

**Fitness, physical activity, and the feasibility of a
school-based adolescent health promotion
project for girls in Wales**

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Abstract

Physical activity is beneficial for current and future health and wellbeing; however, participation remains low, especially in girls. Despite the benefits of physical activity, barriers experienced by girls result in low adherence which is a cause of concern for health professionals. In an attempt to inform intervention design, it is important to explore the lifestyle factors associated with girls' fitness and girls' experiences of physical activity to ensure the design and delivery of bespoke interventions that produce meaningful outcomes. School-based adolescent health promotion projects provide a unique opportunity to work with girls, however the delivery and implementation of projects in school settings is complex and because of this, it is important to assess the feasibility of such projects to ensure the successful development and implementation of future work in this area. Study 1 aimed to explore the association between girls' fitness and obesity with multiple lifestyle factors and found that cardiorespiratory fitness was associated with seven lifestyle factors which accounted for 17.8% of the variance in girls' fitness, while 13.4% of the variance in BMI was attributed to cardiorespiratory fitness and perception of health. Study 2 explored girls' physical activity experiences using the Theory of Normative Social Behaviour as a guiding framework. The findings highlighted the impact social norms, gender expectations and the experiences of other girls had on the physical activity behaviours of girls in the study, highlighting the impact the social environment had on girls' physical activity experiences. Study 3 aimed to evaluate the feasibility of a 39-week school-based health promotion project for adolescent girls in Wales. This study employed robust methods, a 6 month follow up period with project participants and provides unique insights into the real world complexities of implementing a health promotion project across school settings, highlighting considerations for future research and project design.

Declarations and Statements

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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Date: 31.08.2024

This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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I hereby give consent for my thesis, if accepted, to be available for electronic sharing.

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The University's ethical procedures have been followed and, where appropriate, that ethical approval has been granted.

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Scientific Outputs

Presentations

Spacey, H, L., Hughes, R, Brophy, S, Stratton, G. Improving Physical Activity, Health and Wellbeing in Adolescent Girls – Sharing Findings and Delivering Insight, Wales, UK. January 2019. Oral Presentation.

Tyler, R., Spacey, H. L., Stratton, G. Dragon Multi-skills and Sport: The Dragon Challenge, International Physical Literacy Association (IPLA) Conference, Cardiff, UK. June 2018. Oral Presentation.

Spacey, H, L., Becoming Inactive, Postgraduate Bioethics Intergenerational Ethics Conference (Institute of Medical Ethics), Swansea UK. September 2019. Visual Abstract.

Spacey, H, L., Hughes, R, Brophy, S, Stratton, G, Physical Activity, Physical Education and the Water in which we Swim, European College of Sport Science, Prague, Czech Republic. July 2019. Poster Presentation.

Spacey, H, L., Hughes, R, Brophy, S, Stratton, G, Physical activity, physical education and the water in which we swim, Healthcare Disparities: disruptive healthcare technologies and the patient conference, University of Manchester, Manchester, UK. June 2019. Oral Presentation.

Spacey, H, L., Hughes, R, Brophy, S, Stratton, G, Adolescent girls, physical activity and the social environment, Pan Wales Postgraduate Conference in Sport and Exercise Sciences, Cardiff, UK. May 2019. Oral Presentation.

Spacey, H, L., Hughes, R, Brophy, S, Stratton, G, The Girls Project, Sport Wales Seminar, Cardiff, UK. February 2018. Oral Presentation.

Spacey, H, L., Tyler, R, Edwards, K, Brophy, S, Stratton, G, Investigating the relationship between overweight and obesity, cardiorespiratory fitness, components of fitness and physical competence in primary aged girls and boys, UK Congress on Obesity Conference, Pontypridd, UK. June 2017. Poster Presentation.

Spacey, H,L., Marchant, E, Todd, C, Tyler, R, Hughes, R, Brophy, S, Stratton, G,
Correlates of fitness of primary age girls and boys in Swansea, Pan Wales
Postgraduate Conference in Sport and Exercise Sciences, Swansea, UK. May
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Articles

Spacey, H, L., Girls are being denied access to certain sports in PE simply because of
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Abbreviations

20m MSFT	20m Multistage Fitness Test
ALN	Additional learning needs
A-STEM	Applied Sport Technology Exercise and Medicine
BMI	Body mass index; weight (kg) / height (m ²)
BMI z-scores	Measure of body mass adjusted for child age and gender
CHAT	Child Health and Activity Tool
cm	Centimetre
CMO	Chief medical officer
CRF	Cardiorespiratory fitness
CVD	Cardiovascular disease
CYP	Children and young people
DEXA	Dual-energy X-ray absorptiometry
FSM	Free school meals
GDP	Gross domestic product
HP	Health promotion
HRQoL	Health related quality of life
ICC	Intra Class Correlation
IPLA	International Physical Literacy Association
kg	Kilogram
m/m ²	Metre/square metre
min(s)	Minute(s)
MVPA	Moderate to vigorous physical activity
n	Number
NCD	Non-communicable diseases
NHS	National health service
p	Level of significance
PA	Physical activity
PC	Physical competence

PE	Physical education
PL	Physical literacy
QoL	Quality of life
R ²	Statistical measure to denote proportion of the variance in dependent variable, caused by independent variable(s)
SD	Standard deviation
SE	Self-esteem
SEN	Special educational needs
SES	Socio-economic status
SSS	School Sport Survey
TNSB	Theory of Normative Social Behaviour
VO ² MAX	Maximal oxygen consumption
WHO	World Health Organisation
WIMD	Welsh index of multiple deprivation

1. Introduction

1.1 Rational and Background

Physical activity is commonly used to describe any bodily movement that results in energy expenditure (World Health Organization, 2020) and regular engagement has been shown to accrue health benefits, with short and long-term improvements to health and wellbeing observed in active populations (Farooq et al., 2020; Reiner et al., 2013; Rhodes et al., 2017; Warburton et al., 2006; World Health Organization, 2018b). Through regular physical activity, cardiorespiratory fitness, or the body's aerobic capacity to meet physical demands increases, which in turn improves overall fitness and in turn, increases likelihood of physical activity participation (Ávila-García et al., 2020; De Oliveira & Guedes, 2016). Cardiorespiratory fitness is an important marker for overall health (Kokkinos et al., 2018) and because of this, PA has been heavily promoted by governments and public health organisations across the globe, with benefits to the individual, wider society and the economy being cited as key factors in public health rationales. However, despite continuing efforts, engagement in regular PA remains low globally across all population groups. In the UK, PA levels have declined by 20% since the 1960's and if left unchanged will continue to decline to 35% by 2030 (Department of Health and Social Care, 2019).

Health behaviours nurtured during childhood have a greater likelihood of continuing into adulthood (Sawyer, Afifi, et al., 2012; Shackleton et al., 2016), and thus, the promotion of a physically active lifestyle in child and adolescent population groups is seen as a key component in the health of future generations. Current PA guidelines in the UK recommend children and adolescents aged 5-18 years should engage in 150 minutes of moderate to vigorous physical activity (MVPA) per day, with the addition of activities that improve strength and develop motor skills, along with a reduction in time spent sedentary (Department of Health and Social Care, 2019). Despite recommendations and the numerous campaigns and strategies developed to promote PA in child and adolescent populations, only 18% of 5–16-year-olds in England met the physical activity guidelines between 2017-2018 (NHS Digital, 2019). A similar trend was reported in Wales, with only 18.4% of 11–16-year-olds meeting PA

guidelines, and 80% reporting sitting for more than 2 hours per day (Richards, Mackintosh, et al., 2022; Stratton et al., 2018).

While PA engagement remains low across child and adolescent groups (Guthold et al., 2020), a disparity exists between boys and girls, with boys repeatedly reporting greater PA engagement and adherence than girls (Telford et al., 2016). This finding has been replicated globally with disparities becoming greater with age and during the transition between primary and secondary educational settings (Farooq et al., 2020; Jago et al., 2019). Previous work with adolescent girls exploring the barriers to being physically active has highlighted multiple barriers that include body image, perceived physical competence, gender expectations, time constraints and motivation (Martins et al., 2014; Sackett et al., 2018; Spencer et al., 2015).

There have been numerous interventions designed to improve physical activity outcomes in girls with varying outcomes (Camacho-Miñano et al., 2011; Owen et al., 2017). Due to the complexities of the barrier's girls face, recommendations have called for girls' PA interventions to be delivered within a wider program of health behaviours that include a focus on addressing barriers to PA and providing opportunities to be physically active in a safe setting (Camacho-Miñano et al., 2011; Cowley et al., 2021; Warburton et al., 2006). Adolescent health promotion is a key tool in the improvement of health outcomes at an individual and population level and provides an opportunity to work with girls to improve their health and wellbeing, with physical activity being nested in delivery.

Adolescence is a time of great biological, social, and emotional change and is a period where individuals begin to form their identities and sense of self (Eleuteri et al., 2017; Sawyer, Afifi, et al., 2012; Viner & Macfarlane, 2005). Behaviour formations during this period are powerful, with many behaviours shaped during adolescence tracking into adulthood, which is especially important in the context of health across the life course (Rowe et al., 2016; Sawyer, Afifi, et al., 2012; Shackleton et al., 2016). The development of risk taking behaviours increases during this period, as individuals move away from the guidance of health professionals and family values and begin to align themselves with the behaviours of those who they aspire to emulate, namely peer groups and figures from popular culture (Eleuteri et al., 2017). Peer acceptance becomes especially important during this period and can lead to individuals engaging

in risky behaviours to appease peers (Menting et al., 2015). Given the latter, adolescent health promotion is a challenging task but one that is vital to the current and long term health outcomes of our future generation.

Schools are often regarded as important settings for the delivery of adolescent health promotion and education projects (Shackleton et al., 2016) and have been a setting of choice for many adolescent health interventions given the access they provide to large numbers of adolescents (Lima-Serrano & Lima-Rodríguez, 2014). Past health promotion projects have focussed on a range of health behaviours including physical activity, nutrition, smoking cessation, and substance misuse (Lima-Serrano & Lima-Rodríguez, 2014). Despite the wide range of topic areas covered, similarities across health promotion initiatives exist, with many incorporating elements including cognitive and emotional skill development, assessment of facilitators and barriers to health behaviours and assessment of the social factors influencing behaviour formations (Lima-Serrano & Lima-Rodríguez, 2014). There is support for school-based interventions to adopt an integrative approach to health promotion content, where projects address multiple behaviours which is important given that health behaviours during adolescence have similar determining factors and tend to cluster (Shackleton et al., 2016; Viner & Macfarlane, 2005). While schools provide an equitable setting for the delivery of adolescent HP initiatives, they are also complex environments that bring numerous challenges in the implementation of interventions (Darlington et al., 2018; Jaycox et al., 2006; Muellmann et al., 2017). To ensure the success of interventions, it is important to assess the feasibility of intervention design and implementation before rolling out large projects (Blatch-Jones et al., 2018).

Problem statement

PA plays an integral role in health and wellbeing; however, engagement remains sub-optimal across population groups, including in adolescent girls. Despite ongoing public health efforts, girls' PA engagement remains a cause for concern, with the majority of girls not meeting the recommended daily physical activity guidelines. Interventions focusing on improving girls' PA engagement accrue small improvements and have varying success at follow up. Because of its interconnected, complex relationship with other health, social, economic and lifestyle factors, it is important to tailor interventions to best suit the lived experiences of girls, and to assess

the feasibility of intervention design before rolling out at scale. Using this information, professionals will be better equipped to design interventions that bring about real change in the lives of girls.

1.1 Thesis aims

The overarching aim of this thesis was to examine the factors associated with girls' fitness and physical activity before assessing the feasibility of a school-based health promotion project for adolescent girls in Wales. This thesis is divided into three study chapters:

Study 1: The aim of Study 1 was to explore predictive effects of health and lifestyle factors on cardiorespiratory fitness and BMI in 9-11-year-old girls.

Study 2: The purpose of Study 2 was to explore girls' experiences of physical activity and the prominent social norms informing physical activity behaviour by using the Theory of Social Normative Behaviour as a guiding framework.

Study 3: The aim of Study 3 was to evaluate the feasibility of a 39 week school-based adolescent health promotion project for 13-15 year old girls in Wales.

The findings from Study 1 are intended to provide insight into the relationship between fitness and multiple lifestyle factors from a large sample of 9-11 year old girls, the findings of which can be used to assess current associations in a representative sample of girls in Wales. While past research in this area has provided insights into the fitness and physical activity of children and adolescents in Wales (Page et al., 2023, Edwards et al., 2018, Richards et al., 2022, Sport Wales, 2022), Study 1 provides an in depth account of the factors associated with fitness and BMI z-score in a large sample of girls which provides insights into the factors associated with girls' fitness and provides insight into how these factors can contribute to fitness in girls. The findings of Study 1 can be used in developing interventions that are conscious of how these factors relate to one another in girls' fitness. Study 2 provides insights into the social factors that affect girls' physical activity experiences, which adds another layer of understanding that can be used to develop health promotion interventions with girls. While past research has sought to examine the factors associated with girls' physical inactivity (Duffey et al., 2021; Martins et al., 2014, Cowley et al., 2021), none to date have

explored the role of social norms in girls' physical activity experiences. Study 2 aims to fill this gap in the literature and provides new insights into the practicalities of using the Theory of Normative Social Behaviour (TNSB) to explore physical activity experiences with adolescent girls. Study 3 aimed to assess the feasibility of a 39-week health promotion intervention for girls in Wales. This study provides insight into the feasibility and implementation of health promotion projects that are designed to support girls' fitness, health and wellbeing in school-based projects, providing valuable insights into the real-world application of health promotion projects across a number of school sites. Study 3 seeks to contribute to the literature the settings-level implementation considerations in the delivery of school-based health promotion projects, particularly the context based barriers faced in the successful delivery in these settings, which has been previously recommended by Jago and Colleagues (2023). Together, the three studies provide an overview of the state of girls' fitness and experiences of being physically active which provides insights to those designing successful physical activity and health interventions for girls, before providing insight into the complexities of delivering health promotion projects in schools and the context-based barriers to successful implementation that can be used in future research and health promotion projects in this area.

1.2 Student Roles

In Study 1, I was responsible for the co-ordination of the Swan-Linx project, which included the enrolment of schools in to the research project, the training of all research staff, hiring of lab equipment, the coordination of research days, consent procedures and data input. During this time, I was also responsible for the development of the Swan-Linx Standard Operating Procedure and Swan-Linx Training Manual (Appendix II). I established a working partnership with a Further Education college, recruiting and training BTEC Sport Science students to act as fitness assessors in the Swan-Linx project. Further, I merged and cleaned Swan-Linx data and ran analyses for Study 1. In Study 2 and 3, I designed the studies, created the research questions and implemented the projects from start to finish.

2. Literature Review

2.1 Health

Health is something that features in the lives of individuals globally, however conceptualising what it is and what it means has proved a challenging task. One reason for this is that the understanding and applications of health can widely vary across settings, societies, and cultures (Brüssow, 2013). Traditionally, health was viewed purely in medical terms that focused on the absence of disease, however more modern conceptualisations of health have widened their scope to include factors such as the ability to changes in health brought about by fluctuations in environments or circumstance and position health as a resource in the overall wellbeing of individuals (Brüssow, 2013; Leonardi, 2018; The Lancet, 2009).

The World Health Organization (WHO) Commission define health as “...a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (Leonardi, 2018; Svalastog et al., 2017). However, the definition has faced mounting criticism over recent years as it does not fairly account for the rise in chronic diseases and ageing populations, which harbours the attainment of complete wellbeing as conceptualised in the 1948 definition (Huber et al., 2011; Leonardi, 2018). Because of this, numerous definitions have been put forward over the years, however none have been widely adopted (Leonardi, 2018; McCartney et al., 2019). While producing a unanimously agreed definition of health, none were able to capture all that health entails, at a population or individual level. Leonardi (2018) discusses this issue and concludes that no one definition will ever be truer or better than the last, and that society should have multiple definitions that can be applied across a range of contexts and settings (Leonardi, 2018). It is important to note here that while the expansion of these definitions is beneficial, some argue that health is undeniably subjective to individual experience and is not something that can be defined or measured by external agents (The Lancet, 2009). While this may be the case, defining health in its broadest form allows for public health sectors to tailor their work to ensure the best results for the populations they seek to serve.

Reflecting on the latter, and for the purpose of this thesis, health will be defined by using the definition put forward by the Ottawa Charter which conceptualises health as...

“...to reach a state of complete physical, mental, and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities” (World Health Organization, 2023b).

2.2 Wellbeing

The construct of wellbeing is one that has historically been difficult to conceptualise, with many definitions being narrow and unable to account for the complex nature of wellbeing and its relationship to wider determinants of health (Dodge et al., 2012). While many organisations have made wellbeing a key strategic priority in the context of population health, the variability in the application of terminology has made harmonization across interventions and initiatives difficult. This lack of clarity in academic and professional arenas is made more complex as the use of wellbeing and its related terms are continually used in wider community and popular culture settings and applied in the health, fitness, and beauty industries (Jarden & Roache, 2023).

Past discussion has centred around the distinction between hedonic and eudamonic wellbeing, which can then be further distinguished between objective or subjective wellbeing. Here, hedonic wellbeing describes the experience of happiness and pleasure and eudemonic denotes the experience of meaning and purpose through acts that contribute to the greater good and self-development (McMahan & Estes, 2011). These two have since been grouped together to form the basis of subjective wellbeing, which conceptualises wellbeing as being that which reflects a sense of personal fulfilment, happiness, and optimism (Ross et al., 2020), all of which is intrinsic to the individual. On the other hand, objective wellbeing focuses on the quality of life (QoL) of individuals and the impacts that materials such as health and social care, built environment, socio-political landscape, housing and poverty have on this (Ross et al., 2020).

