., traveling to a testing session during or after working hours) (Bennett et al., 2015). It should be noted the CST estimates VO₂ Max, rather than providing an absolute measure of VO₂ Max (Sykes & Roberts, 2004). If feasible, applied research may consider the gold-standard of gas analysis, or testing within the workplace setting using a validated protocol and portable metabolic pack. The adoption of an absolute measure may be particularly important given sub-maximal estimations of VO₂ Max may be confounded by factors such as motivation and subsequent exercise effort (Buckley et al., 2004; Shepard, 1984). More specifically, participants in the intervention group may be more motivated due to positive
changes in health and PA behaviour and therefore exert greater effort during testing (Buckley et al., 2004; Shepard, 1984). In contrast, control group participants aware they are not receiving team sport, may be demotivated and therefore exert less effort during testing (Buckley et al., 2004; Shepard, 1984). Given the CST provides a prediction of VO\textsubscript{2} Max based on effort, this limitation has the capacity to confound the findings (Buckley et al., 2004; Shepard, 1984).

Likewise, the measurement of PA could be strengthened. Self-reported measures were adopted as objective measures were beyond the financial scope of the current study. While, the self-reported measures used in the current study have been validated (Connor et al., 2016; Mannocci et al., 2010). Multiple measurement periods, using objective and validated accelerometers such as the ActivPAL, GENEActiv and ActiGraph and the gold-standard of double-labelled-water may be viable tools to better understand workplace team sports impact on PA and sedentary behaviour (Atkin et al., 2014).

Previous workplace team sport research has neglected the use of validated measures of social group health (see Chapter 2; Brinkley et al., 2017a). However, when tested within CTG (see Chapter 4), variables such as relationships with colleagues and superiors, group cohesion and team performance may have been confounded by sampling from the broader organisation (Cannon-Bowers & Bowers, 2006). Despite working together, participants may not have shared goals or interactions that influence cohesion and relationships. A stratified sampling technique based upon the presence of face-to-face working relationships and clustering individual workplace teams into study arms may present more conclusive evidence regarding team sports impact on social group outcomes.

Additionally, intensity was not objectively examined during the intervention sessions. Heart rate monitoring during intervention sessions has been used by Barene et al. (2013, 2014a, 2014b, 2016), as an effective measure of intervention fidelity. However, during CTG, this was avoided to reduce the likeness of dropouts. Volume of team sport participated in and
attendance was recorded, and questions regarding perceptions of exertion were asked during the process evaluation. However, it was thought biometric monitoring for intensity may create an additional ‘unnatural’ obstacle for participants considering participation in team sport. The uptake and adherence of workplace PA interventions is low (Conn et al., 2009), therefore this unnatural barrier to attendance was removed. Further, team sport was not prescribed to participants at a given intensity (e.g., 75% of MHR), rather CTG was an applied intervention and participants were playing as they naturally would within a workplace setting. Therefore, monitoring heart rate, although beneficial, may have led participants to alter the intensity during intervention session and consequently confound the findings.

Further, objective data collected over the long-term on sickness data (e.g., absence records), KPI’s (i.e., key performance indicators), productivity (e.g., fiscal health), and using economic health evaluations may provide more translatable and accurate data on the impact of workplace team sport on organisational health (Stang et al., 2001). Given the importance of sickness absence and presenteesim within government policy (see Black & Frost, 2011), a sufficiently powered longitudinal study may better examine team sports impact on these organisational outcomes. Evaluating workplace PA and indeed team sport through a health economics approach on markers of productivity would provide a stronger more translatable case for employers considering implementing PA or sport within their workplace (Drummond et al., 2008).

Finally, the participant groups in CTG differed in average working hours at T₀. Likewise, while CTG was successful at recruiting female participants, only 29% of the intervention group were female. While this figure is proportionate to the number of females who work in the organisation (30% reported in 2016 Annual Report) the groups did differ in gender. Therefore, the study groups may not have been counterfactual. Given the absence of a RCT design and these differences between the groups, the results may have been confounded and caution should be applied when interpreting these findings.
Conclusion

The current study examined the impact of a 12-week workplace team sport intervention on individual, social group and organisational health outcomes. Results indicate workplace team sport can improve aerobic fitness, PA behaviour and interpersonal communication within teams. Furthermore, a team sport programme may improve subjective vitality, quality of life, stress, occupational fatigue scores, perceptions of physical health, relationships with colleagues and superiors, and individual and team work performance, and reduce sickness presentism over 12-weeks. These results suggest team sport may be an effective and viable form of health promotion within a workplace setting.
Chapter 5 ‘Changing the Game’:
Process-Evaluation – Methods and Findings (Study 4)
Study 4

‘Changing the Game’: A RE-AIM Process-Evaluation – Methods and Findings

Introduction

An intervention (i.e., CTG; see Chapter 4) was developed to evaluate the acceptability, efficacy and feasibility of providing a workplace team sport programme on individual, social group and organisational health outcomes. Whilst intervention studies are useful in exerting changes in outcomes measures, they do not provide clarity in how changes in outcomes may have occurred or how outcomes may have been influenced by individual and organisational factors (Bauman & Nutbeam, 2013; Campbell et al., 2000; Craig et al., 2008; Moore et al., 2015). Without a robust process evaluation, little is known as to whether the intervention is acceptable or feasible, or indeed translatable to a real-world setting (Bauman & Nutbeam, 2013; Campbell et al., 2000; Craig et al., 2008; Moore et al., 2015; Saunders et al., 2005). One method to evaluate workplace team sport is through the RE-AIM framework (Gaglio et al., 2013; Glasgow, Klesges, Dzewaltowski & Estabrook, 2006; Harden et al., 2015).

RE-AIM translates evidence into real-world applications through investigating the individual and organisational factors which influence the reach, efficacy, adoption, implementation and maintenance of an intervention study (Gaglio et al., 2013; Glasgow, Klesges, Dzewaltowski & Estabrook, 2006; Harden et al., 2015). Reach can be considered the total number of individuals available to take part in a study; and the proportion of, and characteristics of individuals willing to participate (Gaglio et al., 2013). Efficacy is the impact of the study on key outcomes (e.g., health, psychological wellbeing) (Gaglio et al., 2013). Adoption refers to the number of individuals who engage in the intervention study either initially and/or across its duration (Gaglio et al., 2013). The implementation of a study seeks to understand if the intervention was conducted in accordance with the planned protocol, and the reasons why this may or may not have been the case (Gaglio et al., 2013).
Finally, the maintenance of an intervention study can be considered as the degree to which the intervention has been adopted beyond the end of the study period or the potential to be adopted, within the routine, structure or practices of an organisation (Gaglio et al., 2013). A robust RE-AIM evaluation seeks to comprehensively explore the causality and mechanisms underpinning each outcome (Gaglio et al., 2013). Previous systematic reviews conclude that the RE-AIM framework is a robust and reliable tool to evaluate and translate health promotion interventions and programmes (Harden et al., 2015).

Therefore, a RE-AIM process evaluation was conducted alongside the intervention study. This was conducted using a range of quantitative and qualitative methods, as per the recommendations of the MRC (Craig et al., 2008). Evaluating health promotion programmes through the triangulation of a range of data sources is considered a robust form of investigation (Bauman & Nutbeam, 2013; Campbell et al., 2000; Craig et al., 2008; Moore et al., 2015).

Study Aims

The aim of this study was to evaluate a workplace team sport programme (i.e., CTG; see Chapter 4) using the RE-AIM framework and a mixed methods approach. The objectives of this evaluation have been previously detailed in Chapter 4.

Methods

Programme overview

The current study evaluated the ‘CTG’ (i.e., CTG) programme (see Chapter 4; Brinkley et al., 2017c). CTG was a 12-week team sport programme available to employees of a UK based FTSE 100 services organisation. This organisation’s workforce consisted of 5080 UK based employees. Two regional worksites (130km apart) took part in this non-randomized intervention study (A detailed study description is reported in Chapter 4). CTG consisted of weekly one-hour lunchtime sessions of rounders (weeks 1&7), netball (weeks 2&8), basketball (weeks 3&9), soccer (weeks 4&10), cricket (weeks 5&11) and handball (weeks 6&12). CTG was conducted in an indoor sports hall (30 x 18 metres) located 400 metres from the participating organisation. A 10-
A small number of participants involved in the main study took part in the process evaluation. Prior to the implementation of CTG, five participants recruited through purposive sampling (see Patton, 2002) took part in focus groups (n=5). For the purposes of the pre-programme focus group, employees representing a broad range of demographics who were considering participating in CTG were recruited. Following the end of the intervention, ten participants from the intervention group took part in semi-structured interviews and five participants from the control group took part in a focus group. The two workplace champions who delivered the intervention were also interviewed at the end of the intervention. Finally, 17 participants from the intervention group completed a short process evaluation questionnaire. Employees from a broad range of office based roles, positions of superiority and departments within the organisation were represented (see Chapter 4). An overview of participation in the process evaluation, and the RE-AIM dimension addressed is provided in Table 5.4.
 Measures

**Qualitative data (reach, efficacy, implementation, maintenance)**

**Research diary**

During the intervention, the researcher, who attended all the CTG team sports sessions as an observer kept a paper-based diary to record contextual information relating to the efficacy (e.g., *did participants communicate; was there more cohesion in the group?*) and implementation (e.g., *was the programme being implemented as planned by workplace champions; did participants report any barriers*) of the programme (Brannan & Oultram, 2012). Through the ethnographic position of ‘observer as participant’ (minimum social engagement) (Gold, 1958), the researcher recorded contextual information regarding participation, and conducted interviews with participants following intervention sessions (Sparkes and Smith, 2014). Following each intervention session, a detailed reflective account was recalled. Each account was labelled with the respective time and date. Throughout the duration of the intervention, 31 diary entries were recorded. The use of research diaries and field notes are becoming more prominent when evaluating health promotion programmes (Lewin, Glenton & Oxman, 2009). Research diaries are an established and valid form of qualitative data collection (Brannan & Oultram, 2012; Sparkes & Smith, 2014).

**Follow-up interviews**

Following participation in CTG, participants and workplace champions were invited to take part in a semi-structured interview. These interviews explored the reach, efficacy, implementation and maintenance of CTG. Semi-structured interviews are a frequently used, effective and trustworthy form of data collection (Alvesson & Ashcraft, 2012). More specifically, interviews with a sub-sample of participants (n=11) focused on the reach (e.g., *how did you find out about CTG?*), efficacy (e.g., *how did participation in CTG benefit you?*), implementation (e.g., *what prevented you from attending the programme?*) and maintenance (e.g., *are you still participating in team sport now the programme has finished?*) of the programme. Topics discussed included (i) perceptions of CTG, (ii) benefits of participation, (iii) motivation for
participation, (iv) facilitators and obstacles to participation, (v) perceptions of CTG sessions and sport, and (vi) closing statements and questions.

Semi-structured interviews with both (n=2) workplace champions explored the efficacy (e.g., ‘did CTG benefit you as a workplace champion?’), adoption (e.g., ‘do you believe the company adopted CTG or helped you lead the programme effectively?’), implementation (e.g., ‘how did you help your colleagues during each of the sessions?’) and the potential maintenance (e.g., ‘do you see the programme continuing over the long-term?’) of the programme. Topics discussed included (i) perceptions of CTG, (ii) benefits of participation for champions, (iii) motivation for delivering CTG, (iv) facilitators and obstacles to delivery, (v) perceptions of CTG sessions and sport, and (vi) closing statements and questions. Interview schedules are provided in Table 5.1 (i.e., CTG participants) and 5.2 (i.e., CTG champions). The interviews were recorded on a digital voice recorder (Olympus VN-7700) with the knowledge and consent of participants in meeting rooms or offices at the participating organisation. The interviews were conducted by the researcher trained in establishing rapport, active listening and encouraging discourse (Alvesson & Ashcraft, 2012; Sparkes & Smith, 2014). The interviews lasted between 37 and 60 minutes (M=48 minutes).

Focus group with the control group

Following the completion of the outcomes measures (T^1), a focus group was conducted with five participants (n=4 females) from the control group. Focus groups are considered an effective and trustworthy form of data collection (Kandola, 2012). The purpose of this focus group was to explore the implementation and potential maintenance of CTG. More specifically, the focus group with the control group clarified the extent to which the information (e.g. facilitators and obstacles, perceptions of maintenance) provided by the intervention were consistent across the organisation. Topics discussed included (i) perceptions of the intervention, (ii) benefits of participation, (iii) perceptions of workplace team sport, (iv) workplace team sport facilitators and obstacles, and (v) closing statements and questions. An overview of the topics covered is provided in Table 5.3.
Table 5.1: Post Changing the Game Interview Schedule - Intervention Group

<table>
<thead>
<tr>
<th>Content</th>
<th>Topics for discussion</th>
</tr>
</thead>
</table>
| What were your perceptions of the intervention? | Did you enjoy it? – What did you enjoy? Did you dislike it? – What did you dislike?  
Better or worse than participating alone?  
Would you do something similar again? |
| What were the benefits of participation? | Do you think it benefits you in any way? – Individual health benefits?  
Did it benefit you as a group? – Did it benefit the team you work with?  
Did you get to know your colleagues to a greater degree? Do you think it benefits your working life?  
Has your physical activity participation changed over the 12-weeks?  
Have you observed any changes in your workplace? What benefits can a company gain from having employees that regularly exercise or play sport? |
| What made you attend this programme? | What motivated you to attend? (enablers)  
Peers participation. Other people’s attitudes (peers/management)  
Space/environment. Facilities. Time – before/during/after work  
Communication strategy |
| What prevented or hindered your participation in the programme? | What stopped you attending or was difficult when attending?  
Peers participation. Culture. Other people’s attitudes (peers/management)  
Space/environment. Facilities. Time – before/during/after work  
Communication strategy |
| What was your experience of the sessions like? | Is there anything you enjoyed? Is there anything you disliked?  
Is there anything you would change?  
How accessible were the sports? Were they easy to learn?  
How was participation with your peers? What were the perceptions of your colleagues who chose not to participate?  
Were there enough sessions? Would less or more be better? |
| Closing Statements | Overall do you think it had a positive/negative health benefits for the company or a worthwhile venture? Do you have any further thoughts on the idea? |
### Table 5.2: Post Changing the Game Interview Schedule - Workplace Champions

<table>
<thead>
<tr>
<th>Content</th>
<th>Topics for discussion</th>
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<tbody>
<tr>
<td>What were your perceptions of the intervention?</td>
<td>Did you enjoy it? – What did you enjoy?</td>
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<tr>
<td></td>
<td>Did you dislike it? – What did you dislike?</td>
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<tr>
<td></td>
<td>Would you do something similar again?</td>
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<tr>
<td>What were the benefits of participation?</td>
<td>Do you think it benefits you in any way? – Individual health benefits?</td>
</tr>
<tr>
<td></td>
<td>Did it benefit you as a group? – Did it benefit the team you work with?</td>
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<tr>
<td></td>
<td>Did you get to know your colleagues to a greater degree? Do you think it benefits your working life?</td>
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<tr>
<td></td>
<td>Has your physical activity participation changed over the 12-weeks?</td>
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<tr>
<td></td>
<td>Have you observed any changes in your workplace? What benefits can a company gain from having employees that regularly exercise or play sport?</td>
</tr>
<tr>
<td>What made you deliver this programme?</td>
<td>What motivated you to deliver the programme? (enablers)</td>
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<tr>
<td></td>
<td>Peers participation. Other people’s attitudes (peers/management)</td>
</tr>
<tr>
<td></td>
<td>Space/environment. Facilities. Time – before/during/after work</td>
</tr>
<tr>
<td></td>
<td>Communication strategy</td>
</tr>
<tr>
<td>What enabled or help and prevented or hindered your deliver of the programme?</td>
<td>What stopped you attending or was difficult when attending?</td>
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<tr>
<td></td>
<td>Peers participation. Culture. Other people’s attitudes (peers/management)</td>
</tr>
<tr>
<td></td>
<td>Space/environment. Facilities. Time – before/during/after work</td>
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<tr>
<td></td>
<td>Communication strategy</td>
</tr>
<tr>
<td>What was your experience of the sessions like?</td>
<td>Is there anything you enjoyed? Is there anything you disliked?</td>
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<td></td>
<td>Is there anything you would change?</td>
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<td></td>
<td>How accessible were the sports? Were they easy to deliver?</td>
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<td></td>
<td>How was delivering sport to your peers? What were the perceptions of your colleagues who chose not to participate?</td>
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<tr>
<td></td>
<td>Were there enough sessions? Would less or more be better?</td>
</tr>
<tr>
<td>Closing Statements</td>
<td>Overall do you think it had a positive/negative health benefits for the company or a worthwhile venture? Do you have any further thoughts on the idea?</td>
</tr>
</tbody>
</table>
The focus group was recorded on a digital voice recorder (Olympus VN-7700) with the knowledge and consent of participants. The focus group was conducted in a meeting room at the participating organisation by the researcher trained in establishing rapport, active listening and encouraging discourse. The focus group was moderated by introducing open-ended topics to participants (Kandola, 2012; Sparkes & Smith, 2014). The focus group was steered to ensure all participants were given the opportunity to contribute (Sparkes & Smith, 2014) and lasted 60 minutes.

**Questionnaires (reach, efficacy, adoption, implementation, maintenance)**

*Open-ended questionnaire*

A process evaluation questionnaire was designed to explore the reach, efficacy, adoption, implementation and maintenance of the intervention, and examine the impact of the intervention and its components of the theoretical underpinnings of CTG. This self-report questionnaire was included within the T1 outcome measures. This self-designed measure reflected the questions asked during the pre-intervention focus group and post-intervention interviews. More specifically, this open-ended measure explored the reach, adoption, implementation and maintenance of the programme. Seven open-ended items (e.g., ‘what motivated or enabled you to take part in the programme?’) investigated a participant’s experience of CTG and the implementation of the programme (see Appendix 6).
### Table 5.3: Post Changing the Game Focus Group Schedule - Control Group

<table>
<thead>
<tr>
<th>Content</th>
<th>Topics for discussion</th>
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<tbody>
<tr>
<td>What were your perceptions of the intervention?</td>
<td>Did you enjoy it? – What did you enjoy?</td>
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<td></td>
<td>Did you dislike it? – What did you dislike?</td>
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<td></td>
<td>Would you do something similar again?</td>
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<tr>
<td>What were the benefits of participation?</td>
<td>Do you think it benefits you in any way? – Individual health benefits?</td>
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<tr>
<td></td>
<td>Did it benefit you as a group? – Did it benefit the team you work with?</td>
</tr>
<tr>
<td></td>
<td>Did you get to know your colleagues to a greater degree? Do you think it benefits your working life?</td>
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<tr>
<td></td>
<td>Has your physical activity participation changed over the 12-weeks?</td>
</tr>
<tr>
<td></td>
<td>Have you observed any changes in your workplace? What benefits can a company gain from having employees that regularly exercise or play sport?</td>
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<tr>
<td>What might make you attend workplace team sport?</td>
<td>What might motivate you to attend a programme? (enablers)</td>
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<tr>
<td></td>
<td>Peers participation. Other people’s attitudes (peers/management)</td>
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<tr>
<td></td>
<td>Space/environment. Facilities. Time – before/during/after work</td>
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<tr>
<td></td>
<td>Communication strategy</td>
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<tr>
<td>What might enable or help and prevent or hinder your deliver of the programme?</td>
<td>What might stop you attending or what might make it difficult when attending?</td>
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<tr>
<td></td>
<td>Peers participation.</td>
</tr>
<tr>
<td></td>
<td>Culture.</td>
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<tr>
<td></td>
<td>Other people’s attitudes (peers/management)</td>
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<td></td>
<td>Space/environment.</td>
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<td></td>
<td>Facilities.</td>
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<td></td>
<td>Time – before/during/after work</td>
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<tr>
<td></td>
<td>Communication strategy</td>
</tr>
<tr>
<td>Closing Statements</td>
<td>Overall do you think it could have a positive/negative health benefits for the company or a worthwhile venture? Do you have any further thoughts on the idea?</td>
</tr>
</tbody>
</table>
Autonomy support

A modified version of the Sport Climate Questionnaire short-form (SCQ) (Brickell, Chatzisarantis & Pretty, 2006) was used to assess the autonomy support provided by workplace champions (see Appendix 6). The SCQ uses six 7-point Likert scale items (“strongly disagree” to “strongly agree”) to capture the degree in which workplace champions supported the autonomy of their colleagues (e.g., ‘I felt my workplace champion provided me with choices and options’?). During analysis, a mean score was calculated and converted to a 0-100 score. Higher scores denote greater perceptions of autonomy support. Past research has demonstrated the SCQ to have a Cronbach Alpha score of .86 (Lim & Wang, 2009).

Basic psychological needs satisfaction

A modified version of the Basic Needs in Sport Scale (BNSSS) was used to measure perceptions of basic psychological needs satisfaction (Ng & Lonsdale & Hodge, 2011) (see Appendix 6). The BNSSS uses twenty 7-point Likert scale items (“not at all true” to “very true”) to examine a participant’s perceptions of competence (five items; ‘I was skilled at the sports I played’), choice (four items; ‘In the sports I played, I had a say in how things were done’), internal perceptions of the locus of causality (three items; ‘In the sports I played, I felt I was perusing goals that were my own’), volition (three items; ‘I felt I participated in the sports willingly’) and relatedness (five items; ‘I had a close relationship with the people I played sport with’). A mean score was calculated and converted to a 0-100 score during analysis. Higher scores denote greater perceptions of autonomy (i.e., choice, internal causality, volition), competence and relatedness. Past research has demonstrated a Cronbach Alpha scores between .73 to .88 (Ng et al., 2011).

Subjective wellbeing

Perceptions of subjective wellbeing were assessed with the SVS (Frederick & Ryan, 1993). The construction and psychometric properties of the SVS are described in Chapter 4.
**Documentation (reach, adoption, implementation, maintenance)**

Reach was determined by the number of employees who expressed an interest in participation the programme during the recruitment phase of CTG (i.e., the total number emails, correspondents and responses returned by employees expressing an interest in the programme). Reach was calculated by dividing the total number responses by employees interested in the programme by the number of employees who worked at the intervention (n=1000) and control (n=500) worksites. Adoption of the programme was assessed by an attendance register recorded at each intervention session. Publicly available data from the participating organisation was also collected. The implementation and maintenance of CTG was evaluated using data from annual reports (2013-2017) and governance documents (i.e., data not presented to protect the identification of the organisation)\(^2\). More specifically, qualitative data collected from participants regarding implementation (i.e., organisation supports/does not support workplace) and maintenance (i.e., organisation funds health promotion opportunities) was evaluated against messages from the organisation. The use of document analysis is a valid form of data collection in organisational and health promotion research (Lee, 2012).

**Outcome measures (efficacy)**

In accordance with the guidelines of the MRC (Craig et al., 2008; Moore et al., 2015) and RE-AIM framework (Gaglio et al., 2013; Harden et al., 2015), the efficacy of the programme was assessed using the outcome measures collected between T\(^0\) and T\(^1\). These included measures of VO\(_2\) Max, PA behaviour; group interaction, communication and engagement; psychological wellbeing; health; workplace experiences, and anthropometrics (see Chapter 4 for a comprehensive overview).

\(^2\) Distinguishable data (e.g., direct quotes/data) from annual reports not presented to protect the identity of the participating organisation, and employer.
### Table 5.4: Details of process evaluation participation. Dimensions assessed based on participants

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Study outcome measures (T₀⁻T¹) (n = 27)</th>
<th>Process-evaluation questionnaire (intervention group) (T¹) (n = 17)</th>
<th>Post-intervention interviews (intervention group) (n = 10)</th>
<th>Post-intervention interviews (workplace champions) (n = 2)</th>
<th>Post-intervention focus group (control group) (n = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reach</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Adoption</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Efficacy</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Implementation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Data management and analysis

Quantitative data

Quantitative data collected from participants (i.e., questionnaire data T₀-T₁) were inputted into Microsoft Excel and converted into IBM SPSS (version 23). P<.05 was considered statistically significant and all analysis was conducted using SPSS. Prior to analysis, all questionnaire data were converted to 0-100 scores, whereby a higher score denotes a positive outcome (e.g., higher perceptions of autonomy support). Data were screened for data entry error against the raw data collected from participants. All data were screened for missing data, and outliers in the form of data entry error, measurement error or values which proved to be genuine. Data treatment for outcome measures assessing ‘efficacy’ is described in Chapter 4. In the case of data collected post-intervention (i.e., questionnaires), data were treated with within-person mean substitutions of the missing value.

Weekly intervention session attendance data were assessed for normality using a Shapiro-Wilk test, homogeneity of variance using Levene’s test, and for homogeneity of variance using Box’s test. Weekly attendance data were normally distributed and had homogeneity of variance. Data assessments for demographic data of participants is described in Chapter 4.

Descriptive statistics (M±SD) were computed for all variables. Week by week sports session attendance was examined using a series of one-way ANOVAs. Independent samples t-tests were used post-hoc. Standard linear multiple regressions examined if participation in an autonomy supportive team sport programme predicted changes in participants’ basic psychological needs and subjective wellbeing. Bivariate Pearson correlations were conducted on autonomy support and basic psychological needs scores to examine if an autonomy supportive team sport programmes predicts autonomy, competence and relatedness. The assumptions associated with multiple regression were met for autonomy support and basic psychological needs variables (no influencing multivariate outliers or leverage points, data met the assumptions for normality, homoscedasticity, linearity, multicollinearity). The data representing wellbeing did not have independence of observations and was removed from multivariate analysis.
**Qualitative data**

Interviews and focus groups were transcribed verbatim. A template analysis (see Brooks et al., 2015) collectively incorporating data collected interviews, focus groups, questionnaire and diary data was undertaken using QSR International NVivo version 11. Priori themes (e.g., reach, efficacy, adoption, implementation, maintenance, facilitators and obstacles to attendance, supporting basic psychological needs and autonomy support) were based on previous research (see Brinkley et al., 2017a, 2017b; see Chapters 1-4). Codes were attached to priori themes where appropriate. Failure to attach a code, led to a new theme being developed. Once completed, a template was produced (see Table 5.5). The template was revised, until it reflected the complete data set. All members of the research team gave their consensus on the data by reviewing the identified themes.

**RE-AIM dimensional rating**

RE-AIM dimensions (reach, efficacy, adoption, implementation, maintenance) were evaluated through triangulating the quantitative and qualitative data collected. Each dimension was rated on its applicability (i.e., the extent to which the collected data could accurately assess the dimension) and outcome (i.e., positive or negative outcome based on the data collected) (1 = limited success, 2 = moderate success, 3 = highly successful) (Koorts & Gillison, 2015). A dimensional rating was determined by adding the applicability and outcomes scores and then dividing by two. A schematic overview of the findings is provided in Figure 5.4.
<table>
<thead>
<tr>
<th>RE-AIM Dimension</th>
<th>Theme</th>
<th>Sub-Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reach</td>
<td>Communication and recruitment</td>
<td>Communication methods</td>
</tr>
<tr>
<td></td>
<td>Challenges to recruitment</td>
<td>Lack of communication (occupational health &amp; managers and superiors)</td>
</tr>
<tr>
<td>Efficacy</td>
<td>Behaviour change</td>
<td>Physical activity behaviour</td>
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<td></td>
<td>Psychological wellbeing</td>
<td>Respite from stress</td>
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<tr>
<td></td>
<td>Perceptions of physical health</td>
<td>Disassociation from work</td>
</tr>
<tr>
<td></td>
<td>Perceptions of weight loss</td>
<td>Observations in physical fitness</td>
</tr>
<tr>
<td></td>
<td>Cohesion and communication</td>
<td>Perceptions of weight loss</td>
</tr>
<tr>
<td></td>
<td>Improved cohesion</td>
<td>Open communication</td>
</tr>
<tr>
<td></td>
<td>Developing and maintaining relationships</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Networks and productivity</td>
<td>Shared knowledge</td>
</tr>
<tr>
<td></td>
<td>Productivity</td>
<td>Concentration and focus</td>
</tr>
</tbody>
</table>
### Table 5.5 continued: Changing the Game Process Evaluation Template Analysis continued

<table>
<thead>
<tr>
<th>RE-AIM Dimension</th>
<th>Theme</th>
<th>Sub-Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption</td>
<td>Obstacles to attendance</td>
<td>Intrapersonal obstacles</td>
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<tr>
<td></td>
<td></td>
<td>Interpersonal obstacles</td>
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<td></td>
<td></td>
<td>Organisational obstacles</td>
</tr>
<tr>
<td></td>
<td>Facilitators to attendance</td>
<td>Intrapersonal facilitators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interpersonal facilitators</td>
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<td></td>
<td></td>
<td>Organisational facilitators</td>
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<tr>
<td></td>
<td></td>
<td>Environmental facilitators</td>
</tr>
<tr>
<td>Implementation</td>
<td>Supporting basic psychological needs</td>
<td>Autonomy</td>
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<tr>
<td></td>
<td></td>
<td>Competence</td>
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<tr>
<td></td>
<td></td>
<td>Relatedness</td>
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<tr>
<td></td>
<td>Autonomy supportive champions</td>
<td>Provision of support</td>
</tr>
<tr>
<td>RE-AIM Dimension</td>
<td>Theme</td>
<td>Sub-Theme</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Challenges to the long-term maintenance</td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td>of workplace team sport</td>
<td>Culture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funding</td>
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<tr>
<td></td>
<td></td>
<td>Leadership</td>
</tr>
</tbody>
</table>
Findings

Participants

Five participants (n = 2 females) (46.80±12.43) participated in the pre-intervention focus group. Ten participants (n = 2 females) (42.40±10.17) participated in the semi-structured interviews. Both workplace champions aged 31 and 36 years participated in individual interviews. Five participants from the control group (43±14.81) (n = 4 females) participated in the focus group. Seventeen participants (40.35±9.57) (n = 4 females) completed the process evaluation questionnaire. A broad range of office based roles, positions of superiority and departments within the organisation were represented. All participants worked within a team. A detailed overview of participant demographics is provided in Chapter 4.

Reach

The reach of CTG had limited success ('dimensional outcome' = limited success + 'dimensional applicability' = limited success = (1+1)/2=1 'limited success'). CTG reached 448 participants of the estimated 1500 employees working at the intervention and control worksites (29.86%). Male employees (n=332) were more likely to respond than female employees (n=116) (26% of the 448 employees who responded to recruitment communications were female). This data is consistent with the proportion of females who work in the participating organisation (i.e., 30% reported in 2016 Annual Report). Demographics such as age, job role and department were not collected during recruitment.

Challenges to recruitment

However, it appeared the programme had not been effectively communicated by the organisation or management teams to either the intervention or control worksites prior to the programme commencing:

‘People were asking, what are you doing, what’s with this sport thing? How do you get involved in the sports challenge? There were a number of people who hadn’t heard about it. The company could have helped sell it more. It wasn’t sold very well around the workplace [male team manager aged 47, CTG participant]’
5080 UK based employees. 1500 employees on intervention (n=1000) and control (n=500) sites

### Reach (less successful)
- 448 Employees (29.86% intervention/control sites)

### Challenges to programme reach
- Lack of communication (occupational health)
- Lack of communication from team managers

### Efficacy (highly successful)
**Individual health**
- Improved VO₂ Max
- Positive influence PA and health behaviour
- Protects from BMI increases
- Reduced stress

**Social group health**
- Improved communication
- Hierarchical and organisational barriers removed
- Improved cohesion
- Improved knowledge of peers
- Networking

**Organisational health**
- Transferable skills from sport
- Healthy workplace
- Improved productivity

### Adoption (moderately successful)
- Attendance (total) (48.13%)
- Adjusted attendance (56.42%)

### Challenges to adoption
- Job demands
- Workplace culture
- Lack of support from colleagues, managers, and organisation
- Lack of organisational ‘buy in’

### Implementation (highly successful)
- Autonomy support (60.53±15.05)
- Autonomy (choice) (71.38±14.05), internal perceived locus of causation (volition) (94.6±7.37)
- Competence (74.74±12.15)
- Relatedness (76.40±11.30)
- Basic needs scores predicted by autonomy support ($F_{(5, 22)}= 2.857$)

### Maintenance (moderately successful)
Physical activity participated in post-programme.
- Squash (3.7%), Running (11.1%), Gym (7.4%), football (22.2%)
- Activities participated in during lunch-breaks
- 44.5% of participants continued with activities outside working hours.
- 7.4% of participants walk or cycle to work post-programme.

### Challenges to long-term maintenance
- Communication of health promotion
- Workplace culture
- Funding
- Lack of leadership

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**Figure 5.1: Schematic Overview of Process-Evaluation Findings.**
**Efficacy**

The efficacy of CTG was highly successful. More specifically, efficacy was rated highly on both dimensional outcomes and applicability ((3+3)/2=3). Participation in CTG significantly improved VO₂ Max and interpersonal communication (Brinkley et al., 2017c; see Chapter 4). Participation in CTG also positively influenced PA behaviour, and protected from significant increases in BMI (Brinkley et al., 2017c; see Chapter 4). Qualitative data indicates CTG may have further benefits for individual, social group and organisational health.

**Individual health**

**Behaviour change**

During individual interviews, participants described how their PA behaviour had been influenced by participation in CTG. For example, participation in CTG appeared to have the capacity to develop perceptions of competence and improve self-efficacy for participation in leisure-time PA. Moreover, participation in the intervention may provide identified motivational regulations for sport and exercise:

> ‘It is the sport and what that has enabled me to do since. I’ve now been going out for walks and doing more, whereas before I just use to sit in front of the TV or do the minimum. Sport gave me the confidence that I am able to do this. I have got the confidence to go out and enjoy myself and forget other people [Female team manager aged 50, CTG participant]’

Participation in CTG appeared to positively influence perception of competence and relatedness. More specifically, markers of basic psychological needs associated with controlled forms of autonomous motivation (i.e., identified and integrated regulation) were reported by participants. Therefore, CTG may have provided an activity to reengage with sport:

> ‘It gives you an intro to sport, it helped me take up sport in my spare time. I enjoyed it and because of this I have taken up cricket outside
work where one of my mates plays for a cricket club on a regular basis

[Male advisor aged 41, CTG participant]’

These reports are consistent with outcome measure data, and the reports of participants in the post-programme questionnaire. The intervention group participated in more MET minutes of total and vigorous PA, and spend less time sitting from T₀ to T₁ (see Chapter 4).

**Awareness of health**

Participation in CTG was also reported to influence perceptions of personal health. Participants suggested their participation in CTG had increased their awareness of their personal health in the workplace (e.g., time spent sitting), the time available for participation in PA and the impact of their lifestyle upon their health. In many cases, these factors influenced the adoption of identified motivational regulations for health behaviour change:

‘It made me realise quite how unfit I was, and the programme led me to taking the worst excesses out of my life. It was a catalyst for getting a bit more exercise. So yes, it contributed as part of a long-term change

[Male project manager aged 39, CTG participant]’

**Psychological wellbeing**

Participation in CTG may have the capacity to positively influence mental health and wellbeing. For example, several participants described an association between their participation in CTG and reduced personal and workplace stress. CTG perhaps provided participants an outlet and reprieve from lifestyle and workplace issues contributing to stress:

‘I feel better. I am going through a lot of personal issues in my life at the moment. So, for me it was also a chance to get some tension relief by actually doing some physical exercise, some running around. It was a complete break from work, so turning off your brain from focusing on a PC screen and doing something that is completely different. It is a chance to totally forget about it, and do something that is releasing endorphins within the body, I don’t know what ever sport does for you
that makes you feel better, because I do feel better after playing sport.

[Male IT analyst aged 44, CTG participant]

Participation in CTG also provided several participants an activity to disassociate from workplace stressors and issues:

‘Even though you tell yourself to step away from that situation when you get stressed and go do something else. Well in reality you tell yourself this but you really just say ok, well I will do a bit more, and before you realise you have gone and got more stressed. So, with this programme, you’ve got to stop now and you’ve got to go do it. So, I think that’s the good thing about it, it forces you to actually step away from the office. [Male team manager aged 47, CTG participant]

The study’s outcome measure data provides some support for these interpretations. Whilst these results were non-significant, it should be noted markers of the intervention groups subjective wellbeing and quality of life increased over time, while markers of stress decreased over the duration of the programme (see Chapter 4).

Perceptions of physical health

Data collected from the study’s outcome measures indicates participation in CTG has the capacity to contribute to significant adaptations in aerobic capacity (i.e., VO$_2$ Max), whilst offering significant protection from increases to BMI (see Chapter 4). The reports of participant’s post-intervention reflect these adaptations. More specifically, participants observed positive changes in their physical fitness and body mass. Several participants appear to ‘benchmark’ their fitness with tangible activities such as climbing the stairs or their performance in the intervention sessions. For example, several participants observed these positive adaptations in their physical fitness:

‘It was clear for me my fitness had improved. When we came back to work, and I was walking up and down the stairs, because I am on the fifth floor. It just got easier to do that, I thought I actually can just go up the stairs, rather than take the lift. I was like I still have the energy and
the more I did the better I felt [Male technical expert aged 50, CTG participant]

Interestingly some participants reported observing reductions in body mass throughout the duration of the programme:

‘I have lost a massive amount of weight. I can fit into trousers that I haven’t worn for a few years and I had to tighten up a couple of notches on the belt. I have lost a fair few pounds. [Male project manager aged 39, CTG participant]’

**Social group health**

*Cohesion and communication*

Participation in CTG was reported to develop cohesion and promote communication within the workplace. Participants and workplace champions explained how their attendance had improved cohesion with their fellow participants and influenced the style in which they communicate:

‘In reality, you don’t know many people in the business or even your team for that matter. So, you get to meet new people obviously through the sport. When I see them in the lift, I have a chat with them, or when I see them in the queue for lunch. So, it’s really helped from a social engagement perspective [Male advisor aged 24, CTG participant]’

A cohesive environment appeared to influence interpersonal communication. Participants and champions described learning more about their colleagues’ preferences, personal-life, personality and job role while participating in CTG. Improved cohesion and interpersonal relationships may have improved, and contributed to the adoption of open communication:

‘I definitely believe that it opens up channels of communication within the organisation that you wouldn’t necessarily have or have been able to have used. So, in the past, if I had an issue I would have never normally have approached Sarah [CTG participant]. I had no idea what she does, but now all of a sudden, I know which floor she is based, so if I have something I am not certain of I might go and hunt her down
and ask her. I have a familiar face in that part of the organisation, which I wouldn't have had if I hadn't gone and played team sport [Male team manager aged 47, CTG participant]'

Indeed, data collected from outcome measures indicates participation in CTG improved group cohesion and significantly improved communication in the workplace (see Chapter 4).

Functional relationships

CTG was reported to improve interpersonal relationships within the workplace. Participation provided an environment whereby colleagues and superiors could interact without the logistical (e.g., differing offices and departments) and hierarchical (e.g., differing levels of superiority) constraints present within the workplace. A cohesive environment which promoted open communication was reported to contribute to improved interpersonal relationships within the workplace.

For example, several participants explained how their participation in CTG had developed interpersonal relationships with colleagues they had not met prior to the programme commencing. Some participants explained how the social interactions associated with team sport developed sustainable relationships in the workplace:

‘When you are playing sport, you don’t have conversations about work. You are not there to talk about anything really. But you are building a relationship through working together. So, I am going to pass the ball to you or I am going to congratulate you for getting that shot away, or you say sorry when you bump into someone. Those little interactions mean a lot by the end of it. So, you build up little things like that with each other, which then you can talk about when you are back at work. They seem more long-lasting [Female senior advisor aged 25, CTG participant]’

CTG also contributed to maintaining existing relationships within the workplace. For example, several participants suggested participation in CTG
offered an opportunity for face-to-face social interactions with distant colleagues, which in turn maintained their interpersonal relationships:

‘I think it always helps to speak to someone face-to-face. It really helps your relationship with them, when you see them face-to-face there is more of a human element, it’s easier to see their reaction face-to-face. So, I think the programme has really helped develop those relationships. Because although we are all in the same building, we are on different floors, and you go days without seeing certain people, and that’s how barriers get created. This programme has really helped break down those barriers with my colleagues [Male lead planning analyst aged 45, CTG participant]

Networks and productivity

The improved presence of cohesion, open communication and functional interpersonal relationships within the workplace were reported to develop work-related outcomes such as networking and productivity. In terms of productivity, some participants and champions had effectively used the networks they had created during CTG within their role in the organisation:

‘So now I have a network of people including Gill in HR. She has helped me on numerous occasions, because I thought I know her, I will go and have a chat to her, and I did. There was also a guy, and we were competitive with each other, I think I know who you mean, Tom, and I have been to him on a number of occasions to help my team with a fix that needs fixing. So, I didn’t know him before that, and I just thought it didn’t matter what happened in the hall, as soon as we finished from there, we were back to being a normal selves and we didn’t hold grudges, no matter what happened in the hall [Female team manager aged 50, CTG participant]

Data collected through outcome measures indicate team performance marginally improved, however non-significantly in the intervention group.

Organisational health

Productivity
Productivity was reported to improve following participation. Improvements in individual productivity were attributed to the exertion associated with team sport. More specifically, several participants found their participation to improve their concentration and focus in the workplace:

‘Every Wednesday afternoon, I could really see a difference in my concentration, I stayed even later Wednesday evening purely because I had the energy to do that. It lifted the fog, because I was buzzing. I know there is a hormone that gets released but I don’t know what that is, but that was it, it was really helping [Female team manager aged 50, CTG participant]’

Data collected through the study’s outcome measures reflects these perceptions of improved productivity. With marginal increases in job performance being observed in the intervention group.

**Adoption**

The adoption of CTG was considered moderately successful. Adoption was rated moderately on both dimensional outcomes and applicability \(((2+2)/2=2)\). Twenty-seven of the 28 participants in the intervention group attended at least one CTG session (no participants attended all CTG sessions). Excluding the one participant who did not attend any intervention sessions, the average attendance across the 27 participants was 48.13%. The adjusted attendance rate for frequent nonattendance (<25% of intervention sessions) \((n=23\) participants\) was 56.42%. At least 75% of participants \((21\ of\ 28\ participants)\) completed all \(T^1\) outcome measures across the study duration.

A series of one-way ANOVAs (see Figure 5.5) examined week-by-week attendance. No significant differences were observed between weeks 1-9 and weeks 11-12 \((P>.05)\). A significant difference between participants was observed at week 10, where participants played soccer \((P<.037, \eta^2=.276)\). Post-hoc test reveal significantly \((P<.037)\) less participants attended week 10. Soccer was the least successful sport in weeks 4 and ten (34% attendance). Basketball in week 3 and handball in week 10 were the most successful sports with 67% attendance.
A series of one-way ANOVAs were conducted across attendance and demographic data. More specifically, females (49.95±22.20) were more likely to attend than males (47.36±22.91). The attendance difference between genders was non-significant ($F(1,25) = .73, p = .789$). Employees with dependents (48.52±19.81) were more likely to attend than those without (47.46±27.18). However, this was a non-significant difference ($F(1,25) = .14, p = .908$) between those with and without dependents. Likewise, superiors (40.70±32.07) were less likely to attend than employees without superiority responsibilities (51.84±15.27). Despite a difference of 11.14 in attendance percentage, this difference remained non-significant when examined ($F(1,25) = 1.529, p = .228$).

Employees who were inactive (i.e., not meeting PA guidelines >150’ PA per-week) were more likely to attend (61±19.05) than minimal active employees (i.e., meeting recommended guidelines of >150’ of PA per-week) (50.48±23.84) and employees participating in health promoting levels of PA (i.e., >300’ PA per-week) (36.90±16.56) (See Craig et al., 2003). Non-significant differences were however identified between inactive employees and minimally active employees (95% CI [-20.21, 41.24], $t(18) = .719, p = .482$) and employees participating in health promoting levels of PA (95% CI [-3.3, 51.50], $t(8) = 2.028, p = .077$). Likewise, there was a non-significant difference between minimal active employees and employees participating in health promoting levels of PA (95% CI -6.99, 34.16), $t(22) = 1.369, p = .185$).