While this open discussion of wellbeing can be positive in terms of awareness raising within in the wider population, the lack of consensus in theoretical and conceptual terms, along with a trend of using wellbeing interchangeably with other terms (e.g., happiness, flourishing, life satisfaction), has led to a lack of standardization across spheres, which may serve to do more harm than good (Atkinson, 2013; Jarden & Roache, 2023),

While previous conceptualisations of disease and ill health had been physical in nature, an awareness and understanding of the mechanisms of non-physical factors on health outcomes in individuals has emerged (Balaj et al., 2017; Braveman & Gottlieb, 2014; Gottlieb et al., 2019). This awareness has transcended into wellbeing science which has resulted in an updated understanding of wellbeing and its holistic nature, leading to an expansion in our conceptualisation of the components of wellbeing, which now span the physical, emotional, social, economic, and planetary spheres (Atkinson, 2013; Kortetmäki et al., 2021; OECD, 2013).

2.3 Adolescent Wellbeing

Adolescence is the developmental phase between childhood and early adulthood (10-19 years) and known as the life stage where rapid biological, social, and emotional changes take place. Along with physical changes, this life stage brings changes in the way individuals feel, think and act (Sawyer et al., 2012) and is a key stage in the development of health behaviours which contribute to future health outcomes in adulthood and later life. The period of adolescence has previously been stigmatised as problematic, however despite the challenge that navigating interwoven developmental changes, adolescence often provides a ‘second window’ for brain development and interventions that aim to improve health behaviours (Fuhrmann et al., 2015; Savina & Moran, 2022). The role of society and the socio-political landscape in which children develop cannot be underestimated, especially in the case of girls, where identity, social acceptance and connectedness all play a role in the development and maintenance of girls’ mental health and wellbeing, and ultimately girls’ overall sense of self (Finch et al., 2014; Hartas, 2021; Public Health England, 2017; Savina & Moran, 2022). Family relationships also play a role in the mental health and wellbeing outcomes for girls (Hartas, 2021; Public Health England, 2017), with the risk of multiple risk behaviours

and negative health outcomes being associated with poor parent relationships. In comparison, girls who experience safe, nurturing family dynamics are given the opportunity for longer childhoods, which affords them the chance to develop in line with their maturity rates (Savina & Moran, 2022).

Adolescence is accompanied with the onset of puberty, where biological and morphological changes take place in the body, physically preparing maturing adolescents for adulthood. While puberty can bring about a range of hormonal and emotional difficulties, these are magnified in severity in the case where early onset puberty is present, especially in girls who on average enter puberty earlier than boys.

Early onset puberty can bring about several social and biological challenges for girls that can have a long-term impact on their emotional wellbeing and health outcomes in later life. Girls who enter puberty prematurely may have greater, adult-like expectations placed upon them by society before they are fully able to meet them (Hartas, 2021; Savina & Moran, 2022). This cognitive and emotional inability to meet expectations can lead to girls being unable to achieve the necessary levels of social acceptance needed to maintain of their identity and self-worth (Savina & Moran, 2022). Along with negative social outcomes, early onset puberty in girls is associated with increased risk of emotional dysregulation, substance misuse, disordered eating, early pregnancy, and poor socio-economic status (SES) outcomes (Savina & Moran, 2022). The interconnectedness of social, biological, and emotional factors here mean that no group of factors stand alone, and the emotional dysregulation experienced due to social pressures in adolescence may have a contributory factor in the engagement in risky behaviours that result in risk taking behaviours in later life (Savina & Moran, 2022).

In 2015, the UN declared a vested interest in the health and wellbeing of adolescents which led to work into the conceptualisation and development of a definition of adolescent wellbeing. Building on this work, Ross and colleagues (2020) published their conceptual framework for adolescent wellbeing, which conceptualised wellbeing as having ‘...the support, confidence, and resources to thrive in contexts of secure and healthy relationships, realizing their full potential and rights’. The framework consists of five interconnected (i) connectedness, (ii) knowledge and skills, (iii) supportive

environments, and (iv) resilience and is underpinned by considerations of equity, gender, and access to rights (Ross et al., 2020; Savina & Moran, 2022).

2.4 Adolescent Girls' Health & Wellbeing

Girls repeatedly report lower ratings of subjective health and wellbeing compared to boys and therefore are considered a group for special consideration in public health (Meade & Dowswell, 2016; Murphy et al., 2020; O'Loughlin et al., 2023). On average, girls are more likely to report poor life satisfaction, with those with the lowest life satisfaction reporting the greatest number of health complaints (Inchley et al., 2023; Public Health England, 2017). While the number of adolescents diagnosed with serious health problems remains low, the number of those presenting with one or more recurrent health complaints is high and has been found to increase over time, especially in adolescent girls (Potrebny et al., 2019). Health complaints can be both psychological and somatic in nature, and recurrence rates are commonly used to assess overall health and wellbeing at the individual and population level (Ottová-Jordan et al., 2015; Potrebny et al., 2019).

On average, adolescent girls report more health complaints than boys, with one in two experiencing multiple health complaints more than once a week (Cavallo et al., 2006), with headaches, tiredness, back and neck pain, digestive issues, loss of appetite and anxiety most commonly reported (Ottová-Jordan et al., 2015; Wiklund et al., 2012). Gender disparities can also be observed in social and emotional wellbeing outcomes between the ages of 11-15, with girls presenting poor outcomes across a variety of areas including emotional regulation, family relationships, perceptions of family and school support, peer relationships, self-esteem, and social media use (Aanesen et al., 2017; Inchley et al., 2011; Ottová-Jordan et al., 2015). The reporting prevalence for multiple health complaints appears to change over time, with an increase in reporting observed in older adolescent girls (Potrebny et al., 2019).

There are many factors that may contribute to the worsening health and wellbeing outcomes in adolescent girls, many of which are complex and interwoven with each other. Past research has discussed the impact of social media usage, body image, poor perceptions of self and pressures around school, exams and the future, menarche, and

the transition between primary and secondary school (Boer et al., 2023; Inchley et al., 2011; Lian et al., 2022; Yoon et al., 2022). While the latter is worrying and may feel bleak, there are a number of factors that may serve to protect against the decline in health and wellbeing outcomes in girls such as positive relationships with family and friends, supportive school environments, positive community spaces and optimal health behaviours (Lian et al., 2022; Public Health England, 2017).

2.5 An answer in Physical Activity?

Physical activity (PA) has previously been defined as “any bodily movement produced by skeletal muscles that requires energy expenditure” (World Health Organization, 2023a) and includes activities such as active travel, organised sport, active leisure and recreational pursuits and non-exercise activities such as household chores and work-related activity (World Health Organization, 2023a).

PA is widely accepted as providing several protective and preventative health benefits to individuals, including a reduction in all-cause mortality, obesity and the development of NCD’s such as; cardiovascular disease, cancer and metabolic syndromes (Farooq et al., 2020; Reiner et al., 2013; Rhodes et al., 2017; World Health Organization, 2018). Along with this, sufficient levels of PA have been shown to reduce depressive symptoms and feature in the maintenance of positive mental and emotional wellbeing, regardless of demographics. Along with this, engagement in regular PA helps improve mortality risk, quality of life (QoL) (Posadzki et al., 2020), feelings of social connectedness (Franke et al., 2022), psychological health (Emm-Collison et al., 2022) and has long ranging socioeconomic benefits in terms of productivity and gross domestic product (GDP) (Hafner et al., 2020; Schuch et al., 2016).

In 2019, the UK Government’s Chief Medical Officers (CMO) published their updated PA guidelines that applied across the four UK home nations (Department of Health and Social Care, 2019). Included in the report are guidelines aimed at all population groups which are stratified by age (under 5’s, children and young people – 5 to 18 years, adults – 19 to 64 years and older adults – 65 years and older) and includes

recommendations for people during and after pregnancy and guidance for disabled adults.

In the case of children and adolescents, leading a physically active lifestyle is linked to a range of positive health benefits (Neil-Sztramko et al., 2021; Pate et al., 2019; Smedegaard et al., 2016) and is therefore prioritised for its role in the attainment of key developmental milestones during maturity and maintaining a happy, healthy life (Innerd, 2019, p21; Telama et al., 2005).

The consequences of sustained physical inactivity are high, with 16.9% of all deaths in the UK linked to inactive lifestyles (Lee et al., 2012), with the cost of sedentary behaviour averaging £0.8 billion in the UK (Heron et al., 2019). Despite the overwhelming health and economic benefits of PA, engagement levels remain low across population groups, with Wales being amongst the countries with some of the lowest engagement levels in the world (Richards, Mackintosh, et al., 2022), with activity levels declining by secondary school (Welsh Government, 2022). While supporting people to live physically active lifestyles is a complex and challenging task, the benefits accrued at the individual, social and economic levels demonstrate the need for continued work to promote PA uptake and adherence across population groups (Hafner et al., 2020; Reiner et al., 2013).

2.6 Physical Activity and Fitness

Cardiorespiratory fitness (CRF) is widely used as an indicator of physical fitness and refers to the body's cardiovascular and respiratory capacity to meet the demands of PA (Myers et al., 2015). There is strong body of evidence to suggest that higher CRF levels offer protection against cardiovascular disease (CVD), metabolic syndromes, some cancers, and all-cause mortality (García-Hermoso et al., 2020; Harber et al., 2017). Given the latter, CRF is considered a key indicator for the current and future health of individuals and the wider population.

CRF can be assessed through lab-based tests, or through the use of field measures when assessing larger groups. Measuring the body's maximal oxygen consumption through a graded exercise test in lab based testing ($VO_{2\text{ max}}$) is considered the gold

standard in CRF measurement (Shephard et al., 1968). In the case of field based testing, the 20m Multistage Fitness Test (MSFT) is one of the most commonly used measurement tests and is considered an effective population based measure tool in the surveillance of CRF levels in children and adolescents (Lang et al., 2018). Higher levels of CRF in childhood lead to improved current and future health outcomes, although evidence for the tracking effect of CRF into adulthood and across the life course has been less coherent, with some studies finding minimal effects on the future health outcomes in adulthood (Mintjens et al., 2018). While positive outcomes were demonstrated for BMI, fatness, waist circumference and metabolic syndrome, higher CRF in youth did not lead to better outcomes in blood pressure, lipid profile, glucose homeostasis or waist-to-hip ratio, compared to low CRF in youth groups (Mintjens et al., 2018). A more recent systematic review and meta-analysis found that higher levels of CRF in childhood and adolescence were associated with more favourable CRF outcomes in later life, despite the strength of associations dissipating over time (Harber et al., 2017). Based on these findings, and because cardiovascular diseases begin to develop in early childhood (Berenson et al., 1998; De Ferranti et al., 2019), the authors recommend the advancement of intervention strategies that promote CRF strategies to begin in childhood, in an attempt to provide the maximum effect on future health outcomes (Harber et al., 2017; Martin-Smith et al., 2020).

A key tool in the improvement of CRF outcomes in children and adolescents has been PA, with a wealth of interventions being conducted across home, school, and community settings (Sheldrick et al., 2018). Much focus has been spent on the application of school-based PA interventions, with schools being viewed as an equitable setting that negates inequalities that come from socio-economic and political factors found in home and community settings (Martin-Smith et al., 2020). However, despite the benefits the school setting brings in providing a level playing field for children and adolescents, PA interventions have had little to no impact on CRF outcomes in youth groups (Martin-Smith et al., 2020). In their meta-analysis of interventions that assessed accelerometer-measured PA changes in children and adolescence, Love et al., found no significant change in MVPA in interventions that aimed to increase PA in school settings, regardless of gender or socio-economic position were reported (Love et al., 2019). In conclusion, Love et al., recommend that

close attention be paid to the implementation of PA interventions, as the complex nature of school-based interventions and the contextual factors within can lead to sub-optimal intervention implementation in practice (Love et al., 2019). While much has been done in the way of PA theory conceptualisation and development, it may now be time to assess the facilitators and barriers at play in the advancement of PA interventions in schools (Jago et al., 2023).

2.7 Physical Activity in Children

Current Government guidelines recommend children and adolescents between the ages of 5-18 years engage in 60 minutes of MVPA per day. This can include a variety of activities and should vary in intensity and mode/type to ensure adequate development motor skills, strength, and fitness (Department of Health and Social Care, 2019). Along with this, the recommendations suggest that children and adolescents should break up periods of sedentary behaviour with PA and movement, even if this includes only light bouts of activity (Chaput et al., 2020; del Pozo-Cruz et al., 2018; Department of Health and Social Care, 2019).

Given the latter and the overwhelming health and economic costs of physical inactivity, a multitude of Government strategies have been employed over the years in a bid to increase activity in child groups. Despite continuing efforts, childhood PA levels remain inadequate (Martins et al., 2014). Globally, it is estimated that 81% of adolescents were physically inactive (Chalkley & Milton, 2021; Guthold et al., 2020) with similar trends being reflected in Wales (Richards et al., 2022; Edwards et al., 2018). On the global stage, young people fair much the same, with only a small minority achieving the recommended amount of PA needed for health (Farooq et al., 2020). This trend in physical inactivity is a cause of great concern for child focussed professionals and researchers involved in the promotion of health and raises concerns for the health outcomes and health care provision of our future generation (Hardy et al., 2018; Lee et al., 2012).

2.8 Physical Activity during Adolescence

The transition between primary and secondary education settings highlights a period of great change for children and young people, which is commonly observed alongside a decline in PA levels in both boys and girls. Worryingly, a recent systematic review and meta-analysis reported that annual reductions accelerometer measured MVPA can be seen in children as young as 9 years in boys and 6 years in girls (Farooq et al., 2020). Levels of MVPA continue to decline into adolescence, with a 6-minute decline in MVPA reported per year (Farooq et al., 2020). Hallal and colleagues (2012) reported that 80.3% of 13–15-year-olds globally were not meeting the recommended 60 minutes of MVPA per day (Hallal et al., 2012) and more recently, Guthold et al., reported similar findings based on their pooled global analysis of adolescent PA levels (Guthold et al., 2020). This finding has been replicated in Wales, with recent studies reporting only 18.4% of 11-16-year-olds achieving recommended levels of PA (Edwards et al., 2018). As previously observed in child studies, girls have lower levels of PA than boys during adolescence, with MVPA continuing to decline rapidly through adolescence and into young adulthood. Low levels of MVPA in girl groups has remained unchanged since 2001, and a widening of the PA engagement gap between girls and boys was more apparent in high income countries (Guthold et al., 2020). Because of this, girls have been identified as a population of concern in PA research.

2.9 Physical Activity in Adolescent Girls

During adolescence, girls PA engagement is consistently lower than that of their male counterparts (Althoff et al., 2017; Duffey et al., 2021; López-Gil et al., 2022), with the likelihood of obtaining the health-related benefits of PA reducing with each year of adolescence. A large number of studies have focused on the development and effectiveness of PA interventions in this group, which have produced results of varying success and only minimal effect sizes. It is widely accepted that changing physical activity behaviours in adolescent girl groups is a challenging and complex task, with many studies that focus solely on increasing PA calling for future intervention designs to include girls' lived experiences to inform the development of interventions (Clark et al., 2011). Although the benefits of PA are many, the development and maintenance

of a physically active lifestyle is a complex process, and past research has demonstrated that PA interventions that solely focus on increasing PA behaviours are minimally effective and any effects are usually short lived (Neil-Sztramko et al., 2021). Because of this, there has been a call for PA to be viewed as part of a larger transdisciplinary model of biopsychosocial health (John et al., 2020), where the relationship between children and adolescents and PA is viewed as a complex and multi-faceted interaction that should be seen in the context of the lives and experiences of the young people who interventions and strategies seek to serve (Clark et al., 2011; Emm-Collison et al., 2022).

2.9.1 Adolescent Girls' Experiences of Physical Activity

While much research has focused on the differences in PA engagement between girls and boys, recent research has focused on exploring the barriers and facilitators of PA engagement with girls in an attempt to gain girl-centred insights that can be used to inform future PA strategies and interventions to increase PA in girl groups (Kim et al., 2019; Martins et al., 2014).

2.9.1.1 Gender and the body

The role of gender and gender stereotypes in the lives of girls has been thoroughly discussed, explored, and critiqued in depth by many academics, researchers and the wider public (Choi, 2000; Kågesten et al., 2016; King et al., 2021; Stewart et al., 2021; Ward & Grower, 2020). The body ideals that gender stereotypes communicate are often rigid and unobtainable, and the pursuit of these ideals leads to poor health and wellbeing outcomes (Dai et al., 2020).

In the case of PA, girls must navigate the social narrative that these activities are male-oriented and promote masculine-like qualities such as competitiveness and strength which are not desirable for girls to display (Cowley et al., 2021; Spencer et al., 2015; Ward & Grower, 2020). Thus, for girls who are trying to conform to the feminine ideal, engagement in PA falls in direct conflict and negotiating this interchange is sometimes difficult, despite the numerous benefits of PA reported by girls (Duffey et al., 2021;

Spencer et al., 2015). The conflict is not limited just to the internal dialogue of the individual, but rather spans their social world, with gendered messages being reinforced by family, peers, schools, media outlets, social media, beauty and cosmetic industries (Bozsik et al., 2018; Kennedy & Markula, 2011).