Employees who were in full-time employment (i.e., >35 hours, <40 hours per week) (44.04±20.78) were less likely to participate than employees working over-time (i.e., >40 hours per week) (52.53±23.87). However, the differences between attendance was non-significant ($F(1,25) = .976, p= .333$). Participants were categorised as young adults (i.e., 18-35 years), middle-aged adults (i.e., 36-55 years) and old-aged adults (i.e., >55 years). Young adults (53.78±20.87) were more likely to participate than middle-age adults (44.97±23.70) and older adults (M=33.33). Non-significant differences were identified between young-adults and middle-aged adults (95% CI [-9.67, 27.29], $t(24) = .984, p = .335$) and older adults (95% CI [-28.11, 69.02], $t(10) =$
.938, p = .370). Likewise, there was a non-significant difference between middle aged and older adults (95% CI -40.85, 64.14], t(14) = .476, p = .642).

Obstacles to attendance

The attendance of participants was challenged by interpersonal and organisational factors. Despite sessions being conducted during lunch-breaks, participants described how workplace demands challenged their participation:

‘Work gets in the way. There was always a meeting at eleven o’clock which was supposed to finish at twelve, but it often carried on till ten past, twenty past. I thought stuff it, and started walking down the stairs while they were talking to me and got changed downstairs and said look I’ve got to go now. I should have said I can’t do this, because I had done my actions, I had my time to talk. But it is just not the done thing to disappear [Male systems specialist aged 53, CTG participant]’

Despite CTG being supported by the board and senior management, several participants believed the organisation did not provide enough support for their attendance:

‘There is a lack of buy in from the organisation with things like this. I think with the business it comes down from like the board and think there is it well communicated, but when it is individual things like this, they [colleagues and superiors] haven’t always done as well. I don’t remember that much pushing or support from the organisation about it [Team manager, male aged 47, CTG participant]’

A lack of support for CTG may be explained by the pressure placed on downsizing the organisation through recent financial pressure:

‘There is not enough people doing most of the jobs, they slimed it all down and restructured it. Everyone is so busy, so as soon as you throw extra responsibilities in the mix, they commit thinking it is only twelve weeks, it is only a short-term thing, and then actually that is a lot [Finance manager, female aged 31 CTG champion]’
Figure 5.2: Changing the Game attendance over 12-weeks. (WK = Week). Standard error bars are displayed.
Facilitators to attendance

Attendance at CTG was facilitated by intrapersonal, interpersonal, organisational and environmental factors. From an intrapersonal perspective, some participants commented their attendance was based on their enjoyment of PA, motivation to improve personal health outcomes (e.g., weight, fitness, behaviour) or willingness to develop within the organisation. In many cases, participants reported an innate disposition and integrated motivational regulation to participate in sport:

‘For me I loved it. Because I love sports. I have always been a sports person, so for me that really helped me enjoy it [Male systems specialist aged 53, CTG participant]’

Furthermore, acceptance from colleagues, social support, and more importantly group membership were reported as facilitators to participation. For many participants, the social support associated with participation allowed them to negotiate the intrapersonal challenges they faced with participation:

‘it was such a social thing. I thought we really egged each other on. I just thought it was a great bunch of people, we all fitted really well together, we all mixed with each other. We are a team, encouraging each other to play, the way we wanted. [Female team manager aged 50, CTG participant]’

In some cases, organisational factors such as the support of superiors and colleagues were reported by participants to facilitate participation in CTG. Participants reported their colleagues as supportive of their participation. For example, participants commented on how factors associated with integrated motivational regulations for participation such as their colleague’s inquiry, interest and banter supported their participation in CTG:

‘[My colleagues] were very encouraging and supportive. I have made no secrets that I want to improve my health over the next 12-months. So, it was important for me that people knew, and that they were willing to have a little bit of a laugh with me and a joke about the sports we were doing. Like where was my netball skirt, that kind of thing, that makes me laugh and it encourages me a bit more. Any problems or
concerns, I was able to talk to them. [Male project manager aged 39, CTG participant]

In most cases, direct superiors (e.g., line managers) were reported as supportive of participation. Participants suggested their superiors supported their participation through promoting quality work over the quantity of work. More specifically, superiors were reported to provide their employees trust and autonomy to manage their own workload and time. This support allowed employees time to participate in CTG:

‘He wants to make sure his team enjoys being at work and feel like they are supported with stuff like this. He expects me to work at least my contracted hours, however as long as I am working those hours and I am producing the work, it doesn’t really matter one day if I take an extra bit of time one day. He trusts me, and that trust gives me that flexibility [Male advisor aged 24, CTG participant]

Implementation

The implementation of CTG can be categorised as highly successful. Implementation was rated highly on its dimensional outcome and moderately on its applicability (3+2/2=2.5).

CTG was underpinned by self-determination theory which proposes that meeting basic psychological needs for autonomy, competence and relatedness fosters optimal functioning, well-being and autonomous motivation (Deci & Ryan, 2000a, 2000b). Thwarting these basic psychological needs is known to lead to poor wellbeing and controlled forms of motivation (Deci & Ryan, 2000a, 2000b). For example, providing sessions which do not offer participants a choice and ownership (autonomy), sports which are not adaptable or do not have transferable skills (competence), and an environment which is not socially supportive (relatedness). CTG supported basic psychological needs through an autonomy supportive leadership style (see Chapter 4).

Autonomy support (workplace champions)

A key component of CTG was the delivery of team sport. This was conducted by two female workplace champions. The aim of this delivery was
to create an AS environment. Prior to the programme commencing, both workplace champions completed training delivered by the first author (i.e., education sessions covering; autonomous motivation, supporting basic psychological needs and leading intervention sessions). This encouraged workplace champions to adopt an autonomy supportive leadership style which welcomed the thoughts and perspectives of participants, provided knowledge to enable participation, and created a setting for self-directed participation. Working together, both workplace champions led intervention sessions using this autonomy supportive style:

‘I was making sure everybody was involved and people weren’t getting left out and that people understood what they were going to have to do. With football for example, people assume that everybody knows what the rules are and how to kick a ball and stuff like that, and a lot of people don’t and if you don’t watch it or you’ve never played it before you’re not going to know how to kick a ball, you’re not going to know what the rules are. It’s about making sure people know they are in a safe environment and you know if that’s worked because they say actually look I don’t get it Laura [Female business analyst aged 36, CTG Champion]’

Subsequently, on the process evaluation questionnaire, high ratings of autonomy support (i.e., over the mid-point of 50) as measured through the SCQ, were reported by CTG participants (mean 60.53±15.05).

**Autonomy**

Qualitative data reflects how workplace champions provided participants the autonomy to contribute to the structure of the sessions:

‘She [workplace champion] offered us the choice on how we could solve different numbers on each team, we decided that we would let one person move up and down the pitch on one team in netball. Because you can normally only move a quarter or a half? It helps because sometimes someone is quite strong willed and strong minded, they will try and fit the sport around their best needs, so they can win. Having someone there independently helps to set up the sports, give
you the rules, give you the equipment and off you go [Male systems specialist aged 53, CTG participant]’

Offering a choice, provided volition and a sense of ownership to participants. Participants explained how ownership and a choice influenced markers of autonomous motivational regulation such as enjoyment and internalised-control:

‘We never had a set game. We changed the rules as we were going along. So, we had a time restricted innings rather than three strikes and you are out, that kind of thing. Yeah, I think it worked well. It allows us to own the rules as we are going along, there is a real sense of ownership there. As far as changing the rules as we go along, that is reflective of how I really enjoyed the sessions we did. It felt like we owned it with a little bit of input or guidance from the [champions] [Male project manager aged 39, CTG participant]’

Participants scored highly (mid-point 50) on markers of autonomy such as choice (mean 71.38±14.02), internal perceived locus of causality (mean 80.43±13.66) and volition (mean 94.6±7.37).

**Competence**

Data from the process evaluation questionnaire found that CTG participants rated highly on basic psychological needs for sports competence following participation in the programme (mean 74.74±12.15). The intervention programme was designed to support needs for competence by offering participants sports that could be adapted to their own rules, and which required skills and traditions which were transferable between the sports, such as catching in cricket and rounders, and similar spatial awareness skills for soccer and handball (Deci & Ryan, 2000a, 2000b). During interviews, participants described how the ease of learning sports through adaptions in their rules, traditions and style of play supported needs for competence:

‘Yeah they were all very easy to learn I think. You have got to appreciate that we are not there at the Olympics. So, do we have to
follow every single rule, no, it is just a little bit of fun. So, in that, it makes it easy to learn because you just need to know the basics really

[Female senior advisor aged 25, CTG participant]

Some participants engaging in CTG had experiences of playing team sport (e.g., football). For these participants, basic psychological needs for competence were supported by the novelty of some sports played during CTG. This facilitated identified motivational regulation to participate through providing a new skill to master, an intensity to participate at or tactic to exploit:

‘Handball, I really enjoyed that if I’m honest. It was something completely different, it was something I’ve never really tried before. So, to try something different, and to take to it straight away. That was really nice. One of the things I liked about it. It’s a simple game to play. I think it might be because it is high intensity. I think the high intensity could be the thing there, because you are really moving, you are really pushing yourself [Male lead planning analyst aged 45, CTG participant]’

Furthermore, the reports of participants indicate participation in CTG offered an environment which supported needs for competence. Social support and observing changes in personal skill, fitness and technical proficiency appeared to foster needs for competence, and contribute to optimal functioning and wellbeing. As a result, In many cases participants reported integrated regulation to participate:

‘Day one, I wasn’t as puffed out as I was expecting, I had to stop a couple of times, but I would have thought I would have had to stop a lot more, and the team were great, you felt safe in that environment, nobody was kind of like judging, which is what I am use too. The champions have the patience, and also some of the guys would help and say don’t do it that way, do it this way, and I think that helped, particularly with football, because I was ok when I was walking, but as soon as I had to run and had to lift my foot up and the ball came at speed, it just went underneath my foot. That sort of gave me the confidence that I can do it, I am still able to pick up stuff that I learnt
when I was eleven or twelve. They want you to succeed, and I think that is what maybe rubbed off, so I haven't fell over, I've held my own, I've done whatever I need to do and I felt on top of the world if you like [Female team manager aged 50, CTG participant]

**Relatedness**

Relatedness was rated highly by CTG participants (mean 76.40±11.30). Supported needs for relatedness may be explained by the qualitative data collected. In many cases, the relatedness provided by the intervention provided integrated motivation to participate in sport. The CTG intervention offered a form of PA where colleagues shared the organisational challenges to PA within the workplace:

'We all understand the pressures we are under, we all understand why we are doing it [CTG], I think because the company approves it, it all helps, because you all work under the same flow processes, you all work in a similar way [Male systems specialist aged 53, CTG participant]

This sense of group identify was also described by participants to promote group cohesion and provide encouragement to participate:

'I found it really encouraging playing with these people. Because they are there for the same reason as you, they want to get a bit fitter, so we are there to encourage not to criticize, people are always different skill levels to everybody else, so it's just about encouraging them and playing well together [Male technical expert aged 50, CTG participant]

Participants explained that the cohesive group environment associated with CTG could provide social support and promote self-efficacy to participate:

'I am big lady and because I am unfit, I am fifty, I thought people would judge and say I don't want her on my team and that's why I did say to a few people I knew, don't pick me last, and I am not that kind of person normally, but that was going back to school, where it was a little bit like that, but I didn’t feel any of that here. I felt as if, whatever team I was on, I gave it my all, I couldn’t do anymore, and I encouraged other
people and got encouragement from other people. They wanted me to succeed and the team to succeed. Rather than looking after themselves [Female team manager aged 50, CTG participant]'

**Are basic psychological needs predicted by an autonomy supportive workplace team sport programme?**

Descriptive statistics and Pearson correlations were computed between SCQ and BNSSS scores (see Table 5.6). Autonomy support was significantly correlated with competence \( (R=0.354, p < 0.032) \), internal perceptions of the locus of causality \( (R=0.251, p < 0.014) \) and relatedness \( (R=0.420, p < 0.013) \). Competence was significantly correlated with choice \( (R=0.839, p < 0.0001) \), internal perceptions of the locus of causality \( (R=0.802, p < 0.0001) \), volition \( (R=0.527, p < 0.002) \) and relatedness \( (R=0.416, p < 0.014) \). Perceptions of choice were significantly correlated with internal perceptions of the locus of causality \( (R=0.641, p < 0.0001) \) and volition \( (R=0.494, p < 0.004) \). Internal perceptions of the locus of causality were significantly correlated with volition \( (R=0.579, p < 0.001) \) and relatedness \( (R=0.574, p < 0.001) \). Volition was significantly correlated with relatedness \( (R=0.331, p < 0.043) \). AS and relatedness were not correlated with choice.

Standard multiple regression was conducted with autonomy support and basic psychological needs (i.e., competence, choice, internal perceptions of the locus of causality, volition and relatedness). Basic psychological needs scores were significantly predicted by autonomy support \( (F^{5, 22} = 2.857, p < 0.039, R^2 = 0.394) \) (see Table 5.7). This analysis was sufficiently powered \( 1-\beta = 0.845 \).

**Maintenance**

The maintenance of CTG was rated as moderately successful. More specifically, maintenance was rated moderately on both dimensional outcomes and applicability \( ((2+2)/2=2) \). Thirteen participants (44.5%) continued with the leisure-time and workplace physical activity they were participating in prior to CTG. Fourteen participants participated in additional physical activity in their workplace or with their colleagues since completing the CTG intervention programme. More specifically, since completing CTG two participants had begun active commuting (7.4%), and during the working week, two participants attended the gym at lunch (7.4%), six participants had...
taken up indoor football during lunch (22.2%), one participant had taken up squash during lunch (3.7%) and three participants has started running during lunch (11.1%). However, many participants identified challenges in maintaining participation in team sport for the long-term. These included communication, culture, funding and leadership within the organisation.

**Communication and culture of health and wellbeing within the workplace**

Health and wellbeing messages and programmes appear to have a low reach due to the style and level of communication adopted by the organisation. Participants described the importance of changing the culture within the workplace. Despite pressure from the employer to implement novel forms of workplace health promotion, a culture driven by health and safety and high workplace demands challenged the maintenance of CTG:

‘I think quite often, if people are out there enjoying it then other people want to get involved as well and it kind of has that effect. I think there needs to be something or someone higher up that says there be no meeting booked between this time and this time, because people don’t have the time. I think we would struggle to change the way it is at the minute [Senior advisor, female aged 25, CTG participant]’
Table 5.6: Descriptive statistics and Pearson correlations for autonomy support, competence, choice (autonomy), internal perceptions of the locus of causality (autonomy), volition (autonomy) and relatedness. *P<.05, **P<.01, ***P<.001.

<table>
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<tr>
<th></th>
<th>M</th>
<th>SD</th>
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<th>2</th>
<th>3</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Autonomy support</td>
<td>60.53</td>
<td>15.05</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Competence</td>
<td>74.74</td>
<td>12.15</td>
<td>.354*</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Choice</td>
<td>71.38</td>
<td>14.02</td>
<td>.251</td>
<td>.839***</td>
<td>-</td>
<td></td>
<td></td>
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<tr>
<td>4. Perceived internal locus of causality</td>
<td>80.43</td>
<td>13.66</td>
<td>.417*</td>
<td>.802***</td>
<td>.641***</td>
<td>-</td>
<td></td>
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<tr>
<td>5. Volition</td>
<td>94.61</td>
<td>7.37</td>
<td>.568***</td>
<td>.527**</td>
<td>.494***</td>
<td>.579***</td>
<td>-</td>
</tr>
<tr>
<td>6. Relatedness</td>
<td>76.40</td>
<td>11.30</td>
<td>.420*</td>
<td>.416*</td>
<td>.278</td>
<td>.574***</td>
<td>.331*</td>
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Table 5.7: Summary of multiple regression analysis predicting autonomy support from autonomy support, competence, choice (autonomy), internal perceptions of the locus of causality (autonomy), volition (autonomy) and relatedness. *P<.05.

<table>
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<th></th>
<th>B</th>
<th>SE^\text{b}</th>
<th>(\beta)</th>
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<tbody>
<tr>
<td>Constant</td>
<td>-61.898</td>
<td>(-133.27, 9.40)</td>
<td>34.418</td>
<td>.086</td>
</tr>
<tr>
<td>Competence</td>
<td>.212</td>
<td>(.801, 1.224)</td>
<td>.488</td>
<td>.171</td>
</tr>
<tr>
<td>Choice</td>
<td>-.203</td>
<td>(-.898, .492)</td>
<td>.335</td>
<td>-.189</td>
</tr>
<tr>
<td>Perceived internal locus of causality</td>
<td>-.047</td>
<td>(-.786, .693)</td>
<td>.356</td>
<td>-.042</td>
</tr>
<tr>
<td>Volition</td>
<td>1.043</td>
<td>(.163, 1.924)</td>
<td>.424</td>
<td>.511</td>
</tr>
<tr>
<td>Relatedness</td>
<td>.342</td>
<td>(-.224, .908)</td>
<td>.273</td>
<td>.257</td>
</tr>
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Leadership of health and wellbeing within the workplace

For the maintenance of CTG to be a success, participants frequently commented upon the importance of a leader within the workplace to organise and deliver sport to colleagues:

‘I really hope we are able to carry it on, that’s all I would like to say, and I would like for it to happen within our organisation and it to be supported by them, for them to find a champion and if they need someone to step up I think you could choose any one of the people you saw there and I think all of us could encourage more participation [Male team manager aged 47, CTG participant]

However, job demands and pressure from managers, challenged the potential of some participants championing CTG over the long-term:

‘I just wish we could continue doing it. But you know if we haven’t got somebody leading it, it won’t happen.

AB: Ok did you think you would help lead it?

‘I have not got enough time at the minute to lead it, but I would support it. My boss has got me running ragged [Male technical expert aged 50, CTG participant]

Despite this, some participants and workplace champions suggested a style in which workplace team sport could be managed within the workplace. More specifically, sharing the demands of leadership, organisation, communication and style of delivery of workplace team sport was suggested to reduce the burden placed on an individual employee and moreover the organisation, and occupational health teams:

‘I think we could change it. So, it is not the end of the world if people don’t turn up providing the people who have the hall can still do something, they can still have a game. So rather than it being organised in a really structured way, it could just be a drop-in where people can just turn up too. I’ve done that with team sport before. We could do it as a forum, and it just happened every week and everyone
would know it is there. [Female business analyst aged 36, CTG Champion]’

**Funding for health and wellbeing**

CTG was funded by the researcher’s university. This funding covered the cost of the sports equipment, resources and time associated with organisation, and the cost of hiring the sports hall. Participants acknowledged that a financially supported programme influenced their participation:

‘I think if people had funded it themselves, you may have had less interest, I think funding it gives people the chance to try it [Male lead planning analyst aged 45, CTG participant]’

When the long-term maintenance of the programme was discussed challenges relating to self-funding participation were highlighted. For example, several participants commented on how their employer could use their resources to fund their participation:

‘It is a multi-billion pound company, we are not talking about hundreds of thousands of pounds or even thousands of pounds worth of equipment, its less than hundred, we are talking about half a dozen footballs, a couple of cricket sets, we are talking about something that is significantly less outlet finically than my whole departments fund for the Christmas party which is given to us. [Male advisor aged 41, CTG participant]’

**Discussion**

**Summary of findings**

**Reach**

The CTG programme reached a modest percentage (29.86%) of the intervention and control worksites. Previously, the reach of workplace team sport studies has been poorly reported. Indeed, only Barene et al. (2013) reported a reach of 19.25% for the eligible population. Interestingly, the reach of workplace team sport appears to be less than other forms of group PA such as activity challenges (32.24%) (Dishman, DeJoy, Wilson & Vandenberg, 2009). The 2016 and 2017 annual reports from the participating organisation
consistently echoes the importance of participation in PA in the workplace. However, recruitment communication for CTG was reported as being ineffective by the participants in the process evaluation due to the communication strategy within the organisation and lack of support by middle management and team leaders (e.g., not offering direct support). Managers and superiors are influential stakeholders in encouraging participation and adherence to research studies and health promotion programmes (Brinkley et al., 2017b; Caperchione et al., 2015; Gilson, McKenna & Cooke, 2008). CTG participants may have been amotivated to participate due to negative social comparisons with the behaviour of their superiors and managers or due to workplace demands (Gilson et al., 2008; Teixeira et al., 2012).

**Efficacy**

Quantitative and qualitative data collected from participants indicates CTG had a high level of efficacy. The data presented is consistent with what has been previously confirmed (see Chapters 2 & 4; Brinkley et al., 2017a, 2017c), in that participation in workplace team sport positively influences individual, social group and organisational health outcomes.

**Individual health outcomes**

Consistent with the findings of other workplace PA programmes, CTG positively influenced PA and health behaviour (Burn et al., 2017; Kinnafick, Thøgersen-Ntoumani & Duda, 2016; Malik et al., 2014). It is plausible CTG’s theoretical underpinnings supported basic psychological needs for autonomy, competence and relatedness (Deci & Ryan, 2000a, 2000b). Supported basic psychological needs are known to contribute to optimal function and wellbeing, and the adoption of autonomous forms of motivational regulation (i.e., identified, integrated, intrinsic) (Gucciardi & Jackson, 2015; Teixeira et al., 2012).

Providing support for the findings of Chapter 4, participation in CTG was reported to offer respite and allow participants to disassociate from personal and workplace stressors. Previous evidence has indicated PA can positively influence psychological wellbeing (Penedo & Dahn, 2005; Scuamanna et al., 2017; White et al., 2017), and play a role in the effective
treatment and protection from common mental health conditions such as anxiety and depression (Penedo & Dahn, 2005; Scuamanna et al., 2017; White et al., 2017).

**Social health outcomes**

The current study found participation in team sport to positively influence communication and cohesion, interpersonal relationship and creating workplace networks between participants. Broadly, these reports provide further support for the findings presented in Chapter 4, and what has been previously demonstrated within the literature (See Chapter 2 & 4; Adams et al., 2016; Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Lee, 1991). On a work-group level, informal levels of communication and the promotion of informal relationships present within CTG was reported to create and improve networks within the workplace and support organisational communication and knowledge (Crosling & Ward, 2002; Gibson, Hardy III & Buckley, 2014). Participation in workplace team sport is thought to develop interpersonal relationships and communication between colleagues (See Chapter 1; Adams et al., 2016; Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Lee, 1991). It is plausible participation in workplace team sport may have fostered the social implications of informal relationship and communication such as friendship, socialization and group affect (e.g., attachment) between colleagues (Michael & Yukl, 1993).

**Organisational health outcomes**

Participants perceived CTG to influence their productivity through improvements in cognitive function. Improvements in cognitive function are an established outcome following participation in PA (Chang, Labban, Gapin & Etnier, 2012). Participation in high intensity PA is thought to positively influence cognitive function through heightened endorphins, serotonin and dopamine and improved brain-derived neurotrophic factor (Chang et al., 2012).
Adoption

The adoption of CTG can be considered moderately successful. Evidence has previously indicated workplace PA programmes to have a low level of adoption over the short term (Ryde, Gilson, Burton & Brown, 2013; Walker, Tullar, Taylor, Romàn & Amick, 2017).

The findings of the current evaluation suggest workplace team sport can be considered an effective form of PA with low dropout rate over time. Indeed, CTG was successful at engaging 75% of participants from $T^0$ to $T^1$. This figure is consistent with previous workplace team sport interventions at 12-weeks (75%) and at 40-weeks (58.5%) (Barene et al., 2014), and a multiple-component intervention (65.2% & 76%) using elements of team sport (Burn et al., 2017).

Previous workplace team sport studies are yet to report detailed accounts of their respective week-by-week attendance rate or analysis of their participants’ attendance across demographic data (see Chapter 2; Brinkley et al., 2017a). This has limited researchers understanding of the feasibility of workplace team sport, and acceptability of differing forms of workplace team sport. CTG had a modest attendance rate of 56.42% once adjusted for frequent non-attendance (i.e., less than 25% attendance). Soccer was found to be the least successful sport in terms of attendance (34% in weeks 4 and 10), whilst basketball in week 3 and handball in week 12 proved to be the most popular with 67% attendance respectively. A low attendance rate for soccer may be explained by a lack of expertise in this sport. Sports such as soccer are known to challenge perceptions of competence, and likewise reduce participation (Vlachopoulos, Karageorghis & Terry, 2000).

Modest attendance rates observed in CTG may be explained by several interpersonal, organisational and environmental factors such as pressure to work, employer attitudes, workplace culture, downsizing in the organisation or returning to work (See Chapter 3; Brinkley et al., 2017b). Data comparing attendance across superiority (i.e., superiors’ vs non-superiors’) highlights that employees in a position of superiority were less likely to attend than employees without superiority. The inverse relationship between
participation in workplace PA and sport and workplace demands (e.g., hours, workplace pressure, expectations) is well-established within research (Brinkley et al., 2017b; Cole et al., 2015; Keegan et al., 2016).

Interestingly, employees participating in the least amount of PA were the more likely to attend than employees meeting PA guidelines and employees exceeding these guidelines. Furthermore, participants reported participating for motives relating to weight loss, improvements in fitness; factors typically associated with individuals who are currently inactive (Teixeira et al., 2012). Therefore, it can be argued these employees may have been participating through autonomous forms of extrinsic motivation such identified regulation (Teixeira et al., 2012).

**Implementation**

Evidence indicates CTG is a programme with a high level of efficacy due to its successful implementation which was underpinned by SDT, whereby needs for autonomy, competence and relatedness were supported. Participants rated their basic psychological needs and the provision of AS as high (i.e., over the mid-point) following participation.

At the end of the intervention, perceptions of needs the provision of AS were rated as high (i.e., over the mid-point). Confirming the theoretical underpinnings of the programme, participants’ perceptions of an autonomy supportive intervention predicted the satisfaction of basic psychological needs. Consistent with previous evidence examining an autonomy-supportive environment upon adult’s sports participation and basic psychological needs, AS significantly positively predicted autonomy (volition) (Adie, Duda & Ntoumanis, 2008; Kinnafick et al., 2016). Qualitative data suggests intervention components such as promoting enjoyment and personal development in sport supports needs for autonomy. Evidence has linked these factors to intrinsic regulation (autonomous motivation), and controlled forms of motivation such as identified regulation (Deci & Ryan, 2000a, 2000b). Given workplace champions adopted an autonomy supportive leadership style (e.g., offering choice and ownership) when delivering sports to their colleagues, it is theoretical logical participation in an intervention offering
healthy motivation and functioning during sport would foster perceptions of autonomous participation (Deci & Ryan, 2000a, 2000b).

The regression analyses found that AS did not predict perceptions of competence (Standage et al., 2005). However, qualitative data suggests that key intervention components such as a taster session, adapting sport rules, providing novel sport, and promoting ‘success’ as personal development, rather than outright competition foster needs for competence. Sports which are adaptable and use transferable skills should be considered within future programmes. In agreement with Adie et al. (2008), a modest significant correlation between autonomy support and competence may be explained by the mixed ages, genders and experiences represented in the current study. Indeed, how participants perceive competence across an autonomy-supportive team sport intervention may differ across age, gender and experience. For example, more experienced participants may place less importance on the support of an autonomy supportive champion in terms of competence than a less experienced participant (Adie et al., 2008). Therefore, future research should continue to adopt team sports which are recognisable yet adaptable in future programmes.

CTG was designed to support relatedness through the delivery of sessions by workplace champions, and employees participating with their colleagues and superiors. Following the completion of the intervention, autonomy support did not predict perceptions of relatedness. Qualitative data however, provides support for this intervention component, in that participants sought relatedness (e.g., social support, empathy, cohesion, group identity) from their colleagues, superiors and employer to support participation. Therefore, an autonomy supportive environment promoted by workplace champions (i.e., colleagues) and attended with colleagues and superiors may have fostered needs for relatedness. Interestingly, several studies examining adult participation in sport (Adie et al., 2008), walking (Kinnafick et al., 2014) and exercise (Edmunds, Ntoumanis & Duda, 2008) found an autonomy supportive environment to predict perceptions of relatedness. Consistent with Kinnafick et al. (2014) relatedness appears to be particularly important during the uptake of participation. This may be due to participants having a colleague
to attend with whereby the perceived challenges associated with participation could be shared. It is likely, the team cohesion, group identity and social support offered in a team based activity further fostered needs for relatedness in participants (Thøgersen-Ntoumani, Loughren, Duda, Fox & Kinnafick, 2010). Promoting an autonomy supportive team sport with colleagues and through workplace champions therefore may form a pragmatic method to support relatedness for future research.

It should however be noted wellbeing was removed from the model given the multivariate outliers within the data (i.e., data did not have independence of observations). Autonomy-supportive interventions are known to predict subjective wellbeing (Adie et al., 2008; Kinnafick et al., 2014).

**Maintenance**

Despite participants adhering to physical activity (i.e., sport, active transport, exercise) post-programme, the maintenance of CTG can be considered moderately successful. In the case of CTG, several cultural challenges to long-term participation such as communication, funding and leadership of sport were identified. Workplace culture is known to influence participation in physical activity (Brinkley et al., 2017b; Marshal, 2004). A culture supportive of PA is understanding of flexible working and provides the necessary emotional, informational and tangible support for participation (Brinkley et al., 2017b; Schaefer, Coyne & Lazarus, 1981). In contrast, a culture not supportive of workplace PA promotes non-stop working and provides little ‘actual’ support for participation. In the case of CTG, a culture was identified which while offering messages of support through organisational outlets (i.e., message boards, reports, company communication), provided little support for employees participating in the programme or wishing to continue participation post-programme. These obstacles to participation are consistent with previous research (Brinkley et al., 2017b)

If workplace team sports programmes such as CTG are to become a successful form of health promotion, a culture shift is required within workplaces. Evidence has indicated multicomponent interventions whereby
theories of behaviour change are incorporated alongside organisational changes such as workplace culture may be more successful than behaviour change alone (Marshall, 2004). Although, CTG did adopt a participatory approach to account for the likeness of organisational challenges such as an unsupportive workplace culture (Nielsen et al., 2010, 2013; Sørensen & Holman, 2014), more could be done to affect these challenges occurring prior to the intervention commencing.

**Limitations**

One limitation of the current study is the dimensional applicability rating of reach (see Chapter 5) should be identified as a limitation. Reach was conservatively calculated from the two worksites (intervention and control) only. Whereas the 5080 employees represent the UK workforce and employees working remotely (to whom the programme was not communicated to), if implemented across the entire workforce, the actual reach of the programme may have been greater than what was reported in Chapter 5. Likewise, for pragmatic reasons the demographics of participants were not recorded at the reach stage of the evaluation. Observing the demographic information of potential participants may have provided stronger information assessing the type of individuals who are interested in participating in a workplace team sport scheme (Harden et al., 2015). When implementing larger scale interventions and programmes, future research may consider addressing this limitation.

A further limitation of this research is the absence of measurement over the long-term. The data presented regarding the maintenance dimension (see Chapter 5) refers to the programmes potential to be maintained over time, rather than its specific maintenance over time. Certainly, this challenges the conclusions which can be drawn regarding the long-term efficacy and maintenance of participation in workplace team sport. Within the RE-AIM framework, recommendations suggest the maintenance dimension should be addressed at least 6-months following the last intervention contact (Gaglio et al., 2013; Glasgow et al., 2006; Harden et al., 2015). Within the timeframe of this thesis, a meaningful follow up period was not possible (>6-months).
Future research should consider investigating the long-term efficacy of workplace team sport with RCT designs with a substantial follow up period, and longitudinal case-control designs.

The adoption dimension was rated as moderately successful in terms of dimensional applicability (see Koorts & Gillison, 2015). An interesting and novel approach not utilised within the current study to complement the evaluation of the adoption dimension may have been the use of ethnography within the participating organisation (Brannan & Oultram, 2012). An ethnographic approach utilising the ‘participant as observer’ role (i.e., disclose purpose of research to participants involve themselves in social situations and nature, rigors and demands of the job) may present an interesting step for research (Gold, 1958, 1997). The use of ethnography to complement the evaluation of a programmes adoption has several benefits (Brannan & Oultram, 2012; Gold, 1958, 1997). These include a stronger contextual understanding of the day-to-day factors which influence the adoption and indeed reach and maintenance of workplace health promotion initiatives such as PA or team sport (Zickar & Carter, 2010). Likewise, the adoption of an ethnographic approach may provide the researcher with an experience of the events and circumstances that underpin the facilitators and obstacles reported in interviews (e.g., workplace culture, structure, social approval) (Brannan & Oultram, 2012).

The implementation dimensional in the evaluation of CTG was rated as moderately successful on its data applicability due to several limitations. More specifically, perceptions of basic psychological needs and autonomy support were not assessed at T0. This was due to limitations in the design of study and measures of basic psychological needs satisfaction (BNSSS; Ng et al., 2011) and autonomy support (SCQ; Brickell et al., 2006). Both scales retrospectively assess perceptions of autonomy support and basic psychological needs (Brickell et al., 2006; Ng et al., 2011). Whilst, this presents no issues regarding basic psychological needs, the measure of autonomy support assumes a participant has an experience of a champion leading team sport within their workplace (Brickell et al., 2006). In the case of CTG, many participants may not have had an experience of a workplace
champion, and moreover a workplace champion promoting and leading workplace team sport.

Additionally, the current study did not measure needs support for competence and relatedness independently. Subsequently, this limits the conclusions which may be drawn regarding a workplace champions influence on supporting basic psychological needs for competence and relatedness support. Therefore, it cannot be inferred if strategies such as using transferable skills, adapting sports and reducing competitive traditions influence support needs for competence over the environment (e.g., team sport and the workplace). Moreover, it cannot be confirmed if peer support, the social environment in the workplace (e.g., face to face and online interactions) and the changes in social dynamics associated with team sport support perceptions of relatedness in a workplace setting. Future research may consider addressing these limitations by measuring self-reported needs support, rather an autonomy support alone.

Likewise, exercise regulation was not assessed during this study. Previous research (e.g., Fortier et al., 2007, 2012; Kinnafick et al., 2016) has used the Behavioural Regulations to Exercise Questionnaire (Markland & Tobin, 2004) to assess exercise regulation (i.e., amotivation, external, introjected, identified, integrated, intrinsic regulation). The exclusion of the measure limits the current study’s ability to identify the motivational regulation of participants. Moreover, the exclusion of the measure limits the causal associations which can be established between the impact of the intervention of motivational regulations to exercise.

However, within the current study, this measure was not used for several reasons. Foremost, the Behavioural Regulations to Exercise Questionnaire measures motivational regulation to ‘exercise’ rather than motivational regulation for sport (see Markland & Tobin, 2004). While many participants engaged in regular PA (i.e., exercise), most did not engage in sport prior to the CTG intervention. Therefore, the inclusion of this measure may have led to a type-1 error (e.g., detecting motivational regulation for exercise rather than for sport). To address the exclusion of this measure, a
A qualitative approach using regular interviews, observations and a research diary was adopted. Previous research (e.g., Kinnafick et al., 2014; Rahman, Thorgersen-Ntoumani, Thatcher & Doust, 2011) has adopted a qualitative approach to explore motivational regulations for exercise. The qualitative approach adopted within the current study allowed for motivational regulations to be explored and the processes underpinning these changes to be contextualised over the duration of the intervention. This remains important, given motivation is not fixed ‘trait’, rather a dynamic subjective phenomenon which is influenced by an array of intrapersonal and interpersonal factors (Deci & Ryan, 2000a, 2000b; Teixeira et al., 2012).

A further limitation to assessing the implementation of CTG was the omission of subjective wellbeing within the multiple regression model. Autonomy support is known to predict improvements in both basic psychological needs and subjective wellbeing (Adie et al., 2008; Gucciardi & Jackson, 2015). Likewise, fostered basic psychological needs and subjective wellbeing are thought to account for the adoption of more autonomous forms of motivation (Deci & Ryan, 2000a, 2000b; Teixeira et al., 2012). Subjective wellbeing’s removal was due to the multivariate outliers within the data (i.e., the data representing subjective wellbeing did not have independence of observations). Within the absence of multiple time points, and a low sample size a time-series regression was not viable.

Future research may consider a greater sample size and measurements over time. The regression analysis conducted in this thesis achieved low statistical power. Furthermore, using multilevel modelling (MLM) (see Leyland & Goldstein, 2001) may form an interesting next step for research evaluating the theoretical underpinnings of workplace team sport interventions. Indeed, research examining the impact of a needs-support workplace lunch-time programme has utilised MLM with a good degree of success (Kinnafick et al., 2014). Therefore, further research is required to confirm if a programme underpinned by BNT and autonomy support predicts changes in subjective wellbeing and contributes to change in motivation for participation.
A limitation to the theoretical underpinnings of CTG is the fidelity of the autonomy supportive environment provided. More specifically, individual differences may contribute to the provision of an autonomy supportive environment. Indeed, both workplace champions implementing CTG were female and similar in other demographics (e.g., age, role, level of superiority). Given this thesis presents the first intervention study to promote workplace team sport through the provision of an autonomy supportive programme, future research should continue to examine the feasibility and fidelity of this approach with champions across a range of demographics (e.g., ages, genders, cultures, hierarchical status).

Conclusion

Through a mixed methods RE-AIM framework, the current study evaluated the CTG programme, a team sport programme implemented within a FTSE 100 company. The programme was assessed against its reach, efficacy, adoption, implementation and maintenance. The findings indicate the programme was highly successful in terms of efficacy and implementation. The programme was less successful in terms of its reach, adoption and maintenance. Good evidence supports participation in workplace team sports impact upon individual, social group and organisational health outcomes. The CTG programme provides support for the use of behaviour change strategies utilising SDT and supporting basic psychological needs through the provision of autonomy supportive leadership. Changing the culture within organisations prior to interventions may better assist the reach, adoption and maintenance of future programmes.
Chapter 6 Discussion
Discussion

Introduction

The aim of this thesis was to develop and implement a team sport intervention underpinned by behaviour change theory into a workplace setting. The intervention was designed by exploring the perceived benefits of participation and mapping the environmental, social and behavioural enablers and challenges to team-based sport for employees and organisations. A further aim was to assess this intervention against its acceptability, efficacy (individual, social group and organisational benefits of participating) and feasibility. A final aim was to provide integrated discussion. The contribution to knowledge, limitations of the research, and its implications for future research, practise and policy are discussed.

The efficacy of participation in workplace team sport

Individual health

The data collected through a systematic review (Chapter 2), intervention study (Chapter 4) and process-evaluation (Chapter 5) indicates participation in workplace team sport may positively influence markers of physiological and psychological health, and factors underpinning changes in health behaviour.

Consistent with previous evidence, data from Chapter 4 (Brinkley et al., 2017c) indicates the significant positive influence observed on markers of fitness, may be attributed to participation in regular workplace team sport (Barene et al., 2013, 2014a; Burn et al., 2017; Roessler & Bredah, 2006; Scherrer et al., 2010; Soroush et al., 2013). Furthermore, workplace team sport has the capacity to maintain and further improve aerobic fitness (i.e., VO₂ Max) over the long-term (40-weeks) (Barene et al., 2014b). In this study, the effect size for VO₂ Max (relative) for participation in CTG ($d=0.77$) was marginally higher ($d=0.57$) than modes of workplace PA examined within one meta-analysis (Conn et al., 2009).

Routine exposure to vigorous forms of PA (e.g., HIPA) such as team sport improves cardiac output and skeletal muscle oxidation and capillarisation (Barene et al., 2013, 2014b; Krstrup et al., 2010; Wenger &
Bell, 1986). Chapter 4 demonstrates that participation in a multi-team sport programme is effective in influencing positive adaptations in VO₂ Max in the intervention group (+10.32%) when compared to a control group (i.e., normal working conditions) (Brinkley et al., 2017c). The improvements in absolute and relative VO₂ Max observed in this study indicate an improvement in cardiorespiratory fitness, rather than a reduction in body weight alone. Barene et al. (2013, 2014b) found improvements of 5% in VO₂ Max following a programme of workplace soccer, while Burn et al. (2017) found improvements of 15-19% following a workplace PA programme incorporating team sport sessions.

Although the decrease (-1.75%) VO₂ Max in the control group cannot be directly attributed to working practises and lifestyle choices, office based roles and associated sedentary behaviour have been found to contribute to the detraining of the cardiorespiratory system, reduce cardiac output and increase the prevalence of non-communicable cardiorespiratory disease and illnesses (Ekelund et al., 2016; Hamilton et al., 2008; Santos et al., 2013). If accurate, despite the control group meeting PA guidelines, the findings of the current study provide further evidence of the state of ill-health present within the workplace and the detrimental role sedentary office behaviour can hold for cardiorespiratory function.

The evidence presented within this thesis suggests participation in workplace team sport may contribute to positive adaptations in body composition (i.e., reduced body fat mass/percentage and lower limb mass/percentage), and reduce total body fat mass and percentage (Adams et al., 2016; Barene et al., 2013, 2014a, 2014b, 2016; Brinkley et al., 2017c; Burn et al., 2017). Systematic reviews of workplace PA programmes (i.e., walking, action days, gymnastic breaks, campaigns) found reductions in BMI to range from -.03 to 1.0 Kg/m² over the short- to long-term (Conn et al., 2009; To, Chen, Magnusse, & To, 2013). Within CTG (See Chapter 4), participation in team sport may have protected the intervention group from significant increases in BMI over time (Pavey, Peetersm Gomersall & Brown, 2016; Sigel et al., 2009; Varela-Mato et al., 2017).
Routine HIPA is associated with reduced markers of body composition such as weight loss, abdominal adiposity and subcutaneous skinfolds (Tremblay et al., 1990; Warburton et al., 2006). Likewise, sedentary working practises have been causally linked with increases in BMI through increased fasted plasma glucose, triglycerides, lipoprotein and waist circumference (Eriksen, Rosthøj, Burr & Holtermann et al., 2015; Hamilton et al., 2008; Mummery, Schofield, Steele, Eakin & Brown, 2005). A lack of a significant reduction in the intervention group is consistent with the findings of Sigel et al. (2009). The findings of this prospective cohort study indicate a reduction in BMI is not observed until the frequency of vigorous PA (e.g., team sport) reaches ≥5 times weekly (Sigel et al., 2009). This finding presents further evidence of the importance of maintaining an active lifestyle within the workplace, and the detrimental impact of sedentary behaviour on body composition.

Markers of musculoskeletal health and function were not examined within the empirical studies within this thesis. However, previous evidence has indicated participation in workplace team sport (i.e., soccer) can improve neck extension strength and sit-and-reach flexibility over the short- and medium-term (9-months) (Barene et al., 2016), and decrease neck-shoulder muscle pain over the long-term (Barene et al., 2014b). Future research may consider confirming if participation in a multiple programme of workplace team sport also contributes to adaptions in musculoskeletal health and function.

Participation in workplace team sport (see Chapters 1, 2, 4 and 5) may also be comparable with other modes of workplace PA (e.g., aerobic exercise, dance, resistance training, yoga) on markers of subjective wellbeing, quality of life and mental health (Chu et al., 2014; Lindwall et al., 2012; Penedo & Dahn, 2005; Prince et al., 2007; Robertson et al., 2012). Consistent with previous research (e.g., Brown et al., 2014; Pretty, Peacock, Sellens & Griffin, 2005), team sports delivered within a natural environment (e.g., Thøgersen-Ntoumani et al., 2014) were found to be effective in improving psychological well-being. Participation in team sport (i.e., defined as ball sports), external to the workplace, has been associated with reduced perceptions of stress and improved wellbeing in male adults (Asztaloes et al., 2012; Marque et al.,
2016; Skead & Rogers, 2016; Thøgersen-Ntoumani et al., 2014). Whilst yoga within the workplace has been shown to influence changes in work-ability (Axén & Follin, 2017).