The pressure placed on girls to obtain unrealistic body ideals that champion thinness, fitness, muscularity, and attractiveness are repeated through imagery, film, music, and fashion (Beasley, 2013; Roberts et al., 2022; Thyne et al., 2016). For girls and women, the body and its appearance are a central mediator in the quality of the relationships they have with people and the wider world and has been previously cited as a barrier to girls' PA engagement (Martins et al., 2014; Widdows, 2018, p.64). Unsurprisingly, the many media images and beauty products and services that are directed toward women and girls are focused on the body, with notions of improved health and wellbeing being closely linked to the beauty/lifestyle products that are being advertised (Robinson et al., 2017; Thyne et al., 2016). Because of this, girls have become accustomed to improving their health through the purchasing and consumption of beauty products, with many believing that their bodies are flawed and in need of modification to be socially accepted and healthy (Choi, 2000, p. 65; Clark et al., 2011; Clark, 2018; Spencer et al., 2015) This is only made more complex by the connection between health, body image and PA, where PA has become less of a vehicle for health, and more a tool for the attainment of the body beautiful (Choi, 2000, p. 65; Kennedy & Markula, 2011, p. 3). Body image describes an individual's perceptions of their physical self and is a key predictor of subjective health and wellbeing outcomes in adolescents (Dai et al., 2020). Poor body image in girls can lead to a number of exercise and PA outcomes that include reductions in MVPA, physical inactivity in those with poor body image and over-exercising in those who strive to look like celebrities and public personalities (Mieziene et al., 2014).

The complex relationship that girls have with their bodies, appearance and body image means that the interactions they have with health and wellbeing promoting activities can become challenging and end with girls being inactive. Spencer et al., 2015 reported that engaging in PA became problematic for girls during adolescence, with many reporting feeling uncomfortable with their bodies during activities. Girls shared feeling uncomfortable with being sweaty and wearing unflattering sport clothing, and in the

case of girls in schools, they felt they were not given enough time to tend to their appearance after PE lessons (Spencer et al., 2015). Similar barriers have been reported (Duffey et al., 2021; Martins et al., 2014) and while these factors to some may not appear to warrant disengagement in physical activities, for many adolescent girls they cause a palatable tension between being fit, feminine and socio-culturally accepted (Slater et al., 2011; Clark, 2016) and result in girls turning to unhealthy weight-management behaviours (Neumark-Sztainer et al., 2006). Despite the latter, sustained PA engagement can have a positive impact on girls' body image and overall wellbeing, thus providing girls with additional support in accessing and maintaining healthy PA behaviours is warranted (Dai et al., 2020).

2.9.1.2 Physical Competence and Physical Literacy

Physical competence (PC) is another key mediating factor in the enjoyment of physical activities for girls and also a determinant in long term adherence to physical activities (Cairney et al., 2012). The physical competence a girl possesses is not only a factor in her sustained engagement with PA but also determines the amount of support she will get from others in her physical pursuits (Telford et al., 2016). Where skilled girls receive support and positive reinforcement, unskilled girls report experiencing bullying, teasing and negative reinforcement from those around them (Corr et al., 2018). This acts as a multi-layered obstruction for girls as it limits their access to the skill-based activities needed to develop their physical competence and when they overcome this barrier and engage in PA and sport, they are teased for their lack of competence.

Given that girls have lower levels of self-reported physical competence and fitness, the above interaction becomes detrimental to current and future PA behaviour, self-esteem, and perceptions of competence (Inchley et al., 2011). In cases where girls engage in physical pursuits, the experience of teasing whilst being physically active leads to a lack of motivation, enjoyment, and an eventual withdrawal from PA over time (García-Hermoso et al., 2020; Scarpa et al., 2012).

A growing area of interest in relation to PC and PA behaviour has been that of physical literacy (PL), which focuses on an individual's confidence, motivation, knowledge,

understanding and physical competence (Edwards et al., 2017; Whitehead, 2001). PL is a dynamic concept that is based on the philosophical underpinnings of monism, existentialism, and phenomenology (Edwards et al., 2018; Whitehead, 2001) and is associated with positive PA, health and wellbeing outcomes in children and adolescents (Blain et al., 2021; Brown et al., 2020).

PL has gained traction over recent years, with a growing interest in the role it may play in the development of long-term adherence to physical activities across the life-course (Belanger et al., 2018; Öztürk et al., 2023). PL is a concept that states that in order to take part in meaningful PA that endures across the life course, an individual must possess optimal levels of cognitive, affective, and physical qualities which are in turn developed through PA and movement experiences (Carl, Barratt, Töpfer, et al., 2022; Carl, Barratt, Wanner, et al., 2022). Given the solid foundations that PL provides for PA behaviour, PL is a growing area of interest to research, public health and health promotion professions alike.

While the concept is relatively new, there has been a wealth of research aimed at conceptualising, measuring, and reporting on trends in population groups (Ozturk et al., 2023). While this is a positive sign of growth and interest in the area, unstandardised and sometimes incompatible measurements and methodologies has meant that comparison across research findings has proved difficult (Edwards, Bryant, et al., 2018). Given its multi-faceted nature, measuring PL can be a challenging task and past research has called for interventions and evaluations to give equal attention to PL components across all domains

While a definition PL was given by the International Physical Literacy Association (IPLA), a number of countries have adopted the concept but placed emphasis on differing components and added in their own additional components (e.g., social and spiritual) to best fit their national contexts (Carl, Barratt, Wanner, et al., 2022). Despite the complexities that still exist, interventions that aim to promote and improve PL have produced promising results, with the majority of improvements centring on the PC and cognitive domains (Carl, Barratt, Wanner, et al., 2022).

Possessing adequate levels of PL in childhood may increase the likelihood of sustained, regular PA engagement, and lower the risk of poor health outcomes that are

associated with physical inactivity(Belanger et al., 2018; Blain et al., 2021; Brown et al., 2020; Öztürk et al., 2023).

2.10 Physical Activity Promotion

PA promotion has been a key strategy in the toolkits of governments, health services, public bodies, and public health organizations for many years, with many developing bespoke, population-specific initiatives in an attempt to increase PA engagement and adherence (Heath et al., 2012). It's enhancing and protective effects for health have meant that PA is now a regular feature in those appointed to better the health outcomes of individuals and the wider public. In the case of children and adolescents, much work has been done across settings (Messing et al., 2019), however, interventions that prioritised parental engagement, theory/model based multi-component design, changes to the school environment, physical education and wider school curriculum, active travel, standing breaks and peer support were the ones that reported more favourable outcomes (Heath et al., 2012; Messing et al., 2019). While the latter shows some promise, PA rates globally remain unchanged for girls and only slightly increased for boys (Guthold et al., 2020), which is concerning given the deadline for the global reduction in physical inactivity is quickly approaching (World Health Organization, 2018a). If change is to be made, some have suggested that PA interventions should be embedded within larger, long-term health and wellbeing promotion strategies that adopt a holistic view of individual health and engage with stakeholders (Duffey et al., 2021; Rhodes et al., 2017; Warburton et al., 2006; Welsh Government, 2022).

2.11 Health Promotion

Health promotion (HP) is a key strategy to improve population health and is a tool that is applied across health settings worldwide. Because of the tracking effects of health behaviour formation across the life-course, along with the trend for unhelpful and often harmful health behaviours to cluster (Lima-Serrano & Lima-Rodríguez, 2014; Lindqvist et al., 2012), adolescents often find themselves the population of interest in HP initiatives that usually focus on one or more of the following: sexual health, oral

hygiene, substance misuse, PA and smoking/vaping (Patton et al., 2016). The most well-known conceptualisation of health promotion was given by the Ottawa Convention in 1986, which stated that health promotion should focus on providing people with the tools and resources necessary to take control of and improve their own health (Brüssow, 2013; Huber et al., 2011; World Health Organization, 2023b). The convention recognised health as a tool for life, rather than being the end destination and discussed the barriers to achieving and obtaining optimal health that needed to be recognised and addressed in order to support population health e.g. equity, multi-sector collaboration, the built environment and the socio-economic and political landscapes that contribute to the attainment of health (Raphael, 2008). In the UK, the National Health Service (NHS) and partners recently published their Long Term Plan, which outlines the joint commitment to address some of these factors through investment in early years, providing world-class care and supporting people to age well (NHS, 2019).

2.11.1 The Health Landscape in Wales

In Wales, the landscape is much the same, with a large emphasis on the health and wellbeing behaviours of the future generation, tying in to the ground-breaking legislation that sees the wellbeing of future generations being put at the centre of decision making in Wales (Welsh Government, 2015). In an attempt to contribute towards this shared vision, Public Health Wales announced that by 2030, it wanted health-prioritising behaviours to be the social norm and announced that it would be working on health promotion strategies to reduce smoking, increase PA and diet outcomes and reduce the prevalence and the social acceptance around risk taking behaviours that are damaging for health e.g., substance misuse (Public Health Wales, 2018)

By 2035, Welsh Government is aiming to increase the number of children and young people with two or more positive health behaviours to 94%, however the percentage of children achieving this has remained stable at 88% since the 2013/14 academic year (Welsh Government, 2022). The percentage of adolescents identifying as regular smokers (within the last week) was greater in Wales (9%) than elsewhere in the UK, with a greater proportion of females reporting being drunk 4 times or more (19%), than

compared to males (17%) ((Royal College of Paediatrics and Child Health, 2020). Health behaviours in Wales have been found to decline in secondary school, with young people reporting increased engagement in smoking, alcohol consumption, and lower levels of fruit and veg consumption (Welsh Government, 2022).

In 2013, Public Health Wales Observatory published their report that aimed to provide an update on the health and wellbeing of children and young people in Wales. The report found that at the time, only 36% of children aged between 5-16 years participated in the recommended daily guidelines for PA, with almost 3 in 10 children being classified as obese (Public Health Wales Observatory, 2013). More recently, the Active Healthy Kids Wales research group reported that only 22% of 8-11 year olds and 14% of 11-16 year olds in Wales were achieving the recommended guidelines for MVPA, with only 17% of 8-12 year old girls engaging in sport recreationally, and 10% of 11-16 year old girls reaching the recommended PA threshold (Richards, Mackintosh, et al., 2022). The group also found there to be a disparity in PA levels between children and young people from the most and least deprived areas, with low levels of PA pooling in areas of low affluence (Richards et al., 2022). More recently, 12% of Welsh girls were meeting the recommended daily guidelines for physical activity (Page et al., 2023). In 2017/18, 26.4% of reception aged children (4-5 years) were recorded as overweight or obese, which was again higher than comparator groups in England, Scotland, and Ireland (Royal College of Paediatrics and Child Health, 2020) with children living in the most deprived areas being 1.4 times more likely to be overweight or obese than children from the least deprived areas (Public Health Wales Observatory, 2013). More recently, the Child Measurement Programme reported that there was a rise in the percentage of 5 year olds with obesity and found a similar trend between obesity and levels of deprivation (Public Health Wales, 2023). In the case of older children and young people and based on self-reported weight, 23% of boys and 17% of girls had a BMI that fell in the overweight-obese category in 2021/22 (Page et al., 2023).

Subjective ratings of quality of life of children and young people in Wales is considerably lower than in England, Scotland, and Ireland. The percentage of 11-16 year olds who rated their health as 'good' or 'excellent' in 2009/10 Health Behaviour of School-aged Children survey was lower in Wales, compared to the other UK

nations, with the percentage ratings of girls decreasing by 14% between Year 7 and Year 11 (Public Health Wales Observatory, 2013). In 2018, The Princes Trust published their 2018 report which found that 75% of children and young people in Wales felt anxious or stressed ‘often’ or ‘always’, with worries about not being good enough, the future, finance and the economic climate being more prevalent in Welsh populations, when compared to the rest of the UK (The Prince’s Trust, 2018; Wales Audit Office, 2019). More recently, the COVID-19 pandemic brought its own challenges that resulted in children and young people reporting sustainable higher rates of emotional difficulties (Moore et al., 2022). The 2021/22 School Health Research Network (SHRN) report found that 46% of young people in Wales reported mental health symptoms that were elevated, with a greater percentage of girls reporting mental health and wellbeing issues compared to boys (Page et al., 2023). Common areas of worry for adolescents in Wales centred around exams and future careers, planetary wellbeing, housing, food security and the economy (Children’s Commissioner for Wales, 2023)

2.12 Adolescent Health Promotion

While there are unlimited examples of HP initiatives targeting adolescent health behaviours, knowledge raising campaigns may need more than appealing branding and palatable soundbites to bring about real change. While these build the foundations of successful health promotion initiatives, more may be needed when working with adolescents (Laski, 2015). After consulting with adolescents about their experiences and awareness of HP, Lindqvist and colleagues reported that despite having a sound grasp of key health promotion messages, the journey to action was often fraught, with adolescents sharing that they felt like they needed further support to engage in and maintain positive behaviour change (Lindqvist et al., 2012). Further, a systematic review of reviews reported that incentive based school-based health promotion interventions with adolescent girls were more likely to be successful (Shackleton et al., 2016)

Despite the long term benefits for individuals and the wider population, funding for adolescent health initiatives has been significantly less than other population groups,

despite adolescents accounting for 11% of the global burden of disease (Li et al., 2018). In order to promote, establish and maintain positive health behaviours, health organisations and those entrusted with supporting children and young people (CYP) need to direct appropriate, long-term funding for adolescent health promotion initiatives that provide tailored health education and support, while offering opportunities to develop life skills in safe and supportive settings that have been co-designed with the youth that the provision aims to serve (De Rosis et al., 2020; Li et al., 2018). The clustering of health behaviours in adolescence means that interventions that solely focus on one area are less likely to produce significant outcomes, and because of this, past intervention research has called for programmes to focus on areas that are clustered with other health behaviours e.g., PA, nutrition, and sleep (Savina & Moran, 2022).

2.13 Health Promotion in School Settings

In 1995, the World Health Organization (WHO) launched a global working strategy that recommended that the health needs of learners should be prioritised and supported in the learning environment through the development and implementation of health promotion strategies that are tailored to the needs of the pupils in schools (Langford et al., 2015; O’Byrne et al., 1996). The intended outcome of this was that the health and wellbeing outcomes of pupils would improve, which would in turn have a positive outcome on the educational attainment of learners (Medeiros et al., 2018). Since then, a number of global initiatives have established, with the sole purpose of providing guidance and support to those delivering health promotion interventions in school settings (Medeiros et al., 2018; Rasmussen, 2005).

Schools have long been viewed as key settings for the delivery of health promotion interventions as they provide unique access opportunities to children and adolescents, that are not determined by social background or other factors that limit participation in health promotion interventions (Adams et al., 2023; Lima-Serrano & Lima-Rodríguez, 2014). Through engagement in health promotion initiatives, children and young people are upskilled about health and the factors that impact upon it, while being supported to make informed health-focused decisions in their own lives (Pucher et al.,

2013). School based health promotion interventions cover a broad range of areas, including PA, nutrition, mental health and risky behaviours, with these producing a varying range of outcomes (Lima-Serrano et al., 2014; Shackleton et al., 2016). Successful interventions offered a range of activities during delivery, and included multiple health behaviours in the intervention content, although there are gaps in the evidence base which need to be filled in terms of identifying the main variables of successful behaviour change and the role of successful evaluation in the development of future health promotion initiatives in schools (Lima-Serrano et al., 2014). While the evidence surrounding school-based health promotion appears favourable, a recent systematic review highlighted the need for robust training and support systems in schools to prepare schools to take on a leading role in the sustainment of interventions when startup funds dwindle over time (Herlitz et al., 2020). The withdrawal of funding provision threatens the sustainability and longevity of health promotion interventions in schools where issues with staff confidence in delivering content with minimal external support and the prioritisation of educational pursuits over health education in curriculum are ever present (Herlitz et al., 2020). Given the complexities of health promotion interventions in school-based settings, it is important to ensure that proposed interventions are feasible and deliverable in school contexts before interventions are rolled out (Jago et al., 2023; Parker et al., 2022).

2.14 Summary

The present literature review has given a summary of the role of PA in the promotion of health and fitness in children and adolescents. There are many benefits of PA however, engagement remains low across child and adolescent groups, with a sustained decline observed in girls. Despite best efforts, girls PA interventions report minimal effects and rarely achieve outcomes that are sustained, post-intervention. Recommendations for future interventions call for PA to be nested within a larger model of girls' adolescent health and wellbeing, that views PA within the wider context of adolescent girls' lives. School-based HP projects provide a valuable opportunity to work with girls, however the delivery and implementation of projects should be assessed for their feasibility before being rolled out at full scale to ensure optimal impact and project sustainability. Therefore, this thesis will explore the

relationship between girls' fitness, lifestyle factors (Study 1) and experiences of PA (Study 2), before assessing the feasibility of a 39 week school based health promotion project for girls in Wales (Study 3).

3. General Methodology

This chapter gives details of the general methodology used in the Swan-Linx and the Girls Health projects. For further, in-depth information, please refer to the project chapters in this thesis.

3.1 Ethical Approval

Ethical approval for thesis studies were granted by Swansea University Research Ethics Committee (PG/2014/077; PG/2014/37; 2016-108). Written school, parent/guardian and child participant information sheets were distributed to all participants during recruitment and participants were only accepted into the studies with accompanying written consent from headteachers, parents/guardians and participant assent. Research ethics applications and consent/assent forms can be found in (Appendix I).

3.2 Instruments and Procedures

3.2.1 Study 1: Swan-Linx Fitness Measures

The fitness tests used in Swan-Linx were based on those used in the EUROFIT fitness test battery (Council of Europe, 1993) and were administered during a Fitness Fun Day by trained persons from Swansea Active Young People Department, Swansea University undergraduate and postgraduate students and BTEC Sport Studies students from Gower College.

After the introduction, children were split into five groups and guided through a 10-minute warm-up by Swan-Linx researchers. Children completed the battery of fitness tests in circuit fashion, with each station rotation lasting between 12-15 minutes. At the completion of the full circuit, children moved onto an indoor tartan surface to complete 20m Multistage Shuttle Run Test. Stations were appropriately set up following EUROFIT standards and cards detailing the testing procedures were located at each station for reference. Scores were recorded on station sheets and data were

input by the researcher after the Fitness Fun Day. For further information, please see Appendix II.

3.2.2 20m Multistage Fitness Test

During the 20m multistage fitness test (Léger et al., 1988) participants were required to run between two lines placed 20m apart, in time with recorded beeps. The participant was required to continue to make each shuttle between beeps and continue to do so as the beeps speed up. Participants were instructed to continue this until they voluntary withdrew or failed to reach the line on two consecutive beeps. To promote pacing and ensure participants maintain a consistent pace, two researchers also completed the test with participants. In the event where a participant outran the researcher, reserve researchers were waiting on the side-line ready to take over.

3.2.3 Body Mass Index (BMI z-score)

Anthropometric measures were recorded by a trained researcher and body mass and stature were measured using an electronic weighting scale [Seca 876, Seca LTD, Birmingham, UK; accuracy .1kg] and portable stadiometer [Seca 213 Portable Stadiometer, Seca Ltd, Birmingham, UK; accuracy .1cm]. Body mass index (BMI) was calculated as ($BMI = weight (kg) / [height (m)^2$) and used as a proxy measure for body composition. BMI z-scores were calculated using the British 1990 growth reference standard (Cole, 1997).

3.2.4 Deprivation – Welsh Index of Multiple Deprivation (WIMD)

The Welsh Index of Multiple Deprivation (WIMD) is the official measure of socioeconomic status in Wales in which 8 domains are used to measure area-specific deprivation (Noble et al., 2006). WIMD scores are assigned based on postcode areas, and range from 1 – 1909, with 1 being the most deprived and 1909 being the least deprived.

3.2.5 Child Health and Activity Tool: Online Questionnaire

The Child Health and Activity Tool (CHAT) is an online questionnaire developed by Swansea University (Everson et al., 2019) and based on the *SportsLinx* Lifestyle Survey (Fairclough et al., 2009). The questionnaire is split into two main parts, the first asks the child to recall what they did yesterday, and the second part asks children to reflect on how many times they engaged in an activity over the past 7 days. Along with this, the CHAT includes questions based on physical competence, wellbeing, mental health and the environment. Children complete the CHAT in their classroom using appropriate devices (PC's, iPads) after the Fitness Fun Day and are supervised by postgraduate researchers and teachers. For an overview of the CHAT variables used in Study 1, please see Table 3.1 below. A copy of the full CHAT survey can be found in the Appendices (Appendix III).

Table 3.1: CHAT Variables used in Study 1

Area of Interest	CHAT Variable	Measurement	
Physical Activity	>60 min PA per day (number of days/week)	Number of days per week	
Sedentary Behaviour	>2 hours spent sedentary (number of days/week)	Number of days per week	
Sport Club Participation	Number of out of school sport clubs attended	Number of sport clubs attended	
Nutritional Behaviours	Number of fruit and veg consumed per day	Daily intake	
	At least 1 fizzy drink (<i>number of days/week</i>)	Number of days per week	
	Consumed sugary snacks (<i>number of days/week</i>)	Number of days per week	
	Had Takeaway (<i>number of days/week</i>)	Number of days per week	
Cognitive Function	Felt Tired (<i>number of days/week</i>)	Number of days per week	
	Could concentrate (<i>number of days/week</i>)	Number of days per week	
Competence	General Competence – ‘There are lots of things that I am good at’ (% - Strongly agree)	Likert scale (1= strongly disagree, 5 = strongly agree)	
Autonomy	Autonomy – ‘I have lots of choices over things that are important to me’ % - (Strongly agree)	Likert scale (1= strongly disagree, 5 = strongly agree)	
Quality of Life	How happy are you with your...	Likert scale (1= not happy, 5 = really happy)	
	...health		...family
	...school		...friends

3.3 Study 2: The Girls Health project

3.3.1 Feasibility Research

Building on the recommendations of past research (Love et al., 2019), and in an attempt to tailor evidence-informed health promotion projects to the needs of the groups they seek to serve (Bowen et al., 2010), it is important to assess the feasibility of procedures, measures, and delivery protocols before rolling out main phases of interventions and health initiatives (Arain et al., 2010).

While evidence-based practice remains the gold standard in intervention design, it is important to note the disparity between the interventions that are implemented in controlled environments and those that happen in real world, natural settings (Bowen et al., 2010; Glasgow et al., 1999). While best practices have an important role in developing the ambitions of public health policies, it's important to address the effect of real-world implementation and the impact on intervention outcomes. As the demand for evidence-based practice increases, the importance of feasibility research has never been so crucial.

Distinguishing between feasibility and pilot studies is an important step in the selection of the most appropriate methods, with the former focusing on determining whether an intervention can be done and what the parameters of this may be, while the latter describes a smaller version of a planned intervention as is typically conducted after the feasibility research has been completed (Bowen et al., 2010). Feasibility studies allow the researcher to assess the acceptability of a project and its components, while also considering whether adjustments to protocols and measures should be made to improve intervention outcomes and thus informing intervention development (Bowen et al., 2010; Parker et al., 2022; Tickle-Degnen, 2013). Feasibility studies provide researchers with an opportunity to consider what might need to be modified or changed in an intervention to improve effectiveness and minimise potential harms, while identifying the key issues that undermine interventions in effectiveness trials (Bowen et al., 2010; Hallingberg et al., 2018). A growing interest in feasibility research has meant that a number of frameworks have been developed to guide the researcher.

3.3.2 RE-AIM Framework

There are several frameworks and theoretical principles available to the researcher interested in conducting an exploratory, feasibility study, and one well used framework in the discipline of health promotion is the RE-AIM framework (Glasgow et al., 1999). First published in 1999, the RE-AIM framework was developed to inform the implementation research in public health promotion (Glasgow et al., 1999). More recently, the authors published a review of its application over the past 20 years and widened the scope of the framework to account for feasibility in real-world settings (Glasgow et al., 2019).

The RE-AIM framework consists of 5 areas, namely, Reach, Effectiveness, Adoption, Implementation and Maintenance. In the framework, Reach refers to the characteristics, representativeness and take up of participants to the intervention or project, while Effectiveness focuses on the effectiveness measures used in the intervention and the appropriateness of these within the context of the project. Adoption focuses on the commitment of intervention stakeholders to take on and adopt the intervention while paying attention to the factors affecting this. The Implementation element of the framework focuses on the extent to which the planned intervention or project was implemented and the adaptations that were made over time, while Maintenance focuses on the extent to which the stakeholders maintained the intervention or project and the ability of the project to become an integrated part of everyday life for the stakeholders and participants (Glasgow et al., 1999, 2019). Based on the latter, the RE-AIM framework was selected for use in Study 3.

3.3.3 Focus Groups

Semi-structured focus groups (Gill et al., 2008) were used throughout the Girls Health project with participants and project deliverers. Focus group questions were drafted beforehand and tested in mock focus groups with PGR researchers for quality assurance, a copy of the focus group script can be found in Appendix IV. At the beginning of focus groups, participants were provided with pens, paper and post-it notes and encouraged to add their talking points to work sheets centred around the themes of the focus group. This helped focus participants, ensured that all points were

covered in discussions and engaged those who did not want to contribute verbally to the research. Participants were debriefed at the end of every focus group. Focus groups were audio recorded and transcribed verbatim by the researcher.

3.3.4 Participant Observations

Participant observation is a type of ethnographic method that enables the researcher to observe participants within the natural setting of the situation under investigation. The data generated through observations produce unique insights into the participants, the environment and accompanying its dynamics (Kawulich, 2005). Session observations were conducted throughout the delivery of the Girls Health and provided the researcher with key insights into the session dynamics, participant engagement and implementation constraints within the project. The researcher kept a written observation diary which was coded and analysed for shared themes.

3.3.5 Photo Novella

Photo Novella belongs to a broad category of visual methodologies that aims to engage participants in the production of knowledge by documenting their experiences and realities through still image (Amos et al., 2012; Burke & Evans, 2011). Participants are asked to visually document a research topic/phenomenon as experienced by them and encouraged to assign meaning and context to photographs during a follow up interview or focus group (Burke & Evans, 2011). A nested photo novella project took place within the Girls Health project and was used to engage participants who struggled with verbal contributions to the research. Participants were given a disposable camera and instructed to take photographs that best symbolise or represent project themes (see Appendix V). Photographs were developed and given back to participants and used to guide discussions in a small focus group with project peers.

3.3.6 Questionnaires

Self-report measures utilised in the Girls Health project were based around project delivery areas and included PA, self-objectification, physical self-perception, dietary behaviours and body dissatisfaction. Questionnaires were administered at baseline and

endpoint in paper format during a project session. The data generated from these measures were scored and handled as outlined in their scoring manual and guidance materials. A copy of the full measures can be found in Appendix VI.

3.3.7 Conclusion

This general methodology has given an outline of the methods used in the studies presented in this thesis. For more detailed information, please refer to the methods section of each individual study.

Thesis Map

Study	Title		
1	Predictors of Fitness and BMI in 9-11-year-old girls	Aim	To explore the associations between cardiorespiratory fitness (CRF), obesity (BMI) and multiple lifestyle factors in 9–11-year-old girls
		Key Findings	
2	Using the theory of normative social behaviour to explore adolescent girls' experiences of physical activity	Aim	
		Key Findings	
3	The feasibility of a 39-week, school-based health promotion programme for adolescent girls – Findings from The Girls Health Project	Aim	
		Key Findings	

4. Study 1

4.1 Predictors of cardiorespiratory fitness and BMI in 9-11-year-old girls

4.2 Abstract

This study aimed to examine the associations between cardiorespiratory fitness, BMI, and multiple lifestyle factors in 9-11-year-old girls in Wales. Using a cross-sectional design, this study included 1,451 girls (aged 10.51 ± 0.64 years) from Wales who participated in the Swan-Linx health, fitness and lifestyle programme between 2017 – 2019. Cardiorespiratory fitness (CRF) was measured using the 20m multistage shuttle run test and anthropometric measures were collected and used to calculate BMI z-scores. Girls were invited to complete an online survey to assess multiple health and lifestyle factors. Linear regression models were used to examine the associations between cardiorespiratory fitness, BMI and multiple health and lifestyle factors. CRF and BMI were significantly associated with several lifestyle factors that included physical activity (PA), deprivation, sedentary behaviour, and sport club attendance. Seven lifestyle factors accounted for 17.8% of the variance in girls' fitness (adjusted $R^2 = .178, p = .001$), while 13.4% of the variance in girls' BMI was attributed to fitness and perception of health (adjusted $R^2 = .134, p = .001$). Some of the variance observed in girls' fitness and BMI can be explained by a number of health and lifestyle behaviours and levels of deprivation. Interventions and health promotion projects for girls should include components to improve fitness and obesity outcomes, through promoting PA and other associated positive lifestyle factors, especially when working with girls from areas of high deprivation.

4.3 Introduction

Cardiorespiratory fitness (CRF) refers to the body's cardiovascular ability to meet the physiological demands of physical activity (PA) and is widely used as an indicator of health (Myers et al., 2015). Achieving sufficient levels of CRF lowers risk of cardiovascular disease (Ruiz et al., 2016), provides a range of physiological and metabolic benefits (de Oliveira & Guedes, 2016) and positively impacts in other areas, such as prevention against non-communicable diseases (World Health Organization,

2018b, 2020), health related quality of life (HRQoL) (Evaristo et al., 2019) and academic attainment (Barbosa et al., 2020; London & Castrechini, 2011). Despite the many benefits of CRF, insufficient levels, coupled with obesity, are regularly observed in the childhood population (Hemmingsson et al., 2022). Obesity is another well used predictor of health and is regularly used to track trends of healthy weight in populations. Aside from the detrimental impact on individual health, the global economic burden of obesity continues to increase, with 11 million more obese adults predicted in UK by 2030, costing an extra £1.9 - £2 billion per year (Wang et al., 2011), making obesity a regular feature on the international public health agendas (Sarma et al., 2021). In a recent pooled analysis including over 2,100 global studies, researchers reported that while mean BMI and height scores were variable across global regions, results highlighted the need to continue workings with children and adolescents to support the positive outcomes that are reported in 0-5 years groups (NCD Risk Factor Collaboration, 2020). Because of their enduring effect on health (Ruiz et al., 2016), much attention has been spent on improving CRF and obesity outcomes in children and adolescents, however despite sustained efforts, their complex, multifaceted nature mean that igniting long term positive change is challenging, particularly in children (Kamath et al., 2008).

The negative impacts of poor fitness and obesity are both acute and chronic in nature, and because of this, child groups are a regular focus in health prevention strategies (Derwig et al., 2022; Graf, 2017). While these are physiological in nature, the elements needed to positively influence them are behavioural, and because of this, it is important to explore associated lifestyle and behavioural factors. This insight can then be used to develop and design appropriate methods to work with individuals and groups. Girls regularly feature as a priority group in health and fitness interventions due to lower reported levels of fitness, PA, and mental health outcomes (Carlén et al., 2022; Duffey et al., 2021). While there have been a few studies that have explored the associations between CRF, obesity and lifestyle factors in adolescent female groups (Mota et al., 2012; Wisnieski et al., 2019), there has not been any that have explored these associations at a population level in girls. Therefore, the aim of this study is to explore the associations between CRF, obesity and multiple lifestyle factors in a large dataset of 9–11-year-old girls, hypothesising that (1) there is an association between the fitness

and BMI z-score variables and multiple lifestyle factors and (2) multiple lifestyle factors have a predictive effect on fitness and BMI z-score in 9-11 year old girls.

4.4 Methods

4.4.1 Participants and settings

A sample of 1,451 girls (aged 10.5 (± 0.64) years) participated in the study. Data were collected as part of the Swan-Linx health, fitness, and lifestyle project between 2016-2019. During this period, 9–11-year-old children were invited in their school groups to attend a Fitness Fun Day (FFD) based at Swansea University's Indoor Training Centre. Data were captured by trained researchers and members of the Swansea Active Young People Team. Children were invited to complete the Child Health and Activity Tool (CHAT) at their school which aimed to capture a range of health and lifestyle behaviours (Everson et al., 2019). Written head teacher and parental consent was sought, along with pupil assent, before data collection commenced. The Swan-Linx project has institutional Research Ethics Committee for its procedures and measures (PG/2014/077; PG/2014/37).

4.4.1.1 Swan-Linx Project

Swan-Linx is a longitudinal project run by A-STEM researchers at Swansea University that collects data on the health, fitness and physical competence of primary age children in Swansea. Schools are invited to attend a Fitness Fun Day where the children take part in a range of health and skill related fitness measures before going back to school to complete the Child Health and Activity Tool (CHAT) with HAPPEN researchers. The CHAT is an online questionnaire that collects data on a wide spectrum of health and lifestyle-related behaviours including sleep, diet, physical activity, mental health, active travel and environment. After the Fitness Fun Day, the participating school receives a report comparing their school data with Swansea averages while data of consenting participants is input into the Secure Anonymised Information Linkage (SAIL) databank for linkage to future health records and educational attainment outcomes. Through Swan-Linx, objective measures of physical competence are collected using the Dragon Challenge V1.0, which is administered during the transition weeks for school children progressing from Primary to Secondary

education. The Dragon Challenge is designed as a continuous circuit that enables the efficient assessment of a number of stability, locomotion and manipulative skills that are deemed crucial for successful participation in physical pursuits and sports throughout the life course.

4.4.2 Instruments and Procedures

The following section provides information on the variables used in the analysis included in this paper and the procedures used to collect the necessary data. The variables included here were selected based on their association with common health and lifestyle behaviours that are associated with health and fitness in children and young people (Richards et al., 2022).

4.4.2.1 Instruments

Cardiorespiratory Fitness (20m multistage shuttle run test - MSFT)

During the 20m multistage fitness test (Léger et al., 1988) participants were required to run between two lines that are placed 20m apart, in time with recorded beeps, that gradually increase in speed during the test. Participants were instructed to continue the test until they voluntarily withdrew or failed to reach the line on two consecutive beeps. To promote pacing and ensure participants maintained a consistent pace, two researchers also completed the test. The total number of shuttles achieved was recorded for each participant.

Body Mass Index (BMI)

Anthropometric measures were recorded by a trainer researcher and height and weight was measured using an electronic weighting scale [Seca 876, Seca LTD, Birmingham, UK; accuracy .1kg] and portable stadiometer [Seca 213 Portable Stadiometer, Seca Ltd, Birmingham, UK; accuracy .1cm]. Body mass index (BMI) was calculated as ($BMI = weight (kg) / [height (m)^2]$) and used as a proxy measure for body composition. BMI z-scores were calculated using the British 1990 growth reference standard (Cole, 1997).

Child Health and Activity Tool: Online Questionnaire

The CHAT variables included in this study were selected due to their significant correlations to MSFT and BMI z-scores (see Appendix IV) and are presented with their mean and percentile values for the overall sample in Table 4.1 below. Participants were invited to complete questions that gauged the number of days per week where they; engaged in physical activity, spent time as sedentary, consumed takeaway, fizzy drinks, and sugary snacks, felt tired and could concentrate. Participants were asked to indicate the number of school clubs they attended, along with the number of fruit and vegetables they consumed on a daily basis. Finally, participants were asked to indicate how happy they felt with their general competence, autonomy, health, school, family life and friends (The Children's Society, 2010). Measures used in CHAT have been previously assessed for validity and reported as valid measures of children health and physical activity (Todd et al., 2016, Everson et al., 2019).

Deprivation – Welsh Index of Multiple Deprivation (WIMD)

The Welsh Index of Multiple Deprivation (WIMD) is the official measure of socioeconomic status in Wales in which 8 domains are used to gauge area-specific deprivation (Noble et al., 2006). WIMD scores are assigned based on postcode areas, and range from 1 – 1909, with 1 being the most deprived and 1909 being the least deprived. Postcode data were collected using the CHAT and calculated using the WIMD conversion add-in for Excel (Noble et al., 2006).