Although non-significant, improvements in markers of psychological wellbeing (i.e., subjective vitality, quality of life, stress and occupational fatigue) were observed between T^0^ - T^1^ of CTG. Likewise, triangulating data from Chapter 2 and 4 indicates participation in workplace team sport has a positive impact on psychological wellbeing. Participation in a range of workplace team sports improves perceptions of global wellbeing, subjective vitality, emotional stability and psychological flow (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Negulescu & Oicâ, 2016; Roessler & Bredah, 2006; Scherrer et al., 2010; Thøgersen-Ntoumani et al., 2014). The experiences of employees participating in modes of workplace team sport and the CTG programme indicates an association between participation and the disassociation of stress (See Chapter 5). It is plausible, workplace team sport may have provided a somatic outlet for employees to disassociate from workplace and lifestyle stressors (Caddick & Smith, 2014). Perceptions of stress have the capacity to be reduced over time due to the associated endorphin hypothesis (Peluso & de Andrade, 2005). This proposes an elevation in endorphin levels decreases cortisol, and stimulates production of norepinephrine and serotonin, and brain level neurotrophic factor (Chu et al., 2014; Kim et al., 2012). Likewise, the social support associated with team sport may have provided an environment where stressors and workplace demands could be discussed.

Previous evidence has associated participation in workplace team sport with improved general health behaviour, PA behaviour and perceptions of health (Evans et al., 2016; Roessler & Bredah, 2006; Scherrer et al., 2010; Thøgersen-Ntoumani et al., 2014; Uttley & Lovelace, 2016). Improving the health behaviour, and more specifically PA behaviour of individuals contributes to the maintenance of physical and mental health outcomes (Biddle & Foster, 2011; Sallis et al., 2008). The findings of Chapter 4 suggest participation in team sport may improve participation in total MET' of PA and vigorous PA. Interestingly, data collected with a daily self-report PA diary
indicates the intervention (i.e., team sport) group participated in significantly more PA than the control group (i.e., normal working conditions). Qualitative data collected during the process evaluation (see Chapter 5) highlights that changes in PA behaviour may be attributed to developed perceptions of competence in sport and improved self-efficacy (Teixeira et al., 2012). Moreover, facilitated perception of competence and relatedness through team sport may contribute to the adoption of more autonomous motivation and changes in participation in PA (Teixeira et al., 2012). Likewise, observable changes in individual health (e.g., fitness, weight loss) may support basic psychological needs for competence, foster wellbeing and likewise promote autonomous motivation for maintained participation in PA (Teixeira et al., 2012).

Workplace PA programmes (e.g., individual and group counselling, fitness testing, gym membership and exercise classes) can influence PA behaviour (Malik et al., 2014). The evidence presented within the thesis indicates workplace team sport may have a comparable impact on PA behaviour. For example, studies using ‘actual PA’ as a strategy to change behaviour have been shown to improve PA duration post-intervention by 2-4 hours (Malik et al., 2014). Similarly, CTG participants engaged in 2.5 hours more PA post-intervention than at baseline (see Chapter 4, Brinkley et al., 2017c).

Chapter 4 found sitting time to decrease marginally in both groups over time. It should, however be noted that this data was self-reported and not measured through an objective indicator of postural change such as the ActivPAL (Atkin et al., 2014). Although CTG was not designed to reduce sitting, past research has demonstrated the impact PA has upon sitting time (De Cocker, Bourdeaudhuij, Brown & Cardon, 2008). The findings of this community pedometer intervention found an increase in step count to reduce sitting time (De Cocker et al., 2008).

The weight of evidence presented within this thesis suggests employers, policy makers and practitioners should consider workplace team sport when seeking to improve the health of employees and the workforce. As
Chapter 6: Discussion

the evidence examining workplace team sport on markers of individual health continues to become more prevalent, future research may conduct a meta-analysis to compare the efficacy of workplace team sport against common forms of workplace PA (e.g., walking, gyms, sit-stand-desks).

Improving markers of individual health through modes of PA in community settings (e.g., the workplace) is a major component of national and international health promotion policy and practise (Department of Health, 2011). Global and national (i.e., UK) physical activity policy recommends the use of sport within captive and engaging community settings to promote positive adaptations in individual health outcomes (Department of Health, 2011; UK Government, 2015; World Health Organisation, 2010). However, these recommendations lack an evidence base to support participation in team sport in settings such as the workplace. The findings of this thesis address this gap in evidence by providing an initial, yet comprehensive, evidence base of the efficacy of participating in workplace team sport.

Meeting international and national guidelines for PA is known to reduce the risk-ratio of CVDs (i.e., CHD, stroke, hypertension), type-2 diabetes, cancer and mental health outcomes (Aune et al., 2015; Bassuk & Manson, 2005; Das & Hortan, 2016; Hamilton et al., 2008; Myers et al., 2015; Lee et al., 2012). An inverse relationship is established between participation in moderate to vigorous PA and aerobic fitness, and the prevalence of CVDs such as CHD, stroke and hypertension (Bassuk & Manson, 2005; Myers et al., 2015). Moreover, regular participation in PA contributes to reduced all-cost mortality (Ekelund et al., 2016; Myers et al., 2004). The efficacy of long-term participation in workplace team sport is not established within UK workplaces or using multi-team sport interventions. Future research may consider examining the association between participation in workplace team sport and the prevalence of non-communicable diseases and illnesses over the long-term.

Social group health

Triangulating the evidence collected from Chapters 2, 4, and 5 indicates participation in workplace team sport can contribute to
improvements in social group health outcomes (i.e., cohesion, interpersonal relationships and communication). Improvements in social health outcomes (e.g., cohesion, communication, interpersonal relationships) are widely documented within the literature (see Chapter 2 & 4; Adams et al., 2016; Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Lee, 1991). More specifically, participation in a range of team sports (e.g., soccer, cricket, volleyball) can remove hierarchical barriers within the workforce, and positively influence teamwork, team values, team trust, communication, interpersonal relationship and cohesion between colleagues and between superiors and subordinates (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Lee, 1991; Pichot et al., 2009). These factors are associated with the development of networks and productivity within a workplace (Gibson et al., 2014; Michael & Yukl, 1993). However, this evidence using qualitative designs has been broadly of low quality and lacks theoretical interpretations of its findings (see Chapter 2; Brinkley et al., 2017a).

Consistent with this evidence, the empirical studies (See Chapter 4 & 5) within this thesis found participation in a variety of workplace team sports to contribute to maintained and improved social group health outcomes. More specifically, observations from Chapter 4 indicate participation in CTG significantly improved interpersonal communication, and non-significantly improved interpersonal relationships with superiors. This finding provides the first empirical support for several qualitative studies presented within Chapter 2 (Joubert et al., 2010a, 2011, 2014; Lee, 1991). Relationships with colleagues and group cohesion decreased marginally overtime in both the intervention and control groups (see Chapter 4). Contrasting these findings, and reflecting that of the evidence identified in Chapter 2 and process-evaluation (see Chapter 4) suggest participation in team sport has a positive influence upon group cohesion and interpersonal relationships, and the removal of hierarchal barriers.

In the case of Chapter 4, findings regarding cohesion and interpersonal relationships may have been confounded by measurement issues and study design. More specifically, 'work-groups' and 'teams' exist within organisations (Cannon-Bowers & Bowers, 2006). Work-groups are constructed of
dependent employees who broadly collaborate on projects with the organisation (e.g., customer service across the organisation), whereas a team represents a group of employees with interdependence that collaborate on face-to-face tasks towards a common goal (e.g., managing an account) (Cannon-Bowers & Bowers, 2006). Work-groups do not work-together on a day-to-day basis (Cannon-Bowers & Bowers, 2006). In contrast, a team’s function and effectiveness is based upon on day-to-day face-to-face interactions, cohesion and relationships (Cannon-Bowers & Bowers, 2006; Salas et al., 1992). The sample of the study presented in Chapter 4 was recruited from the organisation and its work-groups (e.g., department level) rather than from an individual departmental team. Therefore, changes in situational ‘team’ outcomes, such as cohesion and relationships with other employees, may have been confounded due to a lack of influence by workplace team sport. Future research may consider clustering study arms on a ‘team’ level or measuring social health outcomes on broader work-group level.

Effective teams, departments and organisations have high levels of communication, cohesion and interpersonal relationships between members (Cannon-Bowers & Bowers, 2006; Hartenian, 2003; Katz, 2001). Moreover, membership of a social group forms a central construct within an employee’s health and wellbeing (Cannon-Bowers & Bowers, 2006). Social exchange theory (SET) proposes individuals seek, develop and maintain relationships which are positive, and avoid and remove themselves from negative relationships within the workplace (Thibaut & Kelley, 1959; Cropanzano & Mitchell, 2005).

Data indicates participation in workplace team may have the capacity to contribute positively towards factors such as social support, group identity, acceptance, trust, respect, the removal of hierarchal barriers, sharing knowledge and cohesion (see Chapters 2, 4 & 5). These factors are thought to influence the rewards and costs of a relationship (Cropanzano & Mitchell, 2005; Almost et al., 2015). Interpersonal relationships are essential components of functioning organisations (Cropanzano & Mitchell, 2005). Avoiding non-functional relationships is avoid not pragmatic due workplace
demands and structures (Cropanzano & Mitchell, 2005). Therefore, improving factors contributing to improved relationship favourability through team sport may be an effective strategy which has the capacity to improve interpersonal relationships within the workplace. Practitioners may continue to use team sport to develop and maintain the rewards of interpersonal employee relationships (Cropanzano & Mitchell, 2005).

Group cohesion is a component of an effective workplace team (Rosh et al., 2012), and known to contribute to the development and maintenance of effective relationships (Cropanzano & Mitchell, 2005). Cohesion is conceptualized as task commitment, group pride and interpersonal attraction, and can be segregated for task and social purposes (Pescosolido & Saavedra, 2012; Rosh et al., 2012). Evidence indicates groups formed and developed naturally are more cohesive than those created in a controlled setting (Mullen & Copper, 1994).

Regarding workplace team sport, social and task cohesion may have been developed through participation in a natural setting. For example, many of the sports investigated within this thesis and moreover within CTG were team sports within greater levels of independence between members (e.g., soccer, netball, basketball, handball) (Carron et al., 2002; Mullen & Cooper, 1994). Previously, team sports within higher levels independence between members have been linked to greater levels of social cohesion and collective efficacy than individual sports played in a team environment (Carron et al., 2002; Mullen & Cooper, 1994; Pescosolido & Saavedra, 2012; Philippe-Heuzé et al., 2006). Social cohesion within groups has been associated with task performance (e.g., productivity) and coping with high workplace demands (Beal et al., 2003; Carron et al., 1988, 2002; Mullen & Copper, 1994; Pescosolido & Saavedra, 2012).

Compelling evidence has indicated a sports team’s social and task cohesion may be influenced to a greater degree than a workplace teams due to the prevalence of communication, trust, interpersonal relationships, member abilities, similarity between members, shared goals, roles, psychological belonging and group identity, and the absence of undefined
member roles, conflicting group memberships and unstructured organisational factors prevalent within the workplace (Mach et al., 2010; Pescosolido & Saavedra, 2012). Practitioners may therefore consider using activities to promote and develop cohesion within naturally formed workplace teams.

Modern workplaces rely on functioning and effective modes and styles of formal and informal verbal, electronic, written and non-verbal communication on upward, downward and horizontal levels to share knowledge, encourage cohesion, make decisions, and improve staff morale, job satisfaction, work-engagement and productivity (Jones et al., 2004; Lunenburg, 2011; Miller, 2009). Likewise, effective communication is an essential component of team sport (Onağ & Tepeci, 2014; LeCouteur & Feo, 2011). Participation in team sport promotes cohesion and relationships between players (Carron, Colman, Wheeler & Stevens, 2002). Furthermore, team mates have been found to adopt informal communication styles, task- cohesion and form interpersonal relationships outside of sport (Carron et al., 2002; Onağ & Tepeci, 2014; Smith, Arthur, Hardy, Callow & Williams, 2013).

Social identity theory (SIT) proposes employees adopt the identity, belonging and concept of their workplace team (i.e., in-group) (Hogg & Terry, 2001). These groups are associated within open styles of communication (Scott, 2007). Open communication is known to contribute to fostered cohesion, job satisfaction and productivity within the workplace (Kang & Sung, 2017; Whittaker, Frohlich & Daly-Jones, 1994). From the perspective of workplace team sport, improvements in communication may be explained by the time employees spent together, participating in an activity of common interest with shared goals, whereby employees learn more about their colleagues’ communication style in a non-work, barrier free environment (Joubert, 2012). Participation in this environment may have led to development of in-groups within the workplace, and likewise the presence of open communication within the workplace (Scott, 2007).

The findings of this thesis are comparable with other strategies designed to improve communication, cohesion and interpersonal relationships within the workplace (Beal et al., 2003; Mullen & Copper, 1994; Salas et al.,
Team building activities within the workplace are designed to facilitate cohesion through a focus upon developing interpersonal relationships, trust, open communication and cohesion (Rosh et al., 2012). In a variety of settings, including the workplace and within sports teams, improvements in teamwork and communication have been attributed to positively influence staff retention, job satisfaction, cohesion, staff wellbeing and productivity (Almost et al., 2015; Dutton, 2003).

However, whilst broadly positive, previous ‘team building’ interventions in formal and informal settings have been found to have a mixed effect on improving social-group health outcomes within organisations (Klein et al., 2009). The evidence presented within Chapters 2, 4 and 5 indicates participation in team sport has the capacity to influence the development and maintenance of social group health outcomes. Given the prevalence of factors which stimulate cohesion, team intimacy, relationships and communication within team sport (Mach et al., 2010), practitioners would be wise to consider the adoption of team sport as a novel mode of team building to promote cohesive and effective interactions and relationships between colleagues and superiors (Klein et al., 2012; Rosh et al., 2012). Indeed, activities within a high level of team member interaction and independence are more effective than lecture-based exercises alone (McEwan et al., 2017).

Few studies have examined the impact of forms of workplace PA on social group health outcomes. However, recently, Michishita et al. (2017) found a 10-minute workplace physical activity programme conducted during lunch breaks to improve perceptions of friendliness and social support from colleagues and superiors. However, it should be noted these outcomes were examined on a scale of psychological mood, rather than a measure design to examine the efficacy of social group health outcomes, and therefore these findings are open to interpretation and cannot be attributed to the impact of the intervention alone. Triangulating the data available suggests participation in team sport may have a substantially greater impact on social group health outcomes than modes of traditional PA. Therefore, practitioners wishing to promote the development and maintenance of social group health outcomes with modes of PA may consider the use of workplace team sport before more
traditional modes of workplace PA which centre upon factors thought to hinder improvements in social group health outcomes such as individual participation, and a lack group independence (Carron et al., 2002; Mach et al., 2010; Mullen & Cooper, 1994; Pescosolido & Saavedra, 2012).

Organisational health

Markers of individual health and social group health can influence the health, function, effectiveness and fiscal profile of the organisation (Batt, 2009; Conn et al., 2009; Pronk & Kottke, 2009). Data collected from Chapter 1, 2, 4 and 5 indicates participation in workplace team sport can positively influence organisational health outcomes.


The findings of empirical studies within this thesis support previous evidence (see Chapters 4 & 5). More specifically, data from focus groups suggests participation may contribute to perceptions of improved networking with colleagues, knowledge sharing, productivity, and concentration. Likewise, several participants attributed their low levels of absenteeism and presenteeism to participation in workplace team sport.

Participants explained how playing team sports allowed them to refocus during the working day through changes in cognitive function (see Chapter 5). Maintained and improved concentration during a workplace setting has not been examined with team sport as a mechanism of change. However, changes in cognitive function have been inferred from participation in workplace PA (Mullane, Buman, Zeigler, Crespo & Gaesser, 2017; Ratey & Loehr, 2011). During a ‘simulated’ workplace setting, Mullane et al. (2017)
found cycling, walking and standing to improve objectively assessed cognitive function through enhanced arousal and adaptations to working memory and executive function. Furthermore, Ratey and Loehr (2011) argue participation in PA improves performance on cognitive function tasks relating to planning, inhibition, scheduling and working memory. It is plausible, improved cognitive function in experimental setting would contribute to real-world applications such as fostered productivity (Pronk & Kottke, 2009).

Data collected from Chapter 4 indicates employees participating in CTG improved on markers of job satisfaction and individual and team job performance (i.e., productivity), and reported reduced presenteeism over time, albeit non-significantly. In contrast, self-reported sickness absenteeism increased marginally over the duration of CTG in both the intervention and control groups, and work-engagement decreased marginally.

Evidence supporting the relationships between participation in PA and job satisfaction and affective states is growing (Daley & Parfitt, 1996; Judge et al., 2017). One study to date has found participation in team sport to foster a sense of value for the organisation (Joubert & De Beer, 2011). Job satisfaction was however reported in Chapter 5 by participants currently engaging in workplace team sport. It is plausible to suggest providing an employee the opportunity to participate in an activity they enjoy such as team sport, within their role may result in high perceptions of satisfaction with a job role or the workplace in general (Daley & Parfitt, 1996; Judge et al., 2017). It is possible a more satisfied employee may be more prepared to commit to the organisation in times of pressure, be more productive and engaged, and be less likely to contribute to employee turnover (Judge et al., 2017). Recently, Judge et al. (2017) argued job satisfaction provides positive affective mood dispositions such as happiness at work and is linked to favourable trajectories such as commitment over time. However, most of the evidence discussing job satisfaction and PA or team sport provisions is inconclusive (Proper, Staal, Hildebrandt, van der Beek & van Mechelen, 2002).

Positive adaptations in physiological health markers (e.g., VO\textsubscript{2} Max), psychological wellbeing and physical activity behaviour found within this
thesis are known to contribute to a reduced rate of sickness absenteeism and presenteeism through reducing the prevalence of non-communicable illnesses, diseases and conditions (Ding et al., 2016). Reducing the risk of sickness absence and presenteeism would reduce the fiscal loss for the organisation (Michie & Williams, 2003). Therefore, future research may consider examining the impact of individual health outcomes incurred through participation in workplace team sport, and the inverse relationship to sickness absence and presenteeism through objective measures (e.g., sickness records) over the long-term (see Amlani & Munir, 2014).

Interestingly, the social group health outcomes fostered through workplace team sport may improve networking between colleagues, knowledge sharing, team productivity and job satisfaction. Improving open communication, cohesion and interpersonal relationships between colleagues and superiors may provide a socially supportive and engaging environment whereby employees can negotiate the sharing of information (Buljac-Samardzic et al., 2010; McEwan et al., 2017). Given the importance of teams within modern workplace, improving markers of team productivity would likely contribute to fiscal health of the organisation. Future research may consider examining the impact of workplace team sport on social health outcomes over long-term whilst observing objective economic markers in productivity (e.g., output, sales) of workplace teams.

Previous research, evaluating the efficacy of traditional modes of PA within workplaces, has highlighted the lack of measurement of organisational health outcomes (Conn et al., 2009). However, this research argues the impact of PA on markers of organisational health may go beyond what is found and reported within studies (Conn et al., 2009). The findings of this thesis reflect this interpretation, and therefore researchers must do more to understand the impact of participation in workplace PA and team sport on markers of organisational health.

However, the data collected on organisational health outcomes is comparable with other modes of workplace PA. For example, good evidence indicates participation in workplace PA does not exert significant changes in
rates of sickness absenteeism over the short-term (Amlani & Munir, 2014; Proper et al., 2002). Consistent within the recommendations of these reviews, future research examining workplace team sport may examine if team sport has the capacity to exert significant changes in objectively examined sickness absence over the long-term. Previously, evidence has associated participation in workplace PA with improvements in individual productivity (MacEwen et al., 2015; Pendro & Dahn, 2005; Pereira et al., 2015). However, evidence is yet to explore the impact of workplace PA on markers of productivity in teams. Evidence presented within this thesis indicates markers of productivity within teams such as networking and sharing knowledge can be improved through facilitated social health outcomes (i.e., cohesion, communication and interpersonal relationships). Therefore, workplace team sport may be considered an effective mode of workplace PA for employers and practitioners seeking to improve productivity within their workplace, departments and teams.

The acceptability and feasibility of promoting workplace team sport

Acceptability

The data presented within Chapter 5 indicates workplace team sport is an acceptable form of health promotion within an organisational setting. A key determinate of acceptability is a participant’s perceptions, attitudes and behaviour towards an intervention (Sekhon, Cartwright & Francis, 2017). These determinates of acceptability can be examined through data regarding the reach of the intervention (Gaglio et al., 2013; Glasgow et al., 2006; Harden et al., 2015). A critique of workplace team sport research is the failure to accurately report factors determining intervention acceptability such as reach. Whilst the reach of CTG was considered to have limited success (29.86%), this is marginally greater than a previous workplace intervention using soccer to promote adoptions in individual health outcomes (19.25%) (Barene et al., 2013). Interestingly, employee recruitment from small cohorts (<1000 employees) has been attributed to higher recruitment rates in workplace PA interventions (Ryde et al., 2013). Comparisons between PA and team sport reflect an overall low level of reach (<50%), heterogeneous participation, and the absence of recruitment rates (Malik et al., 2014;
Marshall, 2004; Ryde et al., 2013; To et al., 2013). For example, workplace PA interventions using active transport, activity challenges and policy change reach marginally more than team sport, yet a low number of employees (23%-32.24%) (Dishman et al., 2009; Dubuy et al., 2013; Saringer & Ellis, 2017). Likewise, heterogeneous participation rates ranging from 3% to 75% have been reported for modes of PA such as walking, activity days and challenges, mobility exercises, stepping challenges and fitness (e.g., gym) facilities and classes (To et al., 2013).

The 2016 and 2017 annual reports from the participating organisation sampled in CTG (see Chapter 4 and 5) consistently echoes the importance of participation in PA in the workplace. However, recruitment communication for CTG was reported as being ineffective by the participants in the process evaluation. Whilst not reported as directly unsupportive, it appeared managers may have chosen to not raise their colleagues’ awareness of the programme or to offer their direct approval for participation. Evidence suggests managers and superiors are influential stakeholders in encouraging participation and adherence to health promotion programmes (Brinkley et al., 2017b; Caperchione et al., 2015; Gilson, McKenna & Cooke, 2008). CTG participants drew negative social comparisons with the behaviour of their superiors and managers. It is plausible these comparisons may have thwarted needs for relatedness (e.g., to feel social supported) and therefore reduced participants’ motivation for participation in CTG (Teixeira et al., 2012).

Consistent with other FTSE 100 organisations, employees in CTG were subjected to long working hours, in a culture where working non-stop is encouraged (Gilson et al., 2008). Job demands have been found to challenge the acceptability of a workplace walking programme (Gilson et al., 2008). If the reach of health promotion programmes (e.g., team sport) within workplace settings are to match their apparent efficacy, these challenges must be addressed. A strategy for researchers may be promoting a workplace culture that supports and encourages health promotion participation through flexible working (Batt, 2009; Brinkley et al., 2017b; Sorensen et al., 2016). Culture change may be achieved through promoting a ‘top-down’ health-promoting style of leadership within the organisation (Cooper & Barton, 2015; Edmunds
et al., 2013; DeJoy, 2005; Žižek, Mulej & Čančer, 2017). More specifically, leaders (e.g., board members, senior leaders, superiors) have regular contact with differing levels of hierarchy within the workforce, and therefore can adopt a leadership style which influences the culture within the workplace through holistically inspiring and motivating their subordinates to participation (DeJoy, 2005; Žižek, Mulej & Čančer, 2017). This influence is thought to be self-perpetuating within the workforce, whereby employees adopt the attitudes and behaviour of their superiors (DeJoy, 2005). In turn, employees adopting this culture may indoctrinate other members of the workforce. Therefore, researchers and practitioners should consider influencing the culture of the workplace when promoting PA and indeed team sport. Evidence has indicated multicomponent interventions whereby theories of behaviour change are incorporated alongside organisational changes such as workplace culture may be more successful than behaviour change alone (Marshall, 2004).

Interestingly, data presented within CTG indicates workplace team sport was successful at recruiting sub-groups of participants most at risk of non-communicable diseases and illness. Indeed, the BMI of both groups was considered overweight by international standards (27.12±4.75) (World Health Organisation, 2000). A limitation within research is failing to recruit at-risk-populations (Conn et al., 2009). Given both groups were recruited under the premise they would be receiving a programme of team sport, the findings of the current study suggest team sport may be a form of health promotion which is appealing to a high-risk population. This, to a point, challenges the barriers (e.g., perceptions of a negative body image, low self-efficacy, excess weight and poor fitness and health) highlighted by research (McIntosh, Hunter & Royce, 2016; Rech et al., 2016). Given CTG was conducted with colleagues rather than as an exercise referral, it is plausible the social support offered through participation supported relatedness and provided motivation to attend (Silva, et al., 2010). Further, this finding provides support for the notion that PA interventions should be conducted in a setting which is supportive of the basic psychological need for relatedness (Deci & Ryan, 2000a, 2000b).

Tailoring team sport and PA to workplaces is a fundamental step for researchers and practitioners promoting health and wellbeing. Evidence
indicates this may be achieved using a participatory approach (Nielsen et al., 2010, 2013). Interestingly, when examining workplace PA studies with a high level of employee recruitment and adoption, Ryde et al. (2013) and To et al. (2013) found longer study durations (>12-months), objective measures of health and workplace commitment and support for health and wellbeing programmes to translate to high levels of employee recruitment and participation. Researchers and practitioners promoting team sport within the workplace may consider the saliency of this points during the design of future programmes. Likewise, given the absence of data representing the acceptability of workplace team sport, future research may wish to include the measurement of reach and adoption to better understand if team sport is acceptable within a workplace setting.

Feasibility
Evidence suggests team sport is a feasible mode of PA to promote within a workplace setting. Previous workplace team sport research has failed to comprehensively explore the feasibility of their respective programme. Moreover, research from intervention designs has lacked strong theoretical underpinnings (e.g., Barene et al., 2013, 2014a, 2014b, 2016). The findings from Chapter 3 and 5 indicate participation in workplace team sport is influenced by intrapersonal, interpersonal, organisational, environmental and societal factors.

Intrapersonal factors such as autonomy and competence and self-efficacy facilitate or challenge participation. Reduced perceived competence is known to predict the adoption of maladaptive PA behaviours such as embarrassment, a lack of self-efficacy and state anxiety (Adie et al., 2008; Conroy & Elliot, 2004; Deci & Ryan, 2000a, 2000b; Ntoumanis, Thorgersen-Ntoumani & Smith, 2009). Unhealthy behaviours associated with competitive sport (e.g., aggression, over-competitiveness, critiquing) may reduce perceptions of competence and diminish self-efficacy (Adie et al., 2008; Gucciardi & Jackson, 2015).

Societal factors such as perceptions of school sport and gender inequality may also reduce perceptions of competence and self-efficacy in
team sport (see Chapter 3). Outside a workplace setting poor experiences of school sports and teaching practises, gender inequality, and age and obesity related stigma, and perceptions of job demands and expectations, and social class have been found to challenge participation in sport and health promotion (Borrell, Muntaner & Benach, 2004; Flint, 2013; Green, 2014; Harry, 1995; Hillier-Brown et al., 2014; Marmot & Bell, 2010; McGillivray, 2002; McGinnis et al., 2005; Stamarski & Son Hing, 2015; Trolan, 2013).

The findings of Chapter 3 support evidence from prospective cohort designs and theoretical debates which suggests the delivery, structure and content of PE influences adult participation in PA and sport (Green, 2014; Kirk, 2005). The traditional delivery of PE shaped by policy and teaching practises valued performance outcomes (e.g., winning and performance) over the apparent health benefits associated sport (Green, 2014; Kirk, 2005). This pedagogical tradition favours individuals who excel at sport at a young age, and may thwart the competence and self-efficacy of those who do not (Green, 2014; Kirk, 2005). The findings of the current study add to evidence which suggest the current PA behaviours of working age adults are influenced by perceptions of school sport, and therefore participation in workplace team sport may be reduced (Bocarro et al., 2008; Green, 2014; Kirk, 2005).

Confirming previous evidence (Elbe et al., 2016; Teixeira et al., 2012), autonomous motivational regulations were found to facilitate attendance in Chapter 3. Evidence indicates sports with adapted rules or novel sports can improve perceptions of competence and provide self-efficacy (Adie et al., 2008). Facilitating antecedents of autonomous motivation, such as intrinsic motivation, enjoyment, and mastery experiences can further support needs for competence (Adie et al., 2008; Allen, 2006; Gucciardi & Jackson, 2015). Likewise, participation with colleagues may support needs for relatedness, and therefore reduce obstacles surrounding low perceived competence and self-efficacy (Keegan et al., 2016; Schafer et al., 1981). For example, team cohesion, social support and group identity within workplace teams facilitate needs for relatedness and promote participation (Teixeira et al., 2012). Promoting team sport within an organisation which is socially supportive is more likely to be successful than one which is not (Keegan et al., 2016).
The intervention (i.e., CTG) presented within this thesis was implemented using SDT and a participatory approach (see Chapter 4 for an overview; Deci & Ryan, 2000a, 2000b; Neilson et al., 2010, 2013). Support previous evidence, data presented in Chapter 5 indicates a programme supportive of autonomy, competence and relatedness is effective when promoting adult participation in sport, exercise and PA (Adie et al., 2008, Gucciardi & Jackson, 2015; Fortier et al., 2007; Kinnafick et al., 2014; Teixeira et al., 2012). Supported basic psychological needs are known to contribute to optimal function and wellbeing, and the adoption of autonomous motivational regulations for participation in PA (Gucciardi & Jackson, 2015; Teixeira et al., 2012).

Confirming the theoretical underpinnings of the programme, findings of Chapter 5 suggest a team sport intervention, supportive of autonomy, competence and relatedness can support basic psychological needs and promote autonomous motivational regulations for participation in PA (Gucciardi & Jackson, 2015). Accounting for the obstacles employees negotiate through a participatory approach may also improve participation.

Workplace champions leading sport may be a pragmatic method to promote a needs supportive intervention, and therefore autonomous motivation (Conroy & Coatsworth, 2007; Rocchi et al., 2013). The use of champions reduces the demand placed upon stakeholders to deliver and support participation, factors identified as obstacles to participation in workplace team sport in Chapter 3 (Brinkley et al., 2017b). CTG suggests autonomy can be supported through reinforcing the benefits of participation (e.g., demonstrating improvements in health outcomes, or sports performance), offering employees a choice to play and the opportunity to opt-in and -out of team sport sessions, promoting determinants of enjoyment and allowing employees control and ownership of the sports. Informed by evidence presented in Chapter 3 and previous data outside a workplace setting (Standage et al., 2005), novel, adaptable and social sports were selected to investigate within CTG. Evidence presented in Chapter 5 indicates supporting competence through offering employees a choice (e.g., autonomy) to adapt sports based upon their and their groups ability (e.g., relatedness)
may be a feasible strategy for practitioners considering implementing team sport into a workplace with a mixed-range of perceptions of ability. Consistent with the findings of Gucciardi and Jackson (2015), the promotion of workplace team sport may effectively support needs for relatedness through the leadership of workplace champions and participation of colleagues. Data indicates the use of workplace champions and peer groups (i.e., colleagues) can promote determinates of relatedness such as social support, group membership and identity, and cohesion. Given the social and group nature of team sport, promoting relatedness within the design of interventions and programmes is a fundamental step for researchers and practitioners wishing to implement team sport within the workplace. Meeting needs for relatedness may improve attendance during the early stages of participation, and therefore should be considered an important step of promoting a feasible workplace team sport programme (Kinnafick et al., 2014).

However, given the duration of the intervention (12-weeks), it cannot be concluded if the feasibility of team sport would be scalable over the long-term. Likewise, due to sampling from one large private organisation, it cannot be concluded if team sport is scalable to small to medium sized organisations. Future research may consider investigating if the behaviour change strategies utilised in CTG (see Chapter 4 & 5) are feasible over the long-term, and across a range of organisations and industries.

CTG participants attended 56.42% of sessions once adjusted for non-attendance (see Chapter 5). The adoption of CTG was considered moderately successful (75% completed all outcome measures), and comparable with other workplace team sport programmes (58.5%-75%) (Barene et al., 2014; Burn et al., 2017). Week-by-Week adoption data (see Chapter 5) suggests participation can fluctuate due to the influence of intrapersonal, interpersonal, organisational, environmental and societal factors (Brinkley et al., 2017b; Sallis et al., 2008). These factors were also found to create obstacles for participation in a qualitative exploratory study (see Chapter 3) and are widely reported within the workplace PA literature (Batt, 2009; Marshall, 2004; To et al., 2013). Therefore, addressing these obstacles must remain a goal of practitioners and researchers promoting team sport within workplaces.
Organisational obstacles relating to time, the demands placed on the workforce, the approval of colleagues and superiors, communication, management, funding and workplace culture challenge participation. Evidence suggests the quantity of work is valued by the employer, superiors and colleagues above the health of employees (Cole et al., 2015). Research has indicated as workload increased, acceptance for workplace team sport decreased (Keegan et al., 2016). In agreement, the findings of Chapter 3 indicate employees who participated in team sport were perceived as ‘not working’ by their colleagues, while employees who ‘worked non-stop’ were perceived to be productive employees. Likewise, Caperchione et al. (2015) found the culture within the workplace to influence participation. Whilst, Lee (1991) argued the management and communication of team sport within the workplace may influence the level of acceptance and support from within workplace teams. Consistent with workplace PA literature (see Cole et al., 2015; Fletcher et al., 2008; Van Bekkum et al., 2011), despite the acceptance and support of colleagues and superiors, job demands and workplace pressure challenged the regular participation of the workforce.

While no employers were interviewed within Chapter 3, participants perceived their employers to support team sport through a duty of care for their health and wellbeing. A duty of care may be adopted due to the time employees spend in the workplace, pressure from government policy or health recommendations from external health promotion partners (Batt, 2009; Robroek et al., 2012). The findings of Chapter 3 suggest participation in workplace team sport is indirectly facilitated when a duty of care extended to funding, communicating and managing workplace team sport programmes (Robroek et al., 2012). An employer’s willingness to fund, communicate and support workplace health promotion enables a workplace champion or an occupational health team’s ability to set-up, manage and deliver team sport (Adams et al., 2016; Audrey & Procter, 2015; Caperchinea et al., 2015; Pronk & Kottke, 2009). Evidencing the efficacy of workplace team sport therefore may be an effective method to raise an employer’s awareness of the benefits of workplace team sport for their organisation.
Good evidence has indicated individuals with a knowledge of the benefits of participation and recommendation for PA are more likely to attend and maintain participation than those who are not (Abula, Gröpel, Chen & Beckmann, 2016; Knox, Musson & Adams, 2015). Indeed, educating employers and the workforce has the potential to influence changes in organisational policy (e.g., breaks provided to participate) and working practises over time (e.g., flexible working to participate), key determinants of consistent and maintained participation in workplace PA (Crespo, Sallis, Conway, Saelens & Franks, 2011; Lucove, Huston & Evenson, 2007).

Environmental (e.g., lack of sports facilities) challenges to participation were not reported by CTG participants (see Chapter 5). However, these factors were identified to challenge participation in Chapter 3. Inaccessible, sports facilities were addressed by utilising the natural environment (e.g., sports fields, parks) close to the workplace, or negotiation with external stakeholders to use suitable facilities. Due to the intensity in which team sport is played at, practitioners implementing team sport within the workplace should consider the process of participation, rather than simply the time taken to participate alone (e.g., the time taken to change and return to work).

Given the additional equipment, facilities and resources required for participation, it is plausible environmental challenges may be more identifiable for employees within workplace team sport than other modes of workplace PA (Bennie et al., 2010; Renton, Lightfoot & Maar, 2011; Ryde et al., 2013). However, this should not prevent the promotion workplace team sport. A lack of equipment or sports facilities may be addressed through contact with external stakeholders (e.g., sports governing bodies, sports partnerships, clubs, universities) (Brinkley et al., 2017b). These stakeholders may offer employees wishing to participate in workplace team sport tangible and informational support in the form of equipment, resources and sport-specific knowledge (Keegan et al., 2016; Schaefer et al., 1981). Practitioners should consider external stakeholders when promoting workplace team sport.
Limitations and future directions

Research design and measures

Findings from Chapters 2, 4 and 5 suggest participation in workplace team sport may influence positive changes in psychological wellbeing, and reduce stress and occupational fatigue. Previous studies have found sports participation to have a positive impact upon mental health outcomes (Adie et al., 2008; Frederick & Ryan, 1993; Roessler & Bredah, 2006; Thøgersen-Ntoumani et al., 2014). The measurements of mental health outcomes within this thesis were statistically underpowered or limited by the qualitative nature. Future research may consider examining the impact of team sport on objectively measured markers of stress (i.e., cortisol), repeated-measures of subjective wellbeing (i.e., momentary mood-states) or a narrative or discourse based qualitative approach (see Sparkes & Smith, 2014).

Interestingly, data suggests participation in team sport may positively influence cognitive function within the workplace (See Chapter 5). Cognitive function is a determinate of individual productivity (Davranche & McMorris, 2009; Mullane et al., 2017; Pronk & Kottke, 2009). Therefore, the use of day level randomized controlled design studies and objective assessments of cognitive function (e.g., Stroop-Tests; see Schwartz et al., 2015) may provide a next step for researchers interested in examining the efficacy of participation in workplace team sport on organisational health outcomes. Moreover, an additional reason to pursue this mode of inquiry is due to the translatable evidence this may create for employers and external stakeholders.

Finally, this thesis has largely focused on what can be considered traditional team sports (e.g., soccer, netball, basketball). Given the limited number of sports investigated so far within the research, it may be unwise to conclude on the success and failure of certain sports within a workplace setting (Brinkley et al., 2017a, 2017b). Other modes of team sport are conducted within workplaces. These include office-based team sports, individual-team sports and outdoor team sports and activities. To date, little evidence has investigated the efficacy of these modes of team sport within a
workplace setting. Future research may continue to examine the acceptability, efficacy and feasibility of these sports to promote health outcomes.

**Theoretical framework**

A strength of this thesis is the use of behaviour change theory (i.e., SDT; Deci & Ryan, 2000a, 2000b). SDT was used to interpret the data regarding the facilitators and obstacles of participation (see Chapter 3) and underpin the development of a study design (i.e., CTG; see Chapter 4 & 5). Previous research investigating workplace team sport has neglected the use of behaviour change theories in their designs, and interpretation of their findings (e.g., Barene et al., 2013, 2014a, 2014b, 2016; Elbe et al., 2016). However, whilst a strength of this thesis, this offers only one standpoint to interpretation of findings and development of study designs.

Recent research has begun to integrate theories of behaviour change to understand the participation of individuals in PA and sport context. For example, when examining sports continuation in working age adults, Gucciardi and Jackson (2015) integrated the Theory of Planned Behaviour and BNT. Good evidence indicates the integrating SDT with other behaviour change theories can strengthen the design of studies, and the conclusions they can draw (Hagger & Chatzisarantis, 2009). Future research therefore may consider the integration of behaviour change theories in the design of future workplace team sport programmes. Likewise, implementing interventions with the Behaviour Change Wheel may become a feasible and pragmatic means to implement workplace team sport into organisations (see Michie, van Stralen & West, 2011).

**Participants**

A strength of this thesis is sampling participants across a range of hierarchical levels within the workforce. However, this is limited by the absence of data collected from employers (e.g., CEOs, directors). Negotiating contact time with employers appears to be a challenge of most of the evidence examining workplace team sport, and indeed workplace PA and health promotion. Future research may consider obtaining data from CEOs. This may provide valuable information on an organisations true attitudes,
intention and feasibility to promote team sport or PA within the workplace, and may prove particularly useful during the design and evaluation of interventions and programmes.

Whilst inactive participants were sampled throughout this thesis, a limitation of this thesis is testing the efficacy of workplace team sport upon inactive employees with the greatest risk of incurring non-communicable disease, illnesses and conditions contributing to premature mortality (Blair & Brodney, 1999; Ding et al., 2016; Ekelund et al., 2016; Hamilton et al., 2008). Indeed, 89% of intervention group and 85% of control group recruited for CTG (see Chapter 4) reported meeting PA guidelines (Townsend et al., 2015). This figure is higher than the national average for working-age adults (67% of males, 55% of females). This may suggest workplace team sport attracts primarily active employees, rather inactive employees. Certainly, it could be argued participants playing workplace team sport would be more likely to report the benefits of participation, be more motivated to participate and report different barriers than inactive employees or non-participating employees. Likewise, a workplace involved in the promotion of sport may provide social support for participation in a more meaningful way than a largely inactive workplace. Consequently, an interesting step for future research may be investigating the acceptability, efficacy and feasibility of participation in workplace team sport for an inactive workforce and employees who may be considered amotivated (i.e., a lack of any form of intrinsic and extrinsic motivation) (Deci & Ryan, 2000a, 2000b, Teixeira et al., 2012).

While the samples in this thesis contain a diverse range of participants, unavoidable their perceptions, ideas and opinions may not be reflective of all participants or indeed their participating organisations. Moreover, the employees within this thesis are broadly heterogeneous. Whilst, a variety of demographics were recruited, many of the participants within this thesis can be considered fulltime white middle aged white collar employees. Likewise, many of the participants sampled within this thesis were from large private organisations. Future research therefore should consider investigating the acceptability, efficacy and feasibility of participation in workplace team sport across a range of individual and organisational demographics including a
range of industries, sizes of workplace, blue collar workers and employees from a range of ethnicities.

**Contribution to knowledge**

The findings of this thesis provide comprehensive evidence regarding workplace team sports, and its impact on individual, social group and organisational health outcomes. Moreover, the findings of this thesis provide knowledge for researchers and practitioners on the facilitators and obstacles to participation, and the feasibility, acceptability and fidelity of participation. The findings presented within this thesis have important implications for research, policy and practise.

More specifically, the systematic review presented within Chapter 2 (study one) (see Brinkley et al., 2017a) provides the first comprehensive systematic review of the evidence supporting participation in workplace team sport. A major strength of this review is the broad inclusion and exclusion criteria used, therefore comprehensively synthesising literature and categorising studies into intervention (e.g., RCT and non-RCT), observational and qualitative designs. This pooling of evidence draws together the available data regarding team sports impact on individual, social group and organisational health outcomes. The findings of the current study add to literature, and suggest that; the available evidence provides good support that team sports are effective in improving individual health and moderate support (due to measurement issues) that team sports may be effective in improving several group and organisational outcomes. Certainly, this review provides employers and stakeholders within and external to the workplace with needed evidence to support the provision of team sport within workplace settings.

Study two (Chapter 3) is the first qualitative study to implicitly explore the complexity of the facilitators and obstacles underpinning participation in workplace team sport. Qualitative research exploring the facilitators and obstacles faced by employees participating in workplace team sport is lacking and therefore challenging the implementation of programmes. The findings regarding the facilitators and obstacles influencing participation provide stakeholders internal (e.g., occupational health teams) and external (e.g.,
sports partnerships) to the workplace with an overview of the enablers and challenges encountered when promoting team sport. Whilst these influences may not be replicable or consistent within all organisations, certainly this data provides stakeholders an overview of the challenges faced and the factors which enable participation.

CTG (Study 3; Chapter 4) was the first empirical research to confirm and expand the limited evidence concerning the efficacy of participation in workplace team sport on social group and organisational health outcomes. The findings of the current study expand on the literature investigating the benefits of workplace team sport (see Chapter 1), and provide empirical evidence for the effectiveness of this widely adopted form of workplace health promotion. The data collected within this thesis supports the efficacy of schemes and programmes organised by government funded external stakeholders. These initiatives (e.g., Workplace Challenge, Sportivate and Last Man Stands) have previously lacked strong evidence to support their efficacy. Stakeholders would be wise to consider recruiting and training workplace champions in leading team sport through autonomy support when promoting team sport. Whilst sporting governing bodies already provide resources (e.g., booklets, handouts, posters) and training (e.g., taught courses) to champions, it is unclear if there is a focus on supporting basic psychological needs for autonomy, competence and relatedness.