4.4.2.2 Procedure

Measures of fitness and BMI z-score were collected during a Swan-Linx Fitness Fun Day. The Fitness Fun Day is an all-day event that is split into two sessions. In the morning session, a school bring their Year 5/6 children to the Indoor Training Centre where the first part of the Fitness Fun Day takes place. During the morning session, participants engaged with a number of health and fitness measures in small groups of 10-14 participants. The session follows a circuit format and concludes when all participants have completed each station. Each measurement station was allocated 15 minutes to measure and record participants, with the circuit taking on average 1 hour and 15 minutes to complete. At the end of the circuit, participants were invited to take

part in the Multistage Fitness Test (MSFT). Once complete, the school group then return to their school to complete the Child Health and Activity Tool (CHAT) online questionnaire in the afternoon session. The Swan-Linx Fitness Fun Days were supported by a research team that included post graduate researchers from the A-STEM postgraduate office, and BTEC Sport & Exercise Science students from an FE College. All members of the research team had received training from the Swan-Linx co-ordinator and were supported on the day by the co-ordinator and senior members of the research team. Children were assigned research ID's before the fitness fun day and were given badges with their ID upon arrival at the Indoor Training Centre. Measurement data were collected at each station and recorded on station sheets by the research team. Measurements were checked and agreed between station researchers before being recorded. At the end of the morning session, data collection sheets were collected in by the co-ordinator. After the fitness fun day, data were input into an Excel spreadsheet by the Swan-Linx coordinator, and regularly checked by a senior member of the research team.

The Child Health and Activity Tool (CHAT) is an online, self-report health and lifestyle questionnaire developed by Swansea University (Todd et al., 2016, Everson et al., 2019) and based on the SportsLinx Lifestyle Survey (Fairclough et al., 2009). The questionnaire is split into two main parts, the first asks the child to recall what they did yesterday, and the second asks children to reflect on how many times they engaged in an activity over the past 7 days. The CHAT also includes questions based on physical competence, wellbeing, mental health, and the environment. Participants were invited to complete the CHAT in their classroom using appropriate devices (PC's, iPads) after the FFD and were supervised by postgraduate researchers and teachers.

4.4.3 Statistical Analyses

Statistical analyses were selected to examine the hypotheses of this study and selected based on the data being used in the analyses. Because of the continuous nature of the variables being studied, linear regression was selected to assess the average change in outcome variables attributed to a one-unit change in variables included the analyses (Castro & Ferreira, 2022). Statistical analyses were completed using IBM SPSS statistics 22 (IMB SPSS Statistics Inc., Chicago, IL, USA), with significance set at

≤ 0.05 . While some data were normally distributed, the large sample size ($n=1451$) meant that parametric tests were able to be used in this instance. Pearson correlation was used to explore the associations between variables (hypothesis 1), before the predictive effects of health lifestyle behaviours on CRF and BMI z-score (hypothesis 2) were examined using multiple linear regression. Variables with a significant correlation of $p < 0.05$ were included in multiple linear regression modelling. Intra Class Correlation (ICC) were computed to assess for potential nesting effect within schools taking part in the study. A low degree of reliability was found between school groups and variables included in the study ($ICC = -.032, p < 0.01$), indicating there were no nesting effects within school groups within the dataset.

Table 4.1: Mean \pm SD and percentage scores for study sample

Sample Characteristics (n=1,451)	% or Mean	SD
Age (years)	10.51	0.64
Height (cm)	152.2	89.2
Mass (kg)	48.5	126.25
BMI	19.3	3.9
BMI z-score	.546	1.23
Deprivation (WIMD)	892.33	590.72
20m Shuttle Run (lap achieved)	24.95	13.13
<i>CHAT Variables</i>		
>60 min PA per day (number of days/week)	3.45	2.06
>2 hours spent sedentary (number of days/week)	3.27	2.22
Number of out of school clubs attended	2.35	2.33
Number of fruit and veg consumed per day	3.41	2.00
At least 1 fizzy drink (<i>number of days/week</i>)	1.25	1.70
Consumed sugary snacks (<i>number of days/week</i>)	2.75	1.95
Had Takeaway (<i>number of days/week</i>)	.81	1.16
Felt Tired (<i>number of days/week</i>)	2.11	1.99
Could concentrate (<i>number of days/week</i>)	3.31	1.57
General Competence – ‘There are lots of things that I am good at’ (% - Strongly agree)	44.1*	
Autonomy – ‘I have lots of choices over things that are important to me’ % - (Strongly agree)	49.8*	
Health (% - Really happy)	51.8*	
School (% - Really happy)	64.1*	

<i>Family (% - Really happy)</i>	84.6*
<i>Friends (% - Really happy)</i>	75.6*

Note: Sample (n=1,451 girls). * indicates a variable percentage

4.5 Results

Cardiorespiratory Fitness (CRF)

Following examination of correlation coefficients (Appendix IV), twelve variables were significantly associated and were included in a multiple linear regression analysis, and of these, seven (BMI z-score, number of out of school clubs, deprivation, ability to bike, number of days spent sedentary, number of days achieving over 60min PA and ability to swim) produced a significant correlation at the $p < .001$ level (see Table 4.2).

BMI z-score accounted for 12.6% of the variance in fitness ($R^2=.126$, $p < .001$), with the inclusion of number of out of school clubs, deprivation, ability to ride a bike, number of days spent sedentary, number of days achieving over 60 mins of daily PA and ability to swim increasing variance to 17.8% ($R^2=.178$, $p = .001$). CRF was positively associated with number of out of school clubs attended ($\beta = .087$, $p=.001$), deprivation ($\beta = .087$, $p = .000$), ability to ride a bike ($\beta = .087$, $p=.000$), number of days per week <60 min PA per day ($\beta = .071$, $p=.006$), and ability to swim ($\beta = .056$, $p=.027$) and negatively associated with BMI ($\beta = -.342$, $p=.000$) and number of days spent sedentary ($\beta = -.084$, $p=.001$).

Body Mass Index (BMI) z-score

For BMI z-score, five variables were included in a multiple linear regression analysis (MSFT, perception of health, deprivation, number of days felt tired, and general competence), and of these, two were significant ($p < .001$), accounting for 13.6% of the variance in BMI z-scores ($R^2=.136$, $p < .001$). BMI z-score was negatively associated with both fitness ($\beta = -.344$, $p < .001$) and perception of health ($\beta = -.093$, $p < .001$) in the model.

Table 4.2: Multiple Linear Regression: Cardiorespiratory Fitness & BMI z-score

Model	Predictors	β
1. Cardiorespiratory Fitness	No. of out of school clubs	.087**
	Ability to Bike	.087**
	No. days achieving >60 mins PA	.071**
	Ability to Swim	.056**
	BMI z score	-.342**
	No. days spent sedentary	-.084**
	Deprivation (WIMD)	.087**
	R^2 (adjusted R^2)	.182 (.178)
2. BMI z-score	MSFT (shuttles achieved)	-.344**
	Perception of health	-.093**
		R^2 (adjusted R^2)

Note: WIMD = Welsh Index of Multiple Deprivation. MSFT = Multistage fitness test. ** $P < 0.01$. * $P < 0.05$.

4.6 Discussion

The aim of this study was to explore associations between CRF, BMI z-score and multiple lifestyle factors in a large dataset of 9-11-year-old girls. It was hypothesised that lifestyle behaviours would have a predictive effect on cardiorespiratory fitness and BMI z-score in girls. CRF was associated with seven lifestyle factors accounting for 17.8% of the variance in girls' fitness, while 13.4% of the variance in girls' BMI z-score was attributed to fitness and perception of health.

In this study, BMI z-score and fitness were significant predictors of each other, demonstrating the strong link between the two. These results agree with other studies conducted with girls (He et al., 2011; Peterhans et al., 2013) and further highlight the impact that overweight and obesity can have on fitness and physical health outcomes in children. Children with overweight and obesity are more likely to have lower cardiorespiratory fitness and PA levels when compared to normal weight groups (Ruedl et al., 2018), and vice versa (Ortega et al., 2008). Worryingly, a notable decline in the already low fitness and PA levels in this group has been observed, along with declines in PA engagement (Johansson et al., 2020). Another concern is the link between obesity, motor competence and PA engagement, where children with high

obesity are more likely to possess sub-optimal motor competence skills, leading to poor PA and fitness outcomes (Cheng et al., 2016).

In this study, BMI z-score was negatively associated with perceptions of health which aligns with current literature reporting lower levels of health-related quality of life (HRQoL) in children (Meixner et al., 2020; Wallander et al., 2013) and girls (Mota et al., 2012; Silva et al., 2019) with overweight and obesity. The social stigma surrounding overweight and obesity and its relationship to health may go some way to influencing how children perceive themselves and their health (Weissová & Prokop, 2020). Early intervention and support for children is important given that this relationship is strengthened with age (Killedar et al., 2020), which is particularly concerning given the impact that low self-perception can have on the emotional health and wellbeing of girls (Carlén et al., 2022).

CRF was associated with deprivation, where CRF increased with a decline in deprivation status. This is a similar finding to that of Nevill and colleagues, who reported that children from the most deprived areas are more likely to be obese, less fit, and less physically active than children from the least deprived areas (Nevill et al., 2018). Along with deprivation, low SES can also influence CRF, with groups from low SES backgrounds displaying lower cardiorespiratory capacity, compared to higher SES groups (Bai et al., 2016; Raghuveer et al., 2020).

In this study, a positive association was observed between CRF and the number of days per week that girls achieved 60 minutes or more of moderate to vigorous physical activity (MVPA). This finding aligns with the current literature and demonstrates the complementary relationship between the two, where PA is significantly associated with CRF and vice versa (Marzi et al., 2022; Raghuveer et al., 2020; Tambalis et al., 2019). While this is a positive finding that adds to the evidence for a relationship between CRF and MVPA, it is important to note that while some studies have reported significant improvements to health through MVPA only (Denton et al., 2013; Taber et al., 2014), a recent systematic review and meta-analysis concluded that all intensities of PA are of benefit to health outcomes and should therefore be promoted equally in child and adolescent groups (Poitras et al., 2016).

CRF was positively associated with the number of sport clubs attended, where girls with higher CRF levels attended more sport clubs, which is a finding similar to that reported by Wisnieski and colleagues (Wisnieski et al., 2019). Along with improvements to overall fitness, participation in sport clubs can significantly improve individual components of fitness, including endurance, agility, strength, and power (Drenowatz et al., 2019), with athletics, team and racket sports having the greatest effect on outcomes (Barbry et al., 2022; Larsen et al., 2017). While a decline in sport club participation can be observed in younger children, engagement begins to increase again in older childhood and adolescence, leading to positive effects on PA engagement and adiposity (Drenowatz et al., 2019; Jaakkola et al., 2019; Telford et al., 2016).

CRF and number of days spent sedentary were negatively associated, which is a finding consistent with other studies (Júdice et al., 2017; Tambalis et al., 2019, Martinez-Gomez et al., 2011). High levels of sedentary behaviour have a negative effect on the long term health of children and adolescents, with the risk of poor physical, physiological and socio-emotional outcomes (Vondung et al., 2020). Sedentary behaviour dominated by long bouts of screen time and/or TV viewing can lead to poorer health outcomes in children and adolescents, making improvements in this area vital in the health protection of future generations (Carson et al., 2016). Screen time and fitness have previously been reported as having an inverse relationship (Hardy et al., 2018; Pearson et al., 2015) with this trend being replicated between screen-time and girls' MVPA (Sheldrick et al., 2018).

Girls' ability to cycle and swim were both positively associated with CRF in this study, a finding that compliments a larger study into the relationship between CRF, components of fitness and the ability to swim and cycle in 9-11 year old children (Richards et al., 2022). Richards and colleagues found that the ability to swim and cycle both significantly predicted improved fitness outcomes and concluded that both important factors in the pursuit of fitness (Richards et al., 2022). While the ability to swim and cycle formulate part of the foundational skills needed for successful PA engagement over the life course and support the development of children's physical literacy (Hulteen et al., 2018), associations between fitness were stronger in boys than girls (Richards et al., 2022), however girls are at greater risk of having no-to-low

swimming ability (Irwin et al., 2018). Given the importance of both to current and future health, initiatives and interventions that promote the development of swim and cycle abilities should be a priority in health improvement. The findings presented here add further insights into the predictive effects of lifestyle behaviours on fitness and BMI z-score in girls in Wales and supports past work in this area (Sport Wales, 2022, Page et al., 2023, Edwards et al., 2018, Richards et al., 2022). The strengths of this study are rooted in the supplementary information it provides to the population level research conducted in Wales and can be used to develop and tailor projects and initiatives to support the development of positive physical activity and health outcomes in girls.

4.7 Limitations

While there are several important findings in this study, it is important to note that it is not without limitations. While the study was based on a large sample of girls, the cross-sectional design means that we are unable to examine causality and therefore, further investigation is warranted in this area. It is important to note that given that the measures used for assessing fitness are based on participant compliance and motivation, there is a possibility that the MSFT scores were affected by low compliance/motivation and thus may not be a true representation of the full CRF capabilities of the participant (Raghuveer et al., 2020). The self-report nature of lifestyle factors in this study meant that there may have been reporting bias, although the anonymous nature of the CHAT questionnaire (Everson et al., 2019) meant that there were less reasons for participants to misreport their answers (Tambalis et al., 2019). Nevertheless, this is a consideration when reviewing this study, and when designing future inquiry.

4.8 Conclusion

This study sought to explore the associations between fitness, obesity, and multiple lifestyle factors in 9-11-year-old girls. CRF and BMI z-score were significantly associated with a number of lifestyle factors that included PA, deprivation, sedentary behaviour, sport club attendance and perception of health. CRF was associated with seven lifestyle factors accounting for 17.8% of the variance in girls' fitness, while

13.4% of the variance in girls' BMI z-score was attributed to fitness and perception of health. The findings presented provide insight into the association of multiple health and fitness factors in young girls. Interventions and health promotion projects for girls should include components to improve fitness and obesity outcomes, through promoting PA and other associated positive lifestyle factors, especially when working with girls from areas of high deprivation.

Thesis Map

Study	Title		
1	Predictors of Fitness and BMI in 9-11-year-old girls	Aim	To explore the associations between cardiorespiratory fitness (CRF), obesity (BMI) and multiple lifestyle factors in 9–11-year-old girls.
		Key Findings	CRF and BMI z-score were significantly associated with a number of lifestyle factors. CRF was associated with seven lifestyle factors accounting for 17.8% of the variance in girls' fitness, while 13.4% of the variance in girls' BMI z-score was attributed to fitness and perception of health. Interventions and health promotion projects for girls should include components to improve fitness and obesity outcomes, through promoting physical activity and other associated positive lifestyle factors, especially when working with girls from areas of high deprivation.
2	Using the theory of normative social behaviour to explore adolescent girls' experiences of physical activity	Aim	To contribute to the literature surrounding adolescent girls and physical activity and gain insight into the social norms that temper the relationship between girls and their physical activity by using the TNSB as a guiding framework.
		Key Findings	
3	The feasibility of a 39-week, school-based health promotion programme for adolescent girls – Findings from The Girls Health Project	Aim	
		Key Findings	

5. Study 2

5.1 The water in which we swim: Using the theory of normative social behaviour to explore adolescent girls' experiences of physical activity

5.2 Background

The benefits to body and mind through regular participation in PA are well established (Reiner et al., 2013). So great are these benefits that multiple public health organisations have embedded PA at the heart of their health and wellbeing strategies. However, despite continued public health efforts, PA engagement across population groups continue to fall short of government recommendations, including child and adolescent groups. Hallal and colleagues reported that 80.3% of 13-15 year olds globally were not meeting the recommended 60 minutes of MVPA per day (Hallal et al., 2012). This finding has been replicated in Wales, with past research reporting only 18.4% of 11-16-year-olds achieving recommended levels of PA (Edwards et al., 2018), with only 17% of 8-12 year old girls engaging in sport recreationally, and 10% of 11-16 year old girls reaching the recommended PA threshold (Richards et al., 2022). The decline in PA engagement across the transition from childhood into adolescence and onto adulthood has been repeatedly reported, particularly in girls (Hallal et al., 2012; Niven et al., 2009).

The barriers to PA reported by girls are plentiful and include issues such as discomfort surrounding menstruation (Corr et al., 2018), restrictive gender norms (Spencer et al., 2015), perceived low motor competence (Yungblut et al., 2012), negative appraisals of PA (Martins et al., 2014), friendship influences (Coleman et al., 2008), transitions between educational settings (Slater & Tiggemann, 2010), declines in PA enjoyment (Whitehead & Biddle, 2008) and social physique anxiety (Niven et al., 2009). Along with this, weaker influences from social, school and family groups may contribute toward girls' perceptions of PA and its un-importance in their lives. In light of the latter, the relationship between girls and PA may stem from social factors worthy of further investigation (Whitehead & Biddle, 2008).

Social norms that perpetuate gender inequalities are common among adolescents (Kågesten et al., 2016) and conformity to these social norms and their accompanying stereotypes can be observed in the behaviours, opinions and representations among social groups, family and friends (Kågesten et al., 2016; Pronin et al., 2007). Despite being seemingly inconspicuous in nature, social influences exert powerful control over human behaviour and this understanding has led to growing interest in the influence of social norms on healthy behaviours (Ball et al., 2010; Emmons et al., 2007; Mead et al., 2014; Priebe & Spink, 2011). There is a large body of literature describing the influence of social norms on health behaviour (Byron et al., 2016), with research being conducted across a range of fields including sociology, business and public health (Farrow et al., 2017). In adolescence, the link between social norms and health behaviours is even more poignant, given that the behaviours developed during this period may alter health trajectories across the life course (Kunz et al., 2014).

Previous studies in this area have utilised the guiding frameworks offered by the Theory of Planned Behaviour and Social Cognitive Theory (Marks, 2008), however, measurement issues and inconsistencies between researcher-participant conceptualisations of health and insufficient differentiation between descriptive and injunctive norms has resulted in outcome inconsistencies (Ball et al., 2010; Fitzgerald et al., 2012; Priebe & Spink, 2011).

The Theory of Normative Social Behaviour (TNSB) (Rimal & Real, 2005), states that behaviour outcomes are dependent on the interaction between descriptive and injunctive norms, outcome expectations, group identity and social sanctions. The TNSB postulates that descriptive norms (perceptions of what other people do) models an individual's behaviour, and this behaviour is tempered by injunctive norms (perceptions of what individual thinks they are expected to do), outcome expectations (expected benefits/costs, future socialization) and group identity (degree to which individual wishes to emulate the referent group) (Rimal & Real, 2005). The TNSB has been used in a range of areas, with numerous studies focusing on its application in the investigation of risky behaviours which tend to cluster within social networks and systems of social interaction (Mead et al., 2014).

Much has been written about the barriers reported by girls and women to regular PA engagement (Spencer et al., 2015; Martins et al., 2014), however insight into the

relationship between social norms and PA in the lives of adolescent girls is limited (Clark et al., 2011; Priebe & Spink, 2011; Yungblut et al., 2012). This void in current academic thought may be contributed to a general lack of investigation, improper examination and the individual-centred focus applied in PA research (Darker & French, 2009; Priebe & Spink, 2011). This study aims to contribute to the literature surrounding adolescent girls and PA, the insight into the social norms that temper the relationship between girls and PA by using the TNSB as a guiding framework. Using a qualitative approach, this study aims to uncover insights into the physical activity experiences of girls and the social norms and outcome expectations that surround the physically active girl. The findings can be used to supplement the quantitative findings published in this area of research and present these insights through the alternative lens of girls' physical activity social norms.

5.3 Methods

5.3.1 Participants and settings

Girls who contributed to this study were part of a larger study that evaluated the feasibility of a 39-week health promotion programme for 13-15-year-old adolescent girls residing in deprived areas in Wales (The Girls Health Project). Participants who were part of the Girls Health project were eligible to take part in this study, with the aim of adding qualitative insights from girls that had already been selected by schools to take part in a health promotion project. Fourteen white British girls from the Girls Health project, 13.9 (± 0.48) years of age, 73% Free School Meals (FSM) took part. A third of girls had additional learning needs (ALN) or special educational needs (SEN). Accommodations were made where necessary for participants with ALN/SEN, further information can be found below. At the time of research (July 2018), participants were disengaged from curriculum physical education (PE) lessons.

5.3.2 Ethical approval

Ethical approval was granted by the Research Ethics Committee (REC number: 2016-108). Headteachers, project deliverers, parents and participants provided consent and

participant assent for specific research-focused outcome measures to be undertaken and for their anonymous data to be used in this research.

5.3.3 Instruments and procedures

During the Girls Health project, girls from 3 schools completed a written PA worksheet designed to capture their opinions and awareness of PA along with their perceptions about girls being physically active (descriptive norms), perceived expectations of others regarding girls and PA and the perceived acceptability of physically active girls (injunctive norms), the expected outcomes for girls who were physically active (outcome expectations) and the group identity of physically active girls (group identity) (Byron et al., 2016). Once complete, each school group's worksheets were reviewed, and responses were synthesised to formulate one overview statement for each worksheet question. For students with ALN/SEN, photo novella was used to gather insights into their experiences of physical activity, with findings added to a worksheet and included in the development of overview statements, as described above. These statements were then copied onto a focus group worksheet for each school and used as a topic guide during focus groups (Table 5.1). Providing participants with a questionnaire before the focus groups enabled participants to have prior knowledge of focus group topics and enabled the development of statements that could be used as prompts, in place of asking direct questions. This method gave participants the opportunity to think about their answers in more depth before answering and can enhance the quality of the research (Haukås & Tishakov, 2024). During the focus groups, the researcher read out each statement and asked the group to comment on whether this statement was true or false, and for each statement, the group were invited to follow up with further comments and experiences that may not have been fully captured in the synthesised statements. This method incorporated both verbal (focus groups) and non-verbal exercises (written worksheet, opportunity to

contribute written responses during focus groups) to ensure all participants had the opportunity to contribute through their preferred medium (Tinson, 2009).

Table 5.1: Physical activity focus group statements

TNSB Domain	Focus Group True/False Statements
Awareness	<ul style="list-style-type: none"> • Physical activity is good for health and fitness, to lose weight and to control anger – <i>school A</i> • Physical activity is good because it builds confidence and improves health and fitness – <i>school B</i> • Physical activity is good for health and fitness, losing weight and getting a good figure – <i>school C</i>
Opinion	<ul style="list-style-type: none"> • Physical activity is a good thing to do but can be tiring. Physical activity has mixed importance. Girls being physically active is a positive thing and family members are physically active – <i>school A</i> • Some participants think other girls being physically active is a good thing because it shows how healthy they are and that they know what they want their bodies to look like – <i>school B</i> • Physical activity can be important for health and fitness and losing weight but other things take priority. Family members are physically active. Some participants think girls being active is a good thing, others don't care – <i>school C</i>
Descriptive Norms	<ul style="list-style-type: none"> • It's not common to see girls being physically active, some people are confused at why girls want to be physically active, other people don't notice but boys tend to stare – <i>school A</i> • Participants report that it's common to see people being physically active in area but not many of group family members are physically active – <i>school B</i> • It's not common to see people being physically active in area – if so, they are older people and men. Mixed responses on whether girls are seen being physically active in area. Boys stare at girls being physically active – <i>school C</i>
Injunctive Norms	<ul style="list-style-type: none"> • Majority of participants don't feel other people expect them to be physically active. It is considered acceptable for girls to be physically active in area – <i>school A</i> • Group members feel other people expect them to be physically active as they spend too much time in the house. When a girl is seen being physically active, this is seen as acceptable as they are doing it for health and fitness – <i>school B</i> • Group members feel that other people expect them to be physically active – to get out of the house, meet other people/new friends. Participants think that other people think it's acceptable for girls to be physically active – <i>school C</i>
Outcome Expectation	<ul style="list-style-type: none"> • Girls in area take part in a number of activities in public and private places. Physical activity type depends on how fit a girl wants to be and if she wants to be seen – <i>school A</i> • Girls take part in a number of activities in private spaces because they don't want people to see them – <i>school B</i> • Mixed responses on whether girls are physically active in the area and where they take part in physical activity
Group Identity	<ul style="list-style-type: none"> • Mixed opinions on whether being physically active is more difficult for girls – <i>school A</i> • It is more difficult for girls to be physically active in the area because girls think boys will make fun of them, girls don't know what to do and because they are young – <i>school B</i> • Participants felt it was more difficult for girls to be physically active because of smoking, mobile phones and self-consciousness – <i>school C</i>

Focus Groups

Participants were invited to take part in focus groups with their school peers. This resulted in 3 focus groups of 6 (School A), 5 (School B) and 3 (School C) participants (Nyumba et al., 2018). The researcher introduced the focus group to participants and gave a short introduction about the planned activity. Participants were encouraged to contribute both verbally and through written mediums, with participants having access to post it notes, pens and flip chart paper throughout the activity. Participants were given the opportunity to ask questions before the audio recording started. The researcher then shared the corresponding school worksheet with the group, read out each statement and invited the group to share their thoughts and opinions with the other participants. Key discussion points were noted by the researcher in handwritten notes and saved for use in analysis. When the group had finished discussions, participants were invited to share any further reflections they had before the audio recording was stopped. After this, participants were thanked for their participation and were briefed on the next steps of the analysis and future member checking activity.

Qualitative Analysis

Focus groups were audio recorded and transcribed verbatim before the data were coded and analysed thematically. Transcripts were read for familiarisation and underwent a series of reviewing rounds where deductive codes were identified, developed and constantly compared with other quotes throughout to represent shared meaning. Codes were studied, clustered and reviewed to inform the development of qualitative themes (Saldaña, 2016). Findings were presented in written format and read out to each school group in a follow up session, where participants were given the opportunity to review the findings (member checking) and ensure that the written report was representative of what was shared during the focus groups (Thomas, 2016). This enabled participants to assess the accuracy of what the researcher had presented, decreasing the risk of bias and increasing the trustworthiness of the data. The researcher engaged in reflective practice throughout and adopted an iterative approach to the analysis and data synthesis phases of the research (Korstjens & Moser, 2018).

5.4 Findings

Opinions and Awareness: participant awareness and understanding

Girls were aware of the benefits of PA and reported that it was good for improving health and fitness, losing weight, getting a good figure, controlling anger, and building confidence. Despite this, most girls didn't know how they felt about PA. Some felt that PA was a good thing and should be a priority but other things like socialising, sleeping, homework, family and eating take precedent. Others felt that the health benefits of PA were important but felt that they were not themselves achieving a healthy lifestyle - ***“I think it's important to be healthy but I'm far from it to be honest”***. Girls agreed that other girls being physically active is a good thing as it demonstrated a pursuit of health and being ***“in control of their image”***, while others felt that they didn't know or don't care about other girls' PA engagement. Some girls felt that through being physically active, there was an increasing pressure on individuals to maintain the body they had developed through exercise, which in turn may lead to unhealthy practices, such as disordered eating to meet this expectation - ***“cause if you exercise a lot then you might think you have to look a certain way and if you start putting on weight, then you might think of other ways of losing weight and it can just escalate to something bad”***.

Descriptive Norms: participant perceptions of what other people do

A small proportion of girls reported that their parents were active. Some girls shared that it was common to see older adults (men and women) being active, while other girls reported it common to see young males being physically active in their area – ***“Yeah, its older people that go walking round our area ...so like, old people riding their bikes and that”, “I find mostly that they are male...[and] quite young”***. Most girls said that it was not common to see girls being physically active in their area and shared that the possible reasons for this centred around girls' embarrassment and self-consciousness.

Most girls felt that other people thought girls being physically active in the community was a good thing, although some felt that people would be confused at why a girl would want to be physically active. All girls reported that girls were subjected to street harassment by boys while being physically active in their communities - ***“they look at***

your arse”, “*wolf-whistle and shout things [like] ‘peng’ and ‘fit’*”. Girls reported feeling annoyed when this happened and said that it made girls feel self-conscious, while others felt that some girls thought it was a good thing – “*It’s funny, they [girls] laugh and they’re like ‘yeah, I’m getting attention’*”. Feelings of unease were not just limited to street harassment by boys, and some girls shared their unease and heightened state of self-awareness when being seen by a group of girls while exercising - “*there could be a group of girls and they could walk past you and they don’t even have to say anything, all they have to do is glance over and you just have this really bad feeling...It’s just a glance, like if you’re doing exercise and a group of girls walk past you...and they just, they only have to look at you or they have to laugh or even if they look at their friends and start to giggle, you get the feeling they are talking about you, they’re looking at you, maybe that’s being paranoid*”.

Injunctive Norms: participant perceptions of what individual thinks they are expected to do

Most girls felt that other people expected them to be physically active in a bid to reduce sedentary behaviour, improve health and fitness and socialise, while others felt that other people didn’t care about their PA engagement. Respondents felt it was generally socially acceptable for girls to be physically active in the area as people would assume they were doing it to improve their health and fitness which was seen as a positive action.

Outcome Expectation: expected outcomes in girls’ physical activity behaviour

Some girls reported that physically active girls took part in activities that were conducted in private, indoor spaces (trampolining, dance, swimming and gymnastics) to escape street harassment, to feel safer, because of low confidence and to be able to move more freely and “*do your best job*”. Some girls reflected that most physical activities available to girls were indoor based.

Group Identity: degree to which individual wishes to emulate the referent group

Girls felt that it was more difficult for girls to be physically active in their areas because of; smoking, mobile phones, self-consciousness, street harassment, lack of skill and age. Girls discussed issues around joining in with sports that were over-saturated with boys, which resulted in them feeling self-conscious and led to drop out - “*I feel self-*

conscious now... 'cause like our bodies are developing” and shared that if a girl joined a mixed-sex sport team, the boys would not engage in full play – *“if you played rugby with the boys, if you’re on the opposite team, they wouldn’t tackle you... If you had the ball, they’ll just run next to you that’s as far as it’d go... Like they wouldn’t actually full on tackle you”*. The group shared that boys would talk negatively about girls and say hurtful things such as *“you’re useless because you’re a girl”, “you’re going to lose”*. Some girls felt that other people believed that girls would naturally be less successful in physical tasks - *“They just think that we’re like, we’re too weak and stuff”*, and felt that negative narratives about female ability were internalised by girls who believed that they were naturally less capable than boys - *“A load of them do because it’s like, stuck in a stereotypical mind set or because the boys say that they can’t do it they believe they can’t do it”*.

5.5 Discussion

By using the TNSB to investigate social norms surrounding PA with girls in Wales, this study was able to provide further insight into girls’ experiences of being physical active. The TNSB posits that behaviour outcomes are influenced by descriptive norms and mediated by injunctive norms, outcome expectations and group identity. In this study, girls reported that it was not common to see other girls being physically active in their areas (descriptive norm) and reflected mixed opinions on whether other people expected them to be physically active (injunctive norm). If girls were physically active, they were the subject of peer victimisation and street harassment. When playing in mixed-sex team sports, boys did not engage in full play and ridiculed girls for their lack of skill (outcome expectation). Girls were more likely to be active in private indoor spaces to avoid negative experiences and heightened self-awareness. Girls reported that gender inequalities and stereotype norms communicated by boys were internalised by girls and led to girls believing that they were less competent and physically able (group identity). While there is a clear trend of girls’ physical inactivity at a population level, it is important to note that this is not always due to girls’ lack of interest in or enjoyment of physical activity, but rather due to the social and environmental contexts that girls are physically active and live within (Cowley et al., 2021).

Girls in this study were able to recount prominent health promotion messages endorsing PA. However, along with benefits to health, wellbeing and psychosocial functioning, participants referred to the use of PA as a weight management and body work tool. Weight loss and appearance adaptations have previously been reported as extrinsic motivators of PA for girls and women (Choi, 2000; Grieser et al., 2006; Niven et al., 2009). Feminist researchers have argued that this is a symptom of a deeper-rooted problem in which girls and women have been encouraged to construct health behaviours in relation to beauty rather than health and wellbeing, thus altering the way girls and women think about health and the relationships they have with health behaviours (Brumberg, 1997).

While some girls and women display short-term adherence to PA during periods of weight-loss or at special occasions e.g. vacation (Maguire & Mansfield, 1998; Whitehead & Biddle, 2008), the pressure imposed by socio-cultural beauty standards and the marketing of PA as a beauty tool to be used in the pursuit of largely unobtainable feminine aesthetic only intensifies body anxiety and body dissatisfaction and negatively impacts PA engagement (Brumberg, 1997; Choi, 2000; Duncan, 1994; Mieziene et al., 2014; Neumark-Sztainer et al., 2006; Niven et al., 2009). While PA is frequently promoted in conjunction with positive dietary modifications, the continuous pressure on girls and women to attend to the body and achieve cultural beauty norms means girls find themselves over exercising and under eating (Furnham et al., 2002; Mond et al., 2006). This was highlighted by girls when discussing the pressures associated with maintaining aesthetic changes after engaging with regular exercise, which was viewed as a burden that could lead to harmful health practices such as disordered eating (Neumark-Sztainer et al., 2006). The latter contributes to girls viewing PA through a narrow beauty lens that sits in direct contrast to the person-centred, health-based position of global public health institutions. Ultimately for many, the relationship between girls, PA, beauty and the body cultivate problematic interactions that cause PA anguish and avoidance for girls who have already difficult relationships with their bodies (Duncan, 1994; Kennedy & Markula, 2011)

Girls in this study felt that other people in their communities believed it was acceptable for girls to be physically active while in the pursuit of health, however the treatment girls received and observed other girls receiving suggests otherwise. Girls shared that

it was common for girls being physically active to be the focus of peer victimisation, which correlates with the work of previous researchers who found verbal forms of street harassment were commonly experienced by girls and women who were physically active in public spaces (Davidson et al., 2016; Kearl 2010). Street harassment can be displayed through several acts that include catcalls, winks, wolf-whistles, and remarks based on physical appearances (Fairchild & Rudman, 2008). Given that girls and women are more likely to experience street harassment and that instances of harassment correlate with restricted movements (Talboys et al., 2017), anxiety and heightened safety concerns (Davidson et al., 2016), and negative emotions (Betts et al., 2019), it is important to pay attention to the role that street harassment plays in declines in PA observed in adolescent girls.

Girls in this study shared experiences of peer victimisation and jeering while girls are being physically active. Although a small minority of girls in the current study reported that the attention was complimentary (Kearl, 2010), the majority reported experiencing heightened self-consciousness, embarrassment, and activity avoidance. This finding is similar to that reported by Casey and colleagues who found that girls who experienced judgement from peers were discouraged from participating in physical activities. Negative appraisals of girls' physical competence led to declines in self-confidence that limited girls' future attempts to be physically active, thus affecting future health outcomes for girls and women (Henderson & Bialeschki, 1993; Kearl, 2010).

Girls reported that mixed-sex team sports within community areas were over saturated with boys and for some the experience of playing with male teammates had led to drop out due to jeering and boys refusing to engage in full play, for example, tackling in rugby (Oliver & Hamzeh, 2010; Slater & Tiggemann, 2010). Girls felt that girls who were subjected to sexist and gendered ridicule during sporting interactions with male peers were at risk of internalizing misogynistic messages and led to girls believing they (and other girls) were incompetent and unable to engage in sport and physical activities (Bearman et al., 2009). To avoid the latter, girls shared that if girls were physically active, most were active in private, indoor spaces. This is a similar finding to that reported by Cowley and colleagues, who found that girls in their study felt more comfortable being physically active in safe indoor, female-only spaces that minimised the potential for peer victimisation (Cowley et al., 2021). In another study, girls

reported that outdoor community spaces were for those who were skilled in physical activities/sports and possessed the necessary level of physical competency, alluding to the underlying assumption that only those suitably skilled should be physically active in public spaces (Casey et al., 2016). Girls in this study discussed experiencing heightened states of self-awareness when being physically active in front of peers and felt that this was a main reason for girls choosing to be physically active in private. This finding resonates with previous research (Coakley & White, 1992; James & Embrey, 2002; Spink, 1992), and highlights the impact of the perceived (and actual) peer surveillance on the physical activity behaviour of girls (Casey et al., 2016). Despite the protective benefits accrued from being physically active in private spaces, this social norm only serves to reduce visibility, slow the normalisation of the physically active girl and continues to reinforce gendered male-outside, female-inside space divisions (Azzarito & Hill, 2013).