Finally, Study four (Chapter 5) was the first research to conduct a systematic and comprehensive process-evaluation (i.e., RE-AIM guided) of the acceptability, efficacy and feasibility of participation in a programme of workplace team sport. The intervention evaluated was the first to provide a team sport programme that supported basic psychological needs for autonomy, competence and relatedness (Deci & Ryan, 2000a, 2000b). Researchers, practitioners and external stakeholders should consider these original insights when promoting the adoption and maintenance of team sport within workplace settings. The data presented in this thesis provides a substantial evidence base to continue the investigation of workplace team sport. Workplace team sport research should continue to endeavour to investigate a programme similar to CTG across a range of industries and
organisations using the same theoretical framework, however utilising more objective measures of health and productivity over the long-term (>12-months). The findings of these studies undoubtedly provide needed and warranted of evidence regarding participation and the promotion of workplace team sport. These findings have implications for policy, practise and future research, which have been previously highlighted.

**Conclusion**

The modern workplace may contribute to an increased prevalence for a host of non-communicable illnesses, diseases and conditions (Blair & Brodney, 1999; Ding et al., 2016; Eklund et al., 2016; Hamilton et al., 2008). These outcomes are known to contribute to increased sickness absenteeism and reduced productivity, which in turn underpin the reduced fiscal health of an organisation (Ding et al., 2016). Promoting novel modes of PA such as team sport in community settings such as the workplace has the capacity mitigate the impact of the workplace and improve individual and organisational health outcomes (Ding et al., 2016; Eklund et al., 2016; World Health Organisation, 2010).

This research therefore investigated the acceptability, efficacy and feasibility of promoting team sport within the workplace. Findings indicate workplace team sport can improve and maintain the health of employees. Moreover, participant in team sport may influence changes in communication and interpersonal relationships between colleagues. These factors may contribute to changes in organisational health outcomes. Participation is influenced by intrapersonal, interpersonal, organisational, environmental and societal factors. Utilising a participatory approach and supporting needs for autonomy, competence and relatedness through SDT is an acceptable, effective and feasible method to implement a multiple programme of team sport into a workplace setting. These findings provide a comprehensive insight into the promotion and adoption of workplace team sport for employees across a range of demographics. Organisations, external stakeholders, practitioners and researchers should consider encouraging team sport within workplaces to promote positive maintainable adaptations in individual, social-group and organisational health outcomes.
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Appendices

Appendix 1: Systematic review search strategy and assessment
Reproduced from Brinkley et al. (2017a).

Search Strategy

The following search terms were used in a series of combinations (work OR workplace OR work site OR organisation OR organization OR corporate OR business OR enterprise OR employee OR worker) AND (group OR team) AND (sport OR physical activity OR exercise OR physical exercise OR fitness OR health promotion) AND (intervention* OR trial*) OR programme OR program OR randomized controlled OR longitudinal OR prospective OR cross-sectional OR survey OR questionnaire OR qualitative OR interview* OR focus group*) AND (benefit OR health OR quality of life OR well-being OR weight OR obesity OR body mass OR diabetes OR blood pressure OR cardiovascular OR cardiorespiratory OR sickness absence OR sick leave OR sick days OR stress OR presenteeism OR satisfaction OR productivity OR performance OR team work OR communication OR team cohesion OR team trust). Additionally, (*) was used to create wildcard searches (e.g., absence, absenteeism) on database searches, and the literature search was expanded by exploring the reference lists of the studies included in the review.

Inclusion and exclusion criteria

From the literature on workplace team sports (e.g., Joubert et al., 2011) ‘team sports’ were defined as ‘employees participating in any type of workplace PA where interaction takes place between employees in a team or group format to reach a competitive or non-competitive shared common goal or outcome (e.g., winning, skill-development, task completion)’. Therefore, any PA meeting this criterion, with either a competitive (e.g., winning) or non-competitive (e.g., skill-development, task completion) outcome, was classified as a team sport. Examples include, though are not limited too; soccer, netball, volleyball, rugby, cycling, walking, swimming, table tennis, activity challenges, climbing and canoeing. Using this definition, the following inclusion criteria were developed and studies were selected if they: (i) met the definition of ‘team sports’; (ii) used team sport as a study variable; (iii) concerned at least one of the following outcomes for the employee (e.g., cardiovascular or cardiorespiratory changes; stress; health; well-being; quality of life; BMI/weight changes; job satisfaction), for the group (e.g., team commitment; communication;
cohesion; interpersonal relationships; trust) and for the organisation (e.g., sickness absence; presenteeism; work performance; productivity); and (iv) were conducted with employees in a workplace setting. Only studies published in English were included.
Appendix 2: Changing the Game information sheet, informed consent from, HSQ and waiver from participating organisation.

Participant Information Sheet

Changing the Game: Team Sport at Work

A quasi-experiential study understanding the effect participation in workplace team sport, has on your health, wellbeing and productivity

You are invited to take part in a study to find out whether participation in a team sport programme (‘Changing the Game’) can improve your health, wellbeing and productivity. Before you decide whether you would like to take part, it is important that you understand why the research is being done and what it will involve. Please read the following information and discuss it if you wish.

Who is doing this research and why?
A research team at Loughborough University are conducting this study. This is led by Andrew Brinkley, a PhD student in the School of Sport, Exercise, and Health Sciences, supervised by Dr Hilary McDermott and Dr Fehmidah Munir. Our work aims to understand the benefits sports participation has on your health, and productivity at work. We are also interested in why you participate in sport and what types of sport you might like in the future.

Why have I been invited?
You have been invited because you work for [company name]. We are looking for employees to take part in team sport during working hours or continue ‘normal’ working activities. One worksite of [company name] will play team sport; while the other will be continue working as normal.

What happens if I decide to take part?

What is required from me?
If you decide that you are interested in taking part, please complete the informed consent form and return it to the researcher.
A member of the 'Changing the Game' team will then arrange a time with you so we can collect some baseline measures. These measures will be delivered at your workplace, and include a step-test, filling in a brief questionnaire, recording your height and weight, and completing a diary throughout the duration of the study.

The step test is conducted to measure your fitness. You will be required to step on and off a 30cm high bench for a maximum of ten minutes. At regular intervals, we will ask how you are feeling and record your heart rate. The questionnaire contains items relating to your health, physical activity and role at work, and your work team’s productivity and communication. It is worth noting that some of these questions may be sensitive to some individuals. We would like to remind you that these questions are for research purposes only and your answers will be remain anonymous. Finally, you will complete an activity diary every day for 12-weeks, each entry will take you around 2 minutes to complete and will ask for the type, intensity and duration of physical activity you did that day.

The measures will be delivered by Andrew Brinkley, a PhD student at Loughborough University. At the start of the study you will be allocated a number, to protect your identity. All measurements collected from you will be assigned this unique number. You will be asked to complete these measures at ‘baseline’, after 12-weeks and 6-months after the baseline measures.

**Will I be playing team sport or not?**
You and your worksite will then be placed into the intervention or control group. The intervention group will play team sport over a 12-week period, while the control group will continue working normally.

If you are in the intervention group, you will play team sport at an indoor location close to your workplace. You will participate in 40 minute sessions of rounders (weeks 1 & 7), basketball (weeks 2 & 8), netball (weeks 3 & 9), soccer (weeks 4 & 10), cricket (weeks 5 & 11), handball (weeks 6 & 12). Prior to these sessions you participate in a taster session. The taster session will provide you a chance to ‘try’ each sport, while the programme sessions provide you with the opportunity to play each team sport (see above). The sessions will be led by workplace champions in your organisation, and supervised by a qualified member of staff.
In order to evaluate the intervention, after 12-weeks, a subset of participants will be invited to an interview/focus group with the research team. You will be asked questions on how your physical activity behaviour might have changed (e.g., ‘do you do more exercise now than you did before?’) and if changes may have occurred in your workplace.

These interviews/focus groups will last about an hour and will be audio recorded. These recordings will only be heard by the research team. Direct quotes may be used in scientific publications, presentations or posters, but will remain anonymous (i.e., no names will be given). This part of the study is entirely voluntary and you can take part in the wider study without agreeing to be interviewed.

If you are in the intervention group, you may be observed and asked questions about your participation and attitudes regarding the programme. These observations will take place during team sport be record through detailed notes, while interviews will be audio recorded. To further understand the effectiveness of the intervention, you will be invited to share your thoughts and opinions about the intervention, the team sport sessions, and your enablers and obstacles to participation.

*How long will it take?*

The study will take 7-months to complete including all of the measurements mentioned above.

*Are there any criteria to take part?*

To take part in this study, you must be over the age of 18, work at least three days-a-week on the same worksite, and currently on a permanent contract. You cannot participate if you under the age of 18, or on a temporary contract, or if you have planned a holiday or business off site during the study.

*Is there anything I need to bring with me?*

If you are taking part in the sports programme we suggest you wear clothing and footwear you feel comfortable exercising in. You may wish to bring some water, and food and some warm clothing for after each session.
What personal information will be required from me?
At the beginning of the study you will be allocated a number to keep your identity anonymous. However, we will record some personal information regarding your age, gender, weight, presence of illnesses/conditions, position in the organisation, and levels of physical activity.

Do I have to take part?
You do not have to take part – it is up to you to decide whether or not you would like to take part. If you do decide to take part, you will be asked to sign a consent form once you have had the opportunity to read this information sheet and ask any questions you might have. You will be given a copy of your signed form to keep for your own information.

Once I take part, can I change my mind?
Yes! Taking part is entirely voluntary - you don't have to take part if you don't want to. You may withdraw from this research at any time for any reason and you will not be asked to explain your reason for withdrawing. You will be able to request that your data is withdrawn from the study up to 2 months from your participation in the study. After this time, it may not be possible for you to withdraw your data from the study as the data may have been aggregated or published. You may withdraw your data, please email Andrew Brinkley (a.j.brinkley@lboro.ac.uk). You will need to provide your allocated reference number.

Will it cost me anything to take part?
No, the measurements will be conducted in your place of work. The sport sessions will take place within walking distance of your office. There will be no charge to take part.

Will my taking part in the study be keep confidential?
Yes. We will follow ethical and legal practice in accordance with the Data Protection Act (1998). All information about you will be handled in confidence unless you disclose that you, or someone else, is in immediate danger of serious harm. Access to identifiable data (e.g., name) will be limited to members of the research team, and will be kept on secure University computers. All data will be coded and logged and may be used for future research in the same theme as this project. Personal details will not be included in analysis, or in publications or reports. All information collected during the study will be identified by a unique code so that you cannot be identified.
from it. All data will be kept on secure computer servers and in locked filing cabinets within a locked office at Loughborough University for up to six years.

What are the possible risks and benefits of taking part?

Benefits

Evidence suggests, long periods of inactivity (e.g., sitting) are bad for our health, wellbeing and performance in the workplace. Initial research has suggested breaking up this inactive time with team sport may improve our physical fitness and mental wellbeing, while fostering relationships with our peers and helping us concentrate more. Benefits of taking part may include improved fitness, weight loss, relationships with peers and productivity, and reduced stress, fatigue, and muscle stiffness.

Risks

Playing team sport and completing the step-test carries the following risks that we feel you should be made aware of, as well as some of the things we are doing to minimise these risks:

- Sensations of fatigue and physical exhaustion – this will be short-lived and will subside in a few minutes upon stopping exercise. You also may cease participation at any point.
- Injury from playing sport – the risks of each sport will be explained to you. You will be given a chance to warm-up prior to playing sport. Please take in to account you are playing with your peers.

Who do I contact if I have a problem?

If you are not happy with how the research was conducted, please contact Ms Jackie Green, the Secretary for the University’s Ethics Approvals (Human Participants) Sub-Committee:

Ms J Green, Research Office, Hazlerigg Building, Loughborough University, Epinal Way, Loughborough, LE11 3TU. Tel: 01509 222423. Email: J.A.Green@lboro.ac.uk

The University also has a policy relating to Research Misconduct and Whistle Blowing which is available online at http://www.lboro.ac.uk/committees/ethics-approvals-human-participants/additionalinformation/codesofpractice.

What will happen to the results of the study?

The results of this study will be used to assess the effectiveness of providing a workplace team sport programme on health, wellbeing and productivity. The findings
will be presented in an anonymised way and you will not be identified. Findings will be presented at academic conferences and/or published in academic journals in a manner relevant to all the participants. No individual data will be reported. It will be up to your organisation as to how they share the findings.

Who has reviewed the study?
To protect your safety, rights, wellbeing and dignity, all research by Loughborough University is looked at by an independent group of people. This study has been reviewed in accordance with Loughborough University Research Governance Procedures and approved by the Ethical Approval (Human Participants) Sub-Committee.

Who can I contact if I have any questions about the study or if I experience any problems while participating?
Please feel free to ask us any questions about the study using the contact information of the ‘Changing the Game’ research team below. In addition, the team will be happy to explain anything that is unclear about the project or address any concerns you have.

Mr Andrew Brinkley (A.J.Brinkley@lboro.ac.uk)
Dr Hilary McDermott (H.J.McDermott@lboro.ac.uk)
Dr Fehmidah Munir (F.Munir@lboro.ac.uk)
National Centre of Sport and Exercise Medicine
School of Sport, Exercise and Health Sciences
Loughborough University
Loughborough
Leicestershire, LE11 3TU
Please retain this sheet for your information
Changing the Game: Team Sport at Work

INFORMED CONSENT FORM
(to be completed after participant Information Sheet has been read)

Taking Part Please initial box

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethics Approvals (Human Participants) Sub-Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study, have the right to withdraw from this study at any stage for any reason, and will not be required to explain my reasons for withdrawing.

I agree to take part in this study. Taking part in the project will include being interviewed and recorded (audio).

Use of Information

I understand that all the personal information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others or for audit by regulatory authorities.

I understand that anonymised quotes may be used in publications, reports, web pages, and other research outputs.

I agree for the data I provide to be securely archived at the end of the project.

__________________________ _____________________ ________
Name of participant [printed] Signature Date

__________________________ _____________________ ________
Researcher [printed] Signature Date

Participant number .....................

Gender ....................

Date of Birth .....................
# Health Screen Questionnaire for Study Volunteers

As a volunteer participating in a research study, it is important that you are currently in good health and have had no significant medical problems in the past. This is (i) to ensure your own continuing well-being and (ii) to avoid the possibility of individual health issues confounding study outcomes.

Please complete this brief questionnaire to confirm your fitness to participate:

## 1. At present, do you have any health problem for which you are:

<table>
<thead>
<tr>
<th>(a) on medication, prescribed or otherwise</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) attending your general practitioner</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(c) on a hospital waiting list</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

## 2. In the past two years, have you had any illness or injury which required you to:

<table>
<thead>
<tr>
<th>(a) consult your GP</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) attend a hospital outpatient department</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(c) be admitted to hospital</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

## 3. Have you ever had any of the following:

<table>
<thead>
<tr>
<th>(a) Convulsions/epilepsy</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) Asthma</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(c) Eczema</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(d) Diabetes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(e) A blood disorder</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(f) Head injury</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(g) Digestive problems</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(h) Heart problems/chest pains</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(i) Problems with muscles, bones or joints</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(j) Disturbance of balance/coordination</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(k) Numbness in hands or feet</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(l) Disturbance of vision</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(m) Ear/hearing problems</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(n) Thyroid problems</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Kidney or liver problems .......................... Yes  No
Problems with blood pressure ...................... Yes  No

If YES to any question, please describe briefly if you wish (e.g., to confirm problem was/is short-lived, insignificant or well controlled?) Have you consulted your doctor regarding participation in physical activity?


Smoking, physical activity and family history

Are you a current or recent (within the last six months) smoker? Yes  No
Are you physically active (30 minutes of moderate intensity, physical activity on at least 3 days each week for at least 3 months)? Yes  No
Has any, otherwise healthy, member of your family under the age of 35 died suddenly during or soon after exercise? Yes  No

Are you currently involved in any other research studies at the University or elsewhere? Yes  No

If yes, please provide details.

Please provide contact details of a suitable person for us to contact in the event of any incident or emergency.
Name: 

Telephone Number: 

Work  Home  Mobile  

Relationship to Participant: 


Changing the Game: Team Sport at Work

Waiver

(to be completed after participant Information Sheet has been read)

Taking Part

☐ strongly recommends that you consult with your GP before beginning any exercise programme.

You should be in good physical condition and be able to participate in the exercise.

☐ is not a licensed medical care provider and represents that it has no expertise in diagnosing, examining, or treating medical conditions of any kind, or in determining the effect of any specific exercise on a medical condition.

You should understand that when participating in any exercise or exercise programme, there is the possibility of physical injury. If you engage in this exercise or exercise programme, you agree that you do so at your own risk, are voluntarily participating in these activities during your lunch break, assume all risk of injury to yourself, and agree to release and discharge ☐ from any and all claims or causes of action, known or unknown, arising out of ☐ negligence.

____________________________________  _____________________  ________
Name of participant [printed]  Signature  Date
Appendix 3: Workplace champion training manual.

Changing the Game: Workplace Champion Training

Introduction

Our physical activity programme, ‘Changing the Game’ is developed to provide accessible team sport in a workplace setting. We hope we can change the way people view sport and increase their participation and adherence to team sport within the workplace.

The programme you are helping us deliver is part of a larger research project, carried out by a team of researchers at Loughborough University. The team consists of Andrew Brinkley, a doctoral researcher; and his supervisors Dr Hilary McDermott and Dr Fehmidah Munir. Changing the game has the support of Severn Trent, and is run in partnership with Coventry University’s Sports and Recreation Centre.

What benefits does team sport for employees and the organisation?

Evidence suggests participation in workplace team sport can influence employee health and improve organisational performance. Regular participation in team sport may improve cardiorespiratory fitness, psychological wellbeing and musculoskeletal function. Participation in team sport is linked with cohesion, teamwork and relationships. As a result of these benefits work-engagement, communication and productivity may also improve.

What is your role in the program?

Your role is to deliver the team sport sessions to your peers. Workplace champions ‘coaching’ their colleagues is known to influence motivation and
behaviour. Sessions will take place for 12-weeks during lunch hours and there will be one per-week.

**How to lead the sessions?**

During ‘Changing the Game’ you will coach your colleagues through a taster session, and 12 sessions of team sport. By leading sessions, you will motivate and support your peers socially and help them through some of the obstacles associated with participation.

To assist you in each session, you will be provided a detailed session plan and a helpful checklist. When leading sessions, you can adapt sports to help your peers. For example, if someone is struggling to serve overarm in volleyball, switch the serve to underarm.

Your main aim is to make it as easy and enjoyable to play. This type of participation is linked to confidence and positive motivation towards an activity.

You can also reinforce the benefits of playing to participants. Reinforce what they are participating in is good for their health and wellbeing. Further, if someone is finding something challenging, we want to create an environment where they can freely opt out. Try to address the reason why they have opted out, and alter the sport to make it more enjoyable for them.
The sessions

- Ten minutes to warm up and familiarise peers with the sports equipment, at this point try to address any concerns or challenges faced.

- Following this should be a 30-minute game. This game should be flexible. Try to support and help your colleagues by adapting the rules of the sport. Anything goes, feel free to alter from traditions and create new rules. Try to make the sports as enjoyable, novel and interesting as possible.

- Try to avoid ‘strong’ competition, rather promote and encourage fun and enjoyment. Further, where possible encourage group cohesion, try to get peers talking to each other, and facilitate conversation if possible.

For some top tips and a helpful checklist please see the hand-out we have provided.

Contacts

If you have any questions, would like some more information, or anything else, please feel free to get in touch by email.

Andrew Brinkley

a.j.brinkley@lboro.ac.uk

National Centre for Sports and Exercise Medicine, Loughborough University
## Top Tips

<table>
<thead>
<tr>
<th>Team Sport Sessions Checklist</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greet your colleagues – Explain sport we are playing and the rules</td>
<td></td>
</tr>
<tr>
<td>Ask if participants have any questions</td>
<td></td>
</tr>
<tr>
<td>Try to address any concerns and answer any questions. Explain the session is all about enjoyment and making the sport fun and easy to play.</td>
<td></td>
</tr>
<tr>
<td>Elicit (from colleagues) their experiences of this team sport. Adapt sport ad-hoc as you see fit</td>
<td></td>
</tr>
<tr>
<td>Give your colleagues 10 minutes to ‘warm up’ and familiarize themselves with the equipment and rules of the sport. Try to address the ‘key’ skills during this period of time. Adapt the sport if required. Help peers through any obstacles and challenges.</td>
<td></td>
</tr>
<tr>
<td>Give your colleagues a chance to pick their own teams. However, try to make the teams as equal as possible.</td>
<td></td>
</tr>
<tr>
<td>If a colleague has experienced any obstacles to team sport or physical activity try to understand and relate to their issue. Allow them they can opt out of any part of the session.</td>
<td></td>
</tr>
<tr>
<td>During the session, be flexible. Try to make ad-hoc adaptions to the rule of the sport where fitting.</td>
<td></td>
</tr>
<tr>
<td>When the game begins try to promote cohesion in the group. Try and get people talking and joking. Facilitate conversation if required.</td>
<td></td>
</tr>
<tr>
<td>Try to account for the needs of your colleagues when they are playing. If someone is struggling, maybe change the rules or adapt the session.</td>
<td></td>
</tr>
<tr>
<td>Be encouraging, reinforce anything positive. (e.g., scoring a goal)</td>
<td></td>
</tr>
<tr>
<td>At the end of the session. If your colleagues have experienced any benefits (reinforce the benefits that the participant highlights) reinforce the benefits of participation (e.g., improves fitness, meeting national guidelines for exercise).</td>
<td></td>
</tr>
<tr>
<td>Ask your colleagues if they enjoyed the session? What would they change how could it be better?</td>
<td></td>
</tr>
</tbody>
</table>
Date: 10/8/2016
Duration: 40 minutes

Rounders

Equipment needed:
Rounders bat x 2; balls (hard & soft) x 4; cones/markers x 6

Introduction: Play a game of rounders (1 or 2 innings). Basic rules – ‘bowl it’, ‘hit it’, and ‘run’ as far round the square as you can. Every ‘rounder’ equals one point. ‘I will help you through the game and keep score’

Session plan:
Set up = prior to session (Time <10 minutes)
- Set up field. Place 4 cones out in a diamond shape 5 (large) steps apart, with the 5th cone in line with the 4th cone. Place the 6th cone in the centre of the diamond. Place bats near batting cone, balls near bowling cone.