Using the TNSB is a novel approach to exploring girls' PA experiences and provides further insights to supplement the current knowledge base. This chapter provides insight into the application of TNSB within this population and demonstrates the process and value of applying the framework in PA behaviour research. Using TNSB as an analysis framework had a number of strengths and limitations. The framework provided an alternative way of approaching PA behaviours and allowed the researcher to explore PA experiences in a nuanced way by examining the area of interest through the lens of social norms. As adolescent girls, this enabled them to reflect on the PA social norms present in their daily lives, while also reflecting on how these affected their own behaviours. Inviting participants to complete the initial questionnaire before the focus group was beneficial as it gave participants an idea of what the focus group discussions would be centred around and allowed participants to provide greater clarity over experiences and reflections (Thomas, 2016). However, it is important to note that although this approach has benefits to the current study, it could increase the risk of bias. While the framework was beneficial for the points mentioned above, there is the possibility that using the framework meant that other areas outside of the focus of girls' physical activity experiences and the social norms that accompany these may have been missed. This is something to consider in future research into the role of the social environment in girls' PA experiences.

5.6 Limitations

There were several limitations in the present study. Due to a small sample size, the findings from this study cannot be used to extrapolate to the wider population and are not intended to do so. As is commonly discussed, findings from qualitative investigations can only be used to represent those whose voices are present in the research. Although the use of focus group in this study was useful in engaging participants who were taking part in a larger study, the dynamics present in focus group settings may have limited active participant contribution and somewhat limited the contribution of quieter participants (Whitehead & Biddle, 2008). While attempts were made to engage quieter participants through written methods, experiences and opinions may have been missed. Interviews or smaller focus groups may help to limit this happening in future studies that are not faced with time-constraints. The high percentage of girls with ALN/SEN may have contributed to current research that suggest that in Wales children with ALN/SEN are less likely to be physically competent than typically developing children (Richards et al., 2023). Thus, the participating group may not be representative of their age group. Despite the latter, it is hoped that the findings from this study will inform future research in this area.

5.7 Conclusion

To the authors knowledge, this is the first study to utilise the TNSB to explore PA with adolescent girls. The findings demonstrate that despite an awareness of the benefits of PA engagement to health and wellbeing, bridging the gap between awareness and action is tenuous and often hindered by external social factors that are difficult to navigate. In the communities where participants resided it was not common to see girls being physically active, however in cases where girls were physically active, they were the subject of peer victimisation which led to decreased PA participation. Girls were more likely to be active in private indoor spaces to avoid negative peer experiences and heightened self-awareness. When playing in team sports, boys did not engage in full play with girls and ridiculed girls for their lack of skill and physical competence. Girls reported that the misogynistic rhetoric communicated by boys was internalised and led them to feeling that they were less competent and physically able, leading to

girls becoming disengaged in PA. The findings presented in this study suggest that a deeper understanding of the role of social norms in the relationship between girls and PA is needed, especially when designing initiatives to improve physical activity participation in girls. Future research should spend time exploring the social landscapes that girls are physically active within to gain a deeper insight into the social barriers to PA, in the hope of developing meaningful and realistic interventions and tailored support in the lives of adolescent girls. Alongside this, interventions should focus on centring the voices and lived experiences of girls into intervention design, and prioritise improving girls' physical competency and self-perception, with the aim of increasing girls' PA and improving health across the life-course.

Thesis Map

Study	Title		
1	Predictors of Fitness and BMI in 9-11-year-old girls	Aim	To explore the associations between cardiorespiratory fitness (CRF), obesity (BMI) and multiple lifestyle factors in 9–11-year-old girls
		Key Findings	CRF and BMI z-score were significantly associated with a number of lifestyle factors. CRF was associated with seven lifestyle factors accounting for 17.8% of the variance in girls' fitness, while 13.4% of the variance in girls' BMI z-score was attributed to fitness and perception of health. Interventions and health promotion projects for girls should include components to improve fitness and obesity outcomes, through promoting physical activity and other associated positive lifestyle factors, especially when working with girls from areas of high deprivation.
2	Using the theory of normative social behaviour to explore adolescent girls' experiences of physical activity	Aim	To contribute to the literature surrounding adolescent girls and physical activity and gain insight into the social norms that temper the relationship between girls and their physical activity by using the TNSB as a guiding framework.
		Key Findings	The findings demonstrate that despite an awareness of the benefits of physical activity engagement, bridging the gap between awareness and action is tenuous and hindered by a number of barriers based on social norms. Future research should spend time exploring the social landscapes that girls are physically active in to gain a deeper insight into the social barriers to PA, in the hope of developing meaningful and realistic interventions and tailored support in the lives of adolescent girls.
3	The feasibility of a 39-week, school-based health promotion programme for adolescent girls – Findings from The Girls Health Project	Aim	To evaluate the feasibility of implementing a 39-week multisite health promotion project for 13-15-year-old girls in Wales.
		Key Findings	

6. Study 3

6.1 The feasibility of a 39-week, school-based health promotion programme for adolescent girls – Findings from The Girls Health Project

6.2 Background

Adolescence is recognised as a key period where behaviour formations, acquisition of appropriate emotional and social cognitive abilities and future patterns of adult health are developed. During this developmental phase, young people move away from familial values and begin to construct individual identities influenced by the social, cultural and economic environments in which they are situated (Buchmann & Steinhoff, 2017; McBride Murry et al., 2011; Slater et al., 2001). Risky behaviours in adolescent populations have been shown to cluster within peer and social groups (Viner & Macfarlane, 2005) which has led to an increased public health interest in the education and promotion of positive health behaviours and the role they play in future health and disease patterns (Patton et al., 2016). Because of this, attention has been directed toward the promotion of healthy lifestyle behaviours of adolescent groups (Patton et al., 2016; Sawyer et al., 2012).

Girls' mental, physical and social health are lower than boys (Curie et al., 2010; Van Droogenbroeck et al., 2018; Wiklund et al., 2012), and during adolescence, girls face increasing pressure to conform to gendered expectations and restrictive sociocultural ideals that dominate their environments (Slater et al., 2001). The cumulative effect of the latter, which is often chronic and intergenerational, results in poor physical and emotional health in future adulthood.

Given that women face greater health disparities and inequities than men (Davidson et al., 2011; Ostlin et al., 2006), working with girls using a life-course approach is required in interventions that aim to lower the risk of non-communicable diseases and improve health outcomes (Jones et al., 2019). Moreover, interventions should focus on empowering girls and women to challenge and reject gender stereotypes that lead to harmful practices and poor physical, emotional, and social health (Grown et al., 2005; Taukobong et al., 2016; World Health Organisation, 2016).

As children spend over 900 hours per year in secondary schools, it is no surprise to find that schools are regarded as favourable settings for the delivery of health promotion projects due to the total time spent there by children and associated cost effectiveness of delivery (Bundy et al., 2006; OECD, 2019; Pearson et al., 2015; Shackleton et al., 2016), however their successful implementation can be hindered by a plethora of setting level issues within diverse and complex school systems (Greenberg et al., 2005; Muellmann et al., 2017). Schools are recognised as key social environments with bespoke socially embedded platforms from which to promote healthy peer relationships, emotional literacy and personal health (Sawyer, Afifi, et al., 2012). Past research reporting on school-based health promotion projects has clustered around PA, nutrition, mental and sexual health, drug and alcohol consumption and the reduction of risky behaviours (Lima-Serrano & Lima-Rodríguez, 2014; Medeiros et al., 2018), however project delivery, project outcomes and sustainability are often difficult to predict (Darlington et al., 2018). There have been many school-based projects directed at adolescent girls that have focused on PA (Owen et al., 2017), body image (Yager et al., 2013) anorexia nervosa (Lima-Serrano & Lima-Rodríguez, 2014), smoking cessation (de Kleijn et al., 2015) and teenage pregnancy (Shackleton et al., 2016). Despite the wide scope, many of these projects are usually short term and focus only on one area of health at a time.

Within Wales, local authorities are charged with promoting the health of the people in their areas and commission services and interventions that aim to promote health and wellbeing of children and young people. This calls for a collaborative approach between several local authority, council and volunteer organisations that have a duty to promote children's health and wellbeing across a number of settings (Dooris, 2006; National Children's Bureau, 2016; Simovska et al., 2016). Investments in adolescent health have been shown to track into later life, thus making a persuasive case for investing into health education and promotion (Bundy et al., 2018). Evidence based projects are preferred in health promotion initiatives, however there is a considerable discrepancy between the available evidence for public health problems and the evidence needed on how best to address these in real world settings (Hanson & Jones, 2017). In times of increasing funding cuts from central government and growing competition for services, there is a heightened demand for projects and interventions

to be evaluated using rigorous methodologies (Hanson & Jones, 2017) and developed using sustainable models to ensure long-term, low-cost project delivery. There is a shortage of detailed investigations into the feasibility and implementation of health promotion projects for girls and it is hoped that the findings from this study will provide insight into the complexities of implementing health promotion projects across multiple school sites.

The aim of this study was to evaluate the feasibility of implementing a 39-week multi-school health promotion project to 13-15-year-old girls in Wales. This study uses a mixed methods approach and contributes to current literature unique insights into the processes and complexities of implementing a health promotion project in multi-school contexts (Pinnock et al., 2017; Powell et al., 2015). By utilising a mixed methods approach that included validated measures of effectiveness, reflective deliverer and researcher diaries, real-time observations, and qualitative data from project participants (Wiltsey Stirman et al., 2012), this study was able to capture and report on the complex contextual issues that influenced project implementation (Balasubramanian et al., 2018; Greenberg et al., 2005).

6.3 Methods
















6.3.1 The Girls Health Project

The Girls Health project was commissioned and led by the wellbeing department of a county council in Wales that had been tasked with providing PA, health and wellbeing projects for children and young people. Based on findings from their Sport Wales ‘School Sport Survey’ (2016) and their own in-house data, the department identified a need to work with adolescent girls. The wellbeing department contracted a not-for-profit organisation who had the necessary experience and resources to deliver the project and offered partner secondary schools the opportunity to enrol in the project, based on the bespoke needs of their pupils. The aim of the project was to improve PA, health and wellbeing outcomes in girls and was delivered as a school-based intervention, following guidance from the literature base (Adams et al., 2023; Jago et al., 2023; Lima-Serrano & Lima-Rodríguez, 2014). A lead member of the wellbeing department oversaw the management of the project and played a key role in the organisation of key dates for the project and research.

Over 39 weeks of the 2017-2018 academic year, group members took part in one, single-hour classroom-based health promotion session per week, where a range of topics were covered including healthy lifestyles and safe relationships, self-esteem, body confidence, nutrition, girls’ rights and gender equality. These topics were selected for their relevance to girls’ PA and health. Along with this, participants were able to select other topics that they wanted to cover that included sessions on drugs and alcohol, safe relationships, healthy lifestyles, and holistic wellbeing. Sessions were delivered by a trained youth worker with an extensive background in school based adolescent health promotion (15 years) and working with girls (8 years).

During sessions, group members took part in a range of interactive, youth work style activities and were visited by guest speakers (female career role models) and external deliverers (self-defence trainers and meditation practitioners). Toward the end of the project, group members were offered the opportunity to take part in a popular charity run (www.raceforlife.cancerresearchuk.org) and invited to attend a celebration event held at a local heritage site where they took part in a range of adventure activities. See Figure 6.1 for research timeline.

Figure 6.1: Research Timeline (2017-2019)

2017				2018		
September	October	November	December	January	February	March
Headteacher Recruitment 	Participant Recruitment 	Baseline Measures = Accelerometry 			Focus Group 1 	
Deliverer & Wellbeing Department Interview 	Baseline Measures = Self Report Questionnaires 					
2018						2019
April	May	June	July	August	November	April
	Photo Novella Recruitment & Roll Out 	Photo Novella Focus Group Endpoint Measures = Accelerometry 	Focus Group 3 Race for Life Celebration Day Endpoint Measures = Self Report Questionnaires   	Deliverer Follow Up Interview 	Wellbeing Department Follow Up Interview 	Follow Up Focus Groups 
	Focus Group 2 					

6.3.2 Participants and Settings

Schools

Three secondary schools agreed to trial the Girls Health project during the 2017-18 academic year and participate in the feasibility study. Schools were in some of the more socially deprived areas in Wales (Statistics for Wales, 2014) and schools ranged from 13.6% - 26.4% of pupils who were eligible for Free School Meals (FSM).

Participants

Girls were identified by teachers and staff members for the project. The selection criteria were defined by the wellbeing department and girls were considered eligible if they i) were between the ages of 13-15 (school year 9 and 10), ii) were not regularly engaging in PE lessons and iii) teachers believed that they would benefit from being in the project. At the beginning of the project, 35 girls were identified and 21 agreed to take part in the research study (School A = 11, School B = 7, School C =3). The participants in this study include some of those who featured in Study 2.

Settings

Project sessions were delivered in participating schools on a weekly basis in a classroom space and research activities were conducted during sessions.

6.3.3 Ethical approval and consent to participate

Ethical approval was granted by the Research Ethics Committee (REC number: 2016-108). Headteachers, project deliverers, parents and participants provided consent and participants assent for specific research-focused outcome measures to be undertaken and for their anonymous data to be used in this research.

6.3.4 Instruments and procedures

Qualitative Outcomes

Project Focus Groups

Research participants engaged in 3 focus groups during the Girls Health project (February, May and July 2018) that were synchronised with the end of each project delivery block (see Figure 6.1) and a follow up focus group was conducted at 9 months post-project with School A and B. Three focus groups were conducted by an experienced researcher during delivery and took place in the project classroom during weekly sessions and lasted for 25-40 minutes. Focus groups utilised creative methodologies that incorporated both verbal and non-verbal exercises to ensure all participants had the opportunity to contribute through their preferred medium (Tinson, 2009).

Deliverer and Project Partner Interviews

A joint interview with the deliverer and wellbeing department lead was conducted at project commencement (September 2017) and individual interviews were conducted at 1-month post project (deliverer – August 2018) and 4 months post project (wellbeing department lead – November 2018).

Reflective Diaries, Session Observations and Field Notes

The project deliverer kept a reflective diary throughout the project that was structured using Gibb's reflective cycle (Gibbs, 1988). The project deliverer completed 2 reflective diaries covering the periods January to March 2018 and April to June 2018 for each project school. The researcher kept a detailed reflective diary throughout the project and observed a total of 17 project sessions in order to capture the complex nature of project delivery and to gain insight into the school, community, and peer contexts that the project was working within (Darlington et al., 2018). An interview was held with the project deliverer post project (August 2018) where the lead researcher shared summary reports that had been generated based on reflective diary entries. These reported were fed back to the project deliverer for member checking and clarification (Birt et al., 2016).

Qualitative Analysis

All focus groups and interviews were audio recorded and transcribed verbatim by the researcher. Focus groups were conducted in a classroom space in each school during a project session and the researcher followed a focus group script (Appendix V) and ensured that the same line of questioning was taken in each focus group (Noble &

Smith, 2015). Interviews at the start of the project were conducted in an office space, and interviews at the end of the project were conducted over the telephone. Summary reports were fed back to the research participants for member checking after each focus group/interview and participants were invited to review and amend the findings where necessary before the reports were finalised (Birt et al., 2016, Thomas, 2016). The researcher kept a reflexive diary during the project and had regular meetings with a senior researcher during the analysis process which were used as debriefing sessions and opportunities to uncover biases or researcher assumptions (Saldana, 2016, Noble & Smith, 2015). Coding and theme frameworks were shared during these meetings, and any discrepancies were discussed and resolved during the analysis process (McMahon & Winch, 2018). Quotes that feature in the following sections were selected to illustrate in narrative form the themes and findings of the study.

Quantitative Outcomes

The following measures have been previously validated for the age range of participants included in this study (Kowalski et al., 2004, Harter, 2012, Tolman et al., 2000, Corning et al., 2010, Johnson et al., 2002a).

Physical Activity

Subjectively reported PA was captured using the Physical Activity Questionnaire for Older Children (Kowalski et al., 2004). The measure, which is designed for 8-14-year-old children, is a 7-day recall instrument that assesses general PA behaviours in school aged children by providing an overall score based on a 9-item assessment. Participants' PA was objectively monitored over a 7-day period (incorporating week and weekend days) using a wrist mounted tri-axial accelerometer at two time points. Accelerometer files were processed using device-compatible software (GENEActiv PC Software, Version 3.2, ActivInsights 2016), and population specific cut points to analyse the data (Phillips et al., 2013). Average wear time at baseline and endpoint was 6.9 days and 6.6 days respectively across both term-time week and weekend days.

Physical Self-Perception

Self-perception and global self-esteem were captured using the Self-Perception Profile for Adolescents (Harter, 2012). The profile encapsulates several domains (scholastic competence, social competence, athletic competence, physical appearance, job

competence, romantic appeal, behavioural conduct, close friendships and global self-worth), and requires participants to state ‘what is most like me’ across 45 statements. Responses are then grouped and calculated by domain to produce individual scores.

Self-Objectification

Self-objectification was measured using the Adolescent Femininity Ideology Scale (Tolman et al., 2000). The questionnaire is split into 2 categories: inauthentic self in relationship and objectified relationship with body (self-objectification). Participants were required to record level of agreement with statements on a 6-point Likert scale. Responses were scored accordingly, and mean scores calculated, with higher scores signifying a greater level of inauthenticity in relationships and/or higher levels of self-objectification (Tolman et al., 2006).