Warm up = <5 minutes (Time 1220-1225)
- Allow group to warm up, introduce rules (see below)
- Answer any questions
- Split group equally
- Encourage enjoyment, skills and social aspect of games
- Avoid placing emphasis on competition and performance.

Rules
- One team bowl, one team bat. Everyone bats. Innings over when everyone on the batting team is out or 15 minutes is up.
- Bowl under arm from the bowling cone to the batter (on the batting cone). Ball should be under head and over waist height
- Overhead or under waist. Re-bowl ball.
- Miss three balls move on to first base.
- If ball is hit, run around to the furthest base you can
- You can be out if you are caught out (including off walls), or the ball is caught at a base before you arrive there.

Game = 35 minutes (Time 1225-1300)
- Play game
- Adapted rules for game if required (e.g., if a skill is too difficult). E.g., Use softball if hard ball is hard to hit
- Allow anyone to drop in if they are late for the session
- Encourage enjoyment, skill-development and social encouragement – try to motivate players, keep people interested.
# Netball

**Equipment needed:**
Netball goals; netballs x 2; cones/markers. Bibs

**Date:** 13/7/2016 & 24/8/2016

**Duration:** 40 minutes

## Introduction
Play a game of netball. Simple rules. ‘I will help you through the game and keep score’

## Session plan:

### Set up = prior to session (Time <10 minutes)

- Set up pitch. Place cones out in mark the pitch out. Assemble goals, place one at each end of the pitch

### Warm up = <5 minutes (Time 1220-1225)

- Allow group to warm up, introduce rules (see below). Split group equally
- Answer any questions
- Encourage enjoyment, skills and social aspect of games
- Avoid placing emphasis on competition and performance.

### Rules

- Basic rules of netball. Two 15-minute halves. Players can move freely. Players must pass the ball, while keeping a foot grounded.
- Players can only move while ‘off the ball’. A turnover will be awarded if a team breaks this rule
- To score, throw the ball into the opposition goal.
- You may only handle the ball while standing. You may rotate with one foot grounded.
- If a goal is scored. The goalkeeper will restart play with a goal throw.
- Snatching the ball or contact will result in a free throw to the opposition team
- If the ball goes out of play. A throw in will be awarded

### Game = 35 minutes (Time 1225-1300)

- Regular rotation of players. Rotate player if a point is scored, if the ball goals out of play, if a foul is given.
- Adapted rules for game if required. Be lenient with rules.
- Allow anyone to drop in if they are late for the session
- Encourage enjoyment, skill-development and social encouragement – try to motivate players, keep people interested.
### Introduction

Play a game of basketball. Simple rules. ‘I will help you through the game and keep score’

### Session plan:

**Set up = prior to session (Time <10 minutes)**
- Set up court. Make sure court is set out. Make sure nets are down. Lower nets if possible?

**Warm up = <5 minutes (Time 1220-1225)**
- Allow group to warm up, introduce rules (see below). Split group equally
- Answer any questions
- Encourage enjoyment, skills and social aspect of games. Avoid placing emphasis on competition and performance.

**Rules**
- Basic rules of basketball. No kicking the ball. No snatching the ball. No holding onto an opposition player.
- The ball is moved down the court by passing or dribbling. If you stop dribbling you must pass the ball. You can’t move without dribbling.
- Any foul results in a free throw. Inside the ‘D’ (i.e., the goal area) two penalty shots at the net are awarded.
- To score, throw the ball through the opposition hoop/net.
- If a point is scored. Restart by passing the ball from the line behind the net (baseline)
- If the ball goes out of ball. The opposition have possession and must restart with a free-throw from the side line
- If a point is scored outside the ‘D’ (i.e., the goal area) three points are awarded

**Game = 35 minutes (Time 1225-1300)**
- Play game = four 6 minute quarters: couple of minutes break in between each quarter. Change ends. Each time.
- Regular rotation of players. Rotate players if a point is scored, after 1 minute, or at free will.
- Adapted rules for game if required. Be lenient with rules. Allow anyone to drop in if they are late for the session
- Encourage enjoyment, skill-development and social encouragement – try to motivate players, keep people interested.
### Appendices

<table>
<thead>
<tr>
<th>Date</th>
<th>20/7/2016 &amp; 31/8/2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>40 minutes</td>
</tr>
<tr>
<td><strong>Soccer</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Equipment needed:</strong></td>
<td>Goals; balls x 2; cones/markers. Bibs</td>
</tr>
<tr>
<td><strong>Introduction:</strong></td>
<td>Play a game of soccer (football) (2 halves). Basic rules – no offside. ‘I will help you through the game and keep score’</td>
</tr>
</tbody>
</table>

**Session plan:**

**Set up = prior to session (Time <10 minutes)**

- Set up pitch. Assemble goals, place one at each end of the pitch

**Warm up = <5 minutes (Time 1220-1225)**

- Allow group to warm up, introduce rules (see below). Answer any questions
- Split group equally
- Encourage enjoyment, skills and social aspect of games
- Avoid placing emphasis on competition and performance.

**Rules**

- Basic rules of football. Two 15-minute halves. No offside. No handballs. No slide tackling. Only the goalkeeper may handle the ball.
- To score, kick the ball into the opposition goal. If you kick the ball in your own net, an own-goal will be awarded to the opposition team.
- If a goal is scored. The goalkeeper will restart play with a goal kick.
- If the ball leaves the pitch a throw-in will be awarded (on the side-line with two hands throw ball over head)
- Any other foul – e.g., bad tackle, handball will be result in a free kick to the opposition

**Game = 35 minutes (Time 1225-1300)**

- Play game. Regular rotation of players. Rotate players if a goal is scored, if a foul is given, if the ball goes out of play.
- Adapted rules for game if required. Be lenient with rules.
- Allow anyone to drop in if they are late for the session
- Encourage enjoyment, skill-development and social encouragement – try to motivate players, keep people interested.
**Date:** 27/7/2016 & 7/9/2016

**Duration:** 40 minutes

**Cricket**

**Equipment needed:**
indoor cricket set. Extra balls

**Introduction:**
Play a game of cricket (2 innings). Everyone gets to bat and bowl. Basic rules. ‘I will help you and keep score’

**Session plan:**

**Set up = prior to session (Time <10 minutes)**

- Assemble wickets, Place wickets 15 steps apart. Place bats next to wickets.

**Warm up**

- Allow group to warm up, introduce rules (see below) (Time 1220-1300)
- Answer any questions
- Split group equally
- Encourage enjoyment, skills and social aspect of games
- Avoid placing emphasis on competition and performance.

**Rules**

- To score, hit the ball as far as you can into space and run between the wickets, a run is observed every time a player reaches the other wicket
- To score 4 runs hit the back wall with the ball touching the ground. To score 6 runs hit the back wall without the ball touching the floor
- Bowl the ball under or over arm to the batter
- To get a batter out, hit the stumps with the ball; catch the ball before it touches the floor (you can catch the ball off the side wall, providing it doesn’t touch the floor first); hit the ball with the stumps before the batter makes it to the wicket
- Everyone bowls six balls (an over) and everyone bats. Once everyone has bowled or everyone is out swap bowlers/batters. If everyone has not batted after 15 minutes, switch bowlers/bowling teams

**Game = 35 minutes (Time 1225-1300)**

- Play game. If required rotate players. Rotate if a ‘4’ or ‘6’ is scored, if a wicket is taken, or after a run has been scored number dependent
- Adapted rules for game if required. Be lenient with rules. Switch teams around if opposition is losing considerable.
- Allow anyone to drop in if they are late for the session
- Encourage enjoyment, skill-development and social encouragement – try to motivate players, keep people interested.
### Handball

**Date:** 3/8/2016 & 14/9/2016  
**Duration:** 40 minutes  
**Equipment needed:** Goals; handballs x 2; cones/markers. Bibs

**Introduction:** Play a game of handball. Simple rules. 'I will help you through the game and keep score'

**Session plan:**

Set up = prior to session (Time <10 minutes)
- Set up pitch. Place cones out in mark the pitch out. Pitch dimensions 40 steps by 20 steps. Assemble goals, place one at each end of the pitch.

Warm up = <5 minutes (Time 1220-1225)
- Allow group to warm up, introduce rules (see below)
- Answer any questions
- Split group equally
- Encourage enjoyment, skills and social aspect of games
- Avoid placing emphasis on competition and performance.

**Rules**
- Basic rules of handball. Two 15-minute halves. No kicking the ball. No snatching the ball.
- To score, throw the ball into the opposition goal. If you knock the ball in your own net, an own-goal will be awarded to the opposition team.
- You may only handle the ball for 3 steps or 3 seconds before passing the ball to a team mate or shooting.
- If a goal is scored. The goalkeeper will restart play with a goal throw.
- Snatching the ball or contact will result in a free throw to the opposition team
- If the ball goes out of play. A throw in will be awarded

Game = 35 minutes (Time 1225-1300)
- Play game
- Regular rotation of player. Rotate players if a goal is score, if the ball goes out of play, if a foul is awarded
- Adapted rules for game if required. Be lenient with rules.
- Allow anyone to drop in if they are late for the session
- Encourage enjoyment, skill-development and social encouragement – try to motivate players, keep people interested.
Appendix 4: Secondary outcome measures questionnaire.

A questionnaire about your health and work
Your health

The following seven statements are about how you feel at the moment. Please respond to each of the following statements in terms of how you are feeling right now. Please indicate how true each statement is for you at this time, using the following scale. If you have this feeling, indicate how you feel by circling the number (from 1 to 7) that best describes how you feel.

1= Not at all true  
2= Usually not true  
3= Rarely true  
4= Somewhat true  
5= Often true  
6= Usually true  
7= Very true

<table>
<thead>
<tr>
<th>Statement</th>
<th>Scale (1-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At this moment, I feel alive and vital</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>I don’t feel very energetic right now</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>Currently I feel so alive right now, I just want to burst</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>At this time, I have energy and spirit</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>I am looking forward to each new day</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>At this moment, I feel alert and awake</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>I feel energized right now</td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate with a tick how often you felt or thought a certain way in the last week.

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale (Never - Very Often)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the last week, how often have you felt that you were unable to control the important thing in your life?</td>
<td>Never</td>
</tr>
<tr>
<td>In the last week, how often have you felt confident about your ability to handle your personal problems?</td>
<td></td>
</tr>
<tr>
<td>In the last week, how often have you felt that things were going your way?</td>
<td></td>
</tr>
<tr>
<td>In the last week, how often have you felt difficulties were piling up so high that you could not overcome them?</td>
<td></td>
</tr>
</tbody>
</table>
Below are five statements that you may agree or disagree with. Using the 1 to 7 scale below, please indicate your agreement with each item by circling the number preceding the item. Please be open in your responding.

1= Strongly disagree  
2= Disagree  
3= Slightly disagree  
4= Neither agree or disagree  
5= Slightly agree  
6= Agree  
7= Strongly agree

<table>
<thead>
<tr>
<th>In most ways, my life is close to my ideal</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>The conditions of my life are excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I am satisfied with my life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>So far, I have gotten the important things I want in my life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>If I could live my life over, I would change almost nothing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

1. Counting only days which you work, how many days were you absent from work in the past 3 months because you were sick or not feeling well? _______________

2. Counting only days which you work, how many days did you go to work in the past 3 months even though you were sick or not feeling well? _______________

3. Please consider your physical and mental health in the last two weeks, and answer the following questions by circling one of the five options: 1 = excellent  2 = good  3 = moderate  4 = mediocre  5 = poor

3a. How would you evaluate your physical health?  

| 1 | 2 | 3 | 4 | 5 |

3b. How would you evaluate your mental health?  

| 1 | 2 | 3 | 4 | 5 |
These questions ask about your **fatigue**. Please read each question carefully and indicate your response by ticking one of the boxes next to each question.

<table>
<thead>
<tr>
<th>I find it difficult to relax at the end of the working day</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the end of the working day, I feel really worn out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Because of my job, at the end of the working day, I feel rather exhausted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After the evening meal, I generally feel in good shape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In general, I only start to feel relaxed on the second working day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I find it difficult to concentrate in my free time after work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I cannot really show any interest in other people when I have just come home myself</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generally, I need more than an hour before I feel completely recuperated after work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I get home from work, I need to be left in peace for a while</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often, after a day’s work I feel so tired that I cannot get involved in any activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A feeling of tiredness prevents me from doing my work as well as I normally would during the last part of the working day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Your physical activity

These questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house work, to get from place to place, and in your spare time for recreation, exercise or sport.

1. Think about all the **vigorous** activities that you did in the last 7 days. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time. Please think about all the **vigorous** activities that you did in the last 7 days. **Vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

\[ \text{____ Days per week} \]
Appendices

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1. How much time did you usually spend doing vigorous physical activities on one of those days?

__________________ Hours per day

__________________ Minutes per day

Don't know/Not sure

2. Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

__________________ Days per week

No moderate physical activities (Skip to question 5)

3. Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise or leisure. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

__________________ Days per week

No walking (Skip to question 7)

4. How much time did you usually spend walking on one of those days?

__________________ Hours per day

__________________ Minutes per day

Don't know/Not sure

5. This question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This many include time spent at a desk, visiting friends, reading, or
sitting or lying down to watch television. During the **last 7 days**, how much time did you spend sitting on a **week** day?

__________________ Hours per day
__________________ Minutes per day

Don’t know/Not sure  

6. Please describe below any physical activity (e.g., sport, exercise) you do **outside of work** at least once a week?

   

<table>
<thead>
<tr>
<th>Your time at work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking everything into consideration, how do you feel about your job as a whole? (please circle an option)</td>
</tr>
<tr>
<td>Extremely dissatisfied</td>
</tr>
</tbody>
</table>

   

These questions ask about **how your work**. Please read each question carefully and indicate your response by ticking one of the boxes next to each question.

<table>
<thead>
<tr>
<th>I perform tasks that are expected of me</th>
<th>Almost Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I go out of my way to help other colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I take time to take a personal interest in other colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I assist my supervisor/manager with his/her work even when not asked</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following nine statements are about how you feel when working. Please read each statement carefully and decide if you ever feel this way about your role. If you have never had this feeling, circle the “0” (zero) in the space after the statement. If you have had this feeling, indicate how often you feel it by circling the number (from 1 to 6) that best describes how frequently you feel that way.

0= Never 1= Almost never (a few times a year or less) 2= Rarely (once a month or less) 3= Sometimes (a few times a month) 4= Often (once a week) 5= Very often (a few times a week) 6= Always (every day)

<table>
<thead>
<tr>
<th>When working I feel bursting with energy</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>When working, I feel strong and vigorous</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I am enthusiastic about my role</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>My role inspires me</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>When I get up in the morning, I feel like working</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I feel happy when I am working intensely</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I am proud of the work that I do</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I am immersed in my role</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>I get carried away when I am working</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Your teamwork in the workplace

These questions ask about how your views on how your team works. Please read each question carefully and indicate your response by ticking one of the boxes next to each question.

<table>
<thead>
<tr>
<th>Supervisors/Managers often praise the quality of our work.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The team is often told by others that it is performing well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This team is consistently told that it achieves or exceeds its goals.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following questions are about your psychosocial work environment, and your experience with your colleagues and superiors. Please read each question carefully and indicate your response by ticking one of the boxes next to each question.

<table>
<thead>
<tr>
<th>Question</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never/Hardly ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you get help and support from your colleagues?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often are your colleagues willing to listen to your problems at work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do your colleagues talk to you about how well you carry out your work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often is your nearest superior willing to listen to your problems at work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often do you get help from your nearest superior?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often does your nearest superior talk about how well you carry out your work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These questions ask your own view of how your team works together to achieve its goals. Please read each question carefully and indicate your response by ticking one of the boxes next to each question.

<table>
<thead>
<tr>
<th>Question</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never/Hardly ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a good atmosphere between you and your colleagues?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there good co-operation between your colleagues at work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you feel part of a community at your place of work?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following five statements are about **communication within your workplace**. Please read each statement carefully and decide if you agree with the following statements in your workplace. Please read each statement carefully and indicate your response by ticking one of the boxes next to each statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at All</th>
<th>Very Little</th>
<th>Undecided</th>
<th>Somewhat</th>
<th>Very Much</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent is the communication among the members of your team clear?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent is the communication among the members of your team effective?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent is the communication among the members of your team complete?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent is the communication among the members of your team fluent?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent is the communication among the members of your team on time?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**About you?**

1. Please state your age?___________

Are you: Male [ ] Female [ ]

2. What is your highest qualification?

- [ ] No qualification
- [ ] GCSE
- [ ] NVQ
- [ ] AS/A Level
- [ ] Further education (e.g., BETC)
- [ ] Foundation Degree/Diploma
- [ ] Degree
- [ ] Higher Degree
Appendices

3. Are you:

Married/Partnered □  Single □

4. Do you have any dependents?

Yes □  No □

5. Please describe your ethnicity? ________________________________

6. How long have you worked at your organisation? _______Years _______Months

7. What is your job role?_______________________________________

8. What section or department do you work in?
__________________________________

9. On average how many hours do you work per week? _______________

10. Do you currently work as part of a team?

Yes □  No □

11. How many teams do you work in? _____________

12. On average, how many people work in your team(s)

   - Team 1? ______________
   - Team 2? ______________
   - Team 3? ______________

Please answer the following question for the team that you most frequently work in:

13. Do you manage a team as a team leader, supervisor or manager?

   Yes □  No □
Appendix 5: Week-by-week physical activity diary.

Participant Number:………………………… Please Start Completing this Diary on the Week Beginning:……………….. Week:……………………..

<table>
<thead>
<tr>
<th>Day and Date?</th>
<th>What physical activity have you participated in?</th>
<th>Duration?</th>
<th>Intensity? (e.g., easy, hard)</th>
<th>Time you went to sleep?</th>
<th>Other comments about your day?</th>
</tr>
</thead>
</table>
| Day 1 (e.g.)  | Walked to work. Played Football at lunch. Walked home from work (1.5 miles). Played with my son, hovered the house. | Walking = 30 minutes each way 
Football = 40 minutes 
Played with son = half an hour | Pretty hard day, walking in easy. Football and playtime hard work. Fell asleep about 11pm | | Was a busy day. |
| Day 1:        | Date: 07/03/2016                                  |           |                               |                        |                             |
| Day 2:        | Date:                                             |           |                               |                        |                             |
| Day 3:        | Date:                                             |           |                               |                        |                             |
| Day 4:        | Date:                                             |           |                               |                        |                             |
| Day 5:        | Date:                                             |           |                               |                        |                             |
| Day 6:        | Date:                                             |           |                               |                        |                             |
| Day 7:        | Date:                                             |           |                               |                        |                             |
Appendix 6: Process evaluation questionnaire – post participation.

Changing the Game: Post-programme thoughts and experiences

Please read the following questions and answer with your thoughts and experiences in the corresponding box. Any questions, please feel free to ask.

How did you find out about the programme? What were your general thoughts of it?

What did you like or enjoy about the programme?

What didn’t you like or enjoy about the programme? (How could this be made better?)

Do you think the programme benefited you in any way? (For example, personal, social or workplace benefits)

What motivated or enabled you to take part in the programme? (For example, a supportive manager)

What prevented you from or created a barrier to taking part in the programme? (For example, meetings scheduled during sport)

How did you find your colleagues (workplace champions) leading the sports?
This questionnaire contains items that are related to your experiences with your workplace champion. Workplace champions have different styles of dealing with people. We would like to know more about how you have felt about your encounters with your workplace champion. Your responses are confidential. Please be honest and candid. Please circle the box which best represents how you felt.

1= Strongly disagree  
2= Disagree  
3= Somewhat agree  
4= Neutral  
5= Somewhat agree  
6= Agree  
7= Strongly agree

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<tr>
<th>I feel that my workplace champion provides me choices and options</th>
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<tr>
<td>I feel understood by my workplace champion</td>
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<tr>
<td>My workplace champion conveyed confidence in my ability to do well in team sport</td>
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<tr>
<td>My workplace champion encouraged me to ask questions</td>
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<tr>
<td>My workplace champion listens to how I would like to do things</td>
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<tr>
<td>My workplace champion tries to understand how I see things before suggesting a new way to do things</td>
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Whilst taking part in the programme, have you started or were you taking part in any other physical activity, exercise or sport?
This questionnaire contains items that are related to your experiences of workplace team sport. We would like to know your experiences and feelings with the sports offered throughout this programme.

Your responses are confidential. Please be honest and candid. Please circle the number which best represents how you felt.

1= Not at all true  
2= Not true most of the time  
3= Somewhat true  
4= Neutral  
5= Somewhat true  
6= True most of the time  
7= Very true

| I can overcome challenges in the sports I played | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I was skilled at the sports I played | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I felt good at the sports I played | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I felt I had the opportunity to feel good at the sports I played | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I had the ability to perform well in the sports I played | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I had the opportunity to make choices | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I had a say in how things were done | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I took part in the decision-making process | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I got the opportunity to make decisions | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I feel I am pursuing goals that were my own | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I really had a sense of wanting to be there | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I felt I was doing what I wanted to be doing | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I felt I participated in the sports willingly | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| In the sports I played, I felt I was being forced to do things that I didn’t want to do | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I chose to participate in these sports from my own free will | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
This questionnaire contains items that are related to your experiences of workplace team sport. We would like to know your experiences and feelings with the sports offered throughout this programme.

Your responses are confidential. Please be honest and candid. Please circle the number which best represents how you felt.

1= Not at all true
2= Not true most of the time
3= Somewhat true
4= Neutral
5= Somewhat true
6= True most of the time
7= Very true

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<td><strong>In the sports I participated in, I felt close to other people</strong></td>
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<td><strong>I showed concern for other people in the sports I participated in</strong></td>
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<td><strong>There were people in the sports I participated in who cared about me</strong></td>
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<td><strong>In the sports I participated in, there were people who I could trust</strong></td>
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<tr>
<td><strong>I had a close relationship with the people I played sport with</strong></td>
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If a similar programme was available would you be willing to take part, lead sessions or organise this within your workplace?

Any more comments?