Body Dissatisfaction

Body dissatisfaction was captured using the Body Parts Dissatisfaction Scale (Corning et al., 2010). The scale lists 7 concrete body parts/areas and required participants to identify any part/area that they would like to modify by signalling that they would like to make it bigger or smaller. Participants were encouraged to give their reasonings for this change to add clarity/provide further insight. In the case of a body part/area that has been left unmarked, it was assumed that the participant was content with the part/area and did not wish to modify appearance (Corning et al., 2010).

Dietary Behaviours

Food habits and situational dietary behaviours were quantified using the 23 item Adolescent Food Habits Checklist (Johnson et al., 2002a) which required participants to signal whether statements are true or false for them. ‘Healthy’ and ‘unhealthy’ responses were scored accordingly, and an overall score was calculated for each participant, with higher scores signifying greater levels of healthy food behaviours (Johnson et al., 2002b).

6.3.5 Design and analysis

Feasibility studies and the RE-AIM framework

Feasibility studies are conducted to examine if study procedures can be performed and highlight where procedural limitations lie, providing insight that informs and develops the future intervention study (Tickle-Degnen, 2013). In this, the feasibility study is an approach used to assess which parts of the research or intervention need to be modified and how these changes may occur (Bowen et al., 2010). Moreover, feasibility studies do not typically investigate the outcome of interest (Arain et al., 2010), have small sample sizes and therefore do not have the necessary statistical power to demonstrate cause and effect. Rather, feasibility studies use descriptive and qualitative methods, incorporating narrative data on the step-by-step processes taken during the study (Tickle-Degnen, 2013).

Despite their importance, feasibility studies have been poorly reported on (Abbade et al., 2018), and in recent years, numerous frameworks have been created and made available to researchers to improve reporting outcomes. To address the need for feasibility studies to capture and report on real-world interactions and limitations of study design, processes and methods, Glasgow et al., (1999) produced a framework that not only addressed the clinically prioritised efficacy based research but expanded the lens to account for complexities encountered when working in real-world settings (Estabrooks & Gyurcsik, 2003; Glasgow et al., 1999, 2019). See Table 6.1 for data sources used in this study.

Table 6.1: RE-AIM element, overview and project data sources

RE-AIM element	Overview	Project Data Sources
Reach	Characteristics, representativeness and take up of schools and participants who were eligible to participate in project	Project recruitment data School information - ESTYN
Effectiveness	The effectiveness outcomes of the project	Self-report questionnaires Accelerometry data Participant & deliverer reflections
Adoption	The commitment of participating schools to take on the project and the factors affecting this	Deliverer & Researcher reflections Field notes & session observations
Implementation	The extent to which the planned project was implemented, and the adaptations made to the project over time	Deliverer & Researcher reflections Field notes & session observations
Maintenance	The extent to which the schools' maintained project implementation and the project's ability to become an integrated part of daily life	Follow up focus groups at 9 months post-project Interview with project deliverer and Wellbeing department

6.4 Results

6.4.1 Reach – characteristics, representativeness and take up of schools and participants who were eligible to participate in the project

Schools

Reach in this study was assessed based on the recruitment information provided by the schools and wellbeing department. The recruitment of schools for this study was managed by the wellbeing department that had been tasked with providing health and wellbeing projects for children and young people in an area in Wales. The reach of the project in relation to school recruitment was limited to the council area, reliant upon the long-standing relationships built between the department and schools and dependent on head teacher's subjective assessment of their school and pupil needs.

Three schools were enrolled into the project and were each situated within an area with low, middle or high levels of deprivation.

Participants

The selection criteria for participant recruitment were defined by the wellbeing department and girls were considered eligible if they i) were between the ages of 13-15 (school year 9 and 10), ii) were not regularly engaging in PE lessons and iii) teachers believed that they would benefit from being in the project. Due to the subjective nature of the last criteria point, potential participants for the project may have been missed. At project commencement, 35 girls across 3 schools were selected by their schools as eligible and of these, 21 obtained parent consent and assented to take part in the research project. Research participants were 13.7 (± 0.48) years of age, were white British, three quarters were eligible for free school meals (FSM) and over a third were identified as having a special educational need (SEN) or additional learning need (ALN). At the end of the project, 16 participants were actively engaged, while 6 were lost to follow up. Two participants returned to PE lessons, two were removed from the project by their schools due to misbehaviour, one participant became difficult to engage, and one participant had prolonged absence due to injury.

6.4.2 Effectiveness – The effectiveness outcomes of the project

Effectiveness in this study was measured using self-report participant questionnaires, accelerometry and participant and deliverer reflections.

Self-Reported Physical Activity

At baseline, walking for exercise was the most frequently reported activity (n=15), followed by jogging or running (n=10), tag (n=8), skipping (n=8) and swimming (n=7). The research group (n=16) attained a mean score of 2.19 (± 0.62) at baseline. At endpoint, walking for exercise was reported as the most frequently engaged in activity (n=14), followed by jogging or running (n=11), tag (n=8), swimming (n=7) and skipping (n=6). The research group (n=13) attained a mean score of 2.30 (± 0.50) at endpoint.

Objectively Measured Physical Activity

Participants' PA was continuously monitored over a 7-day period (incorporating week and weekend days) using a wrist mounted tri-axial accelerometer. Average wear time at baseline and endpoint was 6.9 days and 6.6 days respectively. At baseline (November 2017), the participants spent 77% of their day being sedentary, 20% engaging in light activity and 3% in moderate intensity activity. At endpoint (June 2018), the group spent 75% of their sedentary, 21% engaging in light activity and 4% at moderate intensity.

Physical Self-Perception

Modest improvements were observed in scholastic competence and athletic competence and small improvements were observed in physical appearance, job competence, behavioural conduct, social competence, romantic appeal and close friendships between baseline (n=16) and endpoint (n=9) measures. A decrease in mean values was observed in the global self-worth domain (Table 6.2). Overall, the research group found this tool difficult to complete, and because of this, several group members left missing responses and incomplete domain measures resulted in invalid responses.

Table 6.2 Physical Self-Perception Profile - Baseline and endpoint mean scores

Domain	Baseline n=9	Endpoint n=9	Difference
Scholastic Competence	1.91	2.26	0.35
Athletic Competence	1.80	2.15	0.35
Physical Appearance	2.02	2.13	0.11
Job Competence	2.31	2.44	0.13
Behavioural Conduct	2.37	2.57	0.20
Social Competence	2.04	2.28	0.24
Romantic Appeal	2.31	2.55	0.24
Close Friendships	2.26	2.33	0.07
Global Self-Worth	2.40	2.26	-0.14

Self-Objectification

At endpoint (n=15), 56% (n=9, mean difference = 0.99) of the research group successfully reduced their scores in the Inauthentic Self in Relationship dimension and 50% (n=8, mean difference = 0.78) of group members reduced their scores in the objectified relationship with body dimension.

Body Dissatisfaction

There were no changes between baseline (n=16) and endpoint (n=14) measurement time points. Qualitative analysis of the reasons for changing body parts provided useful insights into participants motivations for change. The group members reported wanting to make buttocks, chest and waist larger, with reasons including to improve confidence, social desirability, to improve attractiveness and to fit into clothing. In contrast, group members reported wanting to make hips, legs, thighs, and stomach smaller, to improve attractiveness, to look skinnier/less fat, to stop people commenting on body parts and to be happy.

Dietary Behaviours

At endpoint (n=15), 27% of participants improved their food habits, with participants reporting healthy decision making by avoiding fried/processed foods and sweet snacks/cakes, eating more fruit and vegetables, rarely having takeaway meals, choosing the healthiest food options when eating out at a restaurant and choosing diet drinks/foods, when compared to baseline (n=16).

While the quantitative measures presented above can be used to draw some insights into the effectiveness of the project, it is important to note that due to the small sample size, project efficacy cannot be determined. The completion rates for the measures at endpoint were sub optimal and led to smaller sample sizes in the comparison between pre and post measures. The measures were time consuming to complete, and some participants found the measures difficult to understand, which led to incomplete and missing data.

Participant Voices – Before and after the Girls Health project

Participants retrospectively reflected on what they were like before the project and what they were like afterwards. Some felt that they were more confident after engaging

in the project – *“Um, before the project I wasn’t confident in speaking in front of like, big groups...and then after-, after the group I became more confident and I have more self-confidence and I’m now more aware of our rights”* (School C), while others felt that the project gave them an opportunity to make new friends (School A&B). Other changes centred around positive feelings of confidence regarding PE lessons, asking for help, trying new things and being happy.

Participant Voices – Evaluation of the Girls Health project

Participants reported enjoying several activities during the project including; the smoothie bike, body image tasks, gender equality sessions, interactive games and construction activities. Some participants shared that they enjoyed having a space to be themselves while others enjoyed learning about topics that were outside of the current curriculum (School A & C). Participants reported that they found the project topics and session content useful and felt that the sessions had helped them to think about things critically (School C). Participants felt that the sessions had provided them with a safe girl-only space to talk about experiences which led to them implementing their learning in their daily lives – *“...because we’re talking about what boys say about us and stuff I dunno-, it just makes me not react as much as I used to”* (School A&C). Participants felt that the project would benefit others by raising confidence and teaching people to keep an open mind (School B).

Some participants felt that sessions contained too much discussion while others felt that there were too many drawing activities (School C). Some participants shared that they did not enjoy speaking out in sessions, while others felt uncomfortable working with other group members outside of friendship groups – *“...we got friends in this group but then like, we get taken away from our friends and have to work in different groups...I don’t like socialising with people I don’t know...I like staying with my friends”* (School A). Participants reported that at times, there were not enough project members in the sessions for the activities to work effectively while others did not like how loud sessions could get (Schools B & C). There were no variations between the self-report measures between school groups in this RE-AIM element.

6.4.3 Adoption – The commitment of participating schools to take on the project and the factors affecting this

Adoption in this study was assessed using deliverer and researcher reflections, along with field notes and session observation records. At the project planning stage, three schools agreed to take part in the Girls Health project and all head teachers signed a statement of intent with the project deliverer outlining several conditions that both parties would adhere to in order to successfully implement the project. These conditions included schools providing long term classroom provision, fixed weekly project times and prior notice in the event of session cancellations.

Communication Issues

At the beginning of the project, it was common practice in School B and C for the research and delivery team to be met on arrival by the school liaison. This proved to be a valuable opportunity for discussing project progress, project participants and a key opportunity for flagging up issues that needed to be addressed such as challenging participant behaviour and timetable clashes. As the project progressed, this contact became inconsistent and all but disappeared by the end of delivery, which is reflected in both deliverer and researcher reflections –

“I feel a lack of support from the school generally, who don't seem very engaged with the project” – Project Deliverer

Classroom Issues

Inconsistent allocation of classroom space was an issue across the project which affected the delivery of sessions and caused significant anxiety. The lack of private, quiet spaces created an uncomfortable environment and despite deliverer attempts to engage participants, the inadequate space led to participants disengaging with the content and deliverer out of embarrassment and anxiety about being heard or seen by peers –

“Often there is no room for us to work in and this reflects poorly on the project and doesn't help the girls to engage who need a quiet, private space” – Project Deliverer

In one of the project schools, classroom issues were a weekly occurrence, especially toward the middle-to-end of the project and resulted in a number of sessions being held in the school corridor –

“We make our way to the classroom and find it in use....the deliverer goes back up to reception to try and find a different classroom and comes back to say that we have been told to use the corridor” – Researcher

Timetabling/cancellation Issues

Issues with timetable clashes and cancellations became more frequent toward the end of the project which coincided with exams and Summer term activities. Cancellations were usually last minute which meant that groups missed out on session content and in one case, missed out on sessions with external deliverers and guest speakers –

“The school contact rang to say that the girls have an exam today and the session will need to be cancelled. This is such a shame because the girls have not had a chance to try the activity and it is something that they really wanted to do” – Researcher

Decline in Enthusiasm

Schools displayed a decline in enthusiasm for the project over the course of the year, which affected how the project was prioritised, especially during exam periods and school activity days –

“It is interesting to observe the decline in school enthusiasm across the academic year. Schools remained buoyant until February/March then interest dropped which is reflected in declines in face-to-face contact with school contacts and issues with planning” – Researcher

6.4.4 Implementation – The extent to which the planned project was implemented, and the adaptations made to the project over time

Implementation in this study was assessed using deliverer and researcher reflections, field notes and session observation records.

Individual Level Factors

Group engagement and participant selection

Group engagement remained a constant issue despite numerous attempts made by the project deliverer to incorporate new and creative ways of delivering session content. Participant engagement was integral to the success of the project, with sessions being largely dependent on group discussion, debate and engagement in small group activities. Despite there being a group cohesion and formulating phase built into the beginning of the project, some participants struggled to engage throughout the project which affected implementation. The project deliverer reflected the need to introduce several new activities and a variety of tasks to maintain participants interest in project sessions, however, engagement continued to be an issue throughout the project –

“I feel a mixed response...while some students are starting to engage to a far greater extent, others are becoming disengaged (walking in and out of the classroom at will, not completing tasks etc.)” – Project Deliverer

The project deliverer further reflected on whether the right participants had been selected and how this may affect the implementation and effectiveness of the project –

“Some of the girls report engaging in physical activity outside of school, such as going horse riding and going for a run. I wonder how they have been selected for this project and whether the right participants were chosen” – Project Deliverer

Participant misbehaviour and friendship clashes

Participant misbehaviour led to several sessions becoming disrupted and chaotic. Overall, misbehaviour was isolated to a handful of individuals and the project deliverer was usually able to identify and contain misbehaviour before it interrupted project delivery. Despite efforts, some participants continued to misbehave throughout, and this was heavily affected by the school social climate, friendship clashes and external

life events. Much of the negative behaviour resulted in group members disrupting sessions, being unkind and displaying hostility to each other and in School B, two participants were removed from the project due to misbehaviour.

Friendship clashes featured from mid-project onwards and caused significant disruption to the session delivery and project attendance. Tensions between group members in School A and C led to group engagement issues which resulted in those who were not involved in the tensions being reluctant to engage with the project all together due to the negative atmosphere. These periods were very difficult to manage and resulted in a substantial lack of enthusiasm and engagement –

“There appears to be an issue between two of the girls which is leading to a lot of tension in the group today. One of the girls leaves the room in an outburst and attracts the attention of neighbouring teachers. The deliverer manages to get the session back on track after a few minutes, but the group are not engaging as usual. I feel that the tension and subsequent outburst have de-railed today’s session” – Researcher

Group Understanding of project themes and session content

During the project, it became clear that there were limitations to group members’ pre-knowledge of topic areas. This caused issues when trying to deliverer sessions, especially around body image and nutrition. Several participants had difficulty understanding key concepts and in the case of body image, members struggled to identify negative media messages as problematic. Along with this, after engaging with sessions on nutrition and healthy eating, some participants stated that despite their learning, they would not adapt their eating habits.

“I often wonder how much of the session content the group members actually understand upon leaving the session and if the topic areas being discussed are relevant to the lives of the group?” – Researcher

Reactions to project content and complex backgrounds

When working on project areas related to body image, some participants were hyper-aware of their body size and weight, which possibly hindered their full engagement in

project sessions. The diverse backgrounds of participants meant that many brought complex experiences to the sessions, which would affect how the project was experienced by individuals –

“I am learning through discussion and engagement that the girls are bringing a huge amount of life challenges and experiences to the sessions – our intervention is just a tiny part of their overall lives, some of which appear to be complex and challenging” – Project Deliverer

Implementation – Setting level factors

Pressures of solo delivery

The diverse characters within project groups and the continuing issues with participant misbehaviour and friendship clashes meant that it was extremely difficult to effectively deliver the project with just one deliverer. This remained a key issue throughout the project and became especially problematic with the departure of an intern student –

“It is difficult to engage both halves of the group when delivering on my own...I am learning that the group A are a group of two halves and need two different approaches. The one half are boisterous and need constant encouragement to stay on task, while the other half are incredibly quiet and reserved, and need encouragement to share, discuss, and work in groups” – Project Deliverer

Differences in delivery styles

Due to variations in group needs, communication issues, poor behaviour and subsequent delivery pressures, there were differences in project delivery style between school groups. Although this bespoke approach to project delivery had numerous benefits, it also meant that some project content was not delivered in the same format across groups which could have affected implementation and group experiences. Challenging behaviour displayed by group members and the general lack of enthusiasm shown by project groups influenced the deliverer’s demeanour and delivery style –

“The deliverer demonstrates how to use the camera to the group but did not do this in the previous group. I often wonder how much effect the delivery style has on the group’s experience of the project. This group is smaller and more compliant than the others, and I feel that this may impact on their exposure to the project” – Researcher

Presence of school staff during sessions

In School B during the first three months of the project, the school contact and two learning support assistants attended sessions with group members. Although not an issue in theory, in practise it became clear that the group dynamic was very different in the presence of staff members. Along with this, school staff tended to dominate in group discussion which became problematic. Because of this, the project deliverer asked for staff input to be kept to a minimal during sessions which proved positive.

6.4.5 Maintenance – The extent to which the schools’ maintained project implementation and the project’s ability to become an integrated part of daily life

Maintenance in this study was assessed using insight from follow up focus groups with participants 6 months post project, along with insights from wellbeing lead and deliverer post-project interviews.

Organisational level: Wellbeing Department Follow Up

The Wellbeing Lead (WL) shared that feedback from schools had been positive, with some schools sharing an improvement in pupil attendance – *‘we had back from the schools was quite positive...I think in School A they were measuring with some of the pupils that you know-, their attendance was, was actually improving etc. so it was having a knock on effect on other things you know, during school life’*. Along with this, teacher feedback from the celebration event held at the end of the year was very positive, with teachers sharing that they were surprised at how engaged participants were and how they approached the activities in an open manner – *‘The teachers were really pleased with the girls and how you know, they saw a different side of them and they were saying that they were actually doing things that perhaps they thought that they wouldn’t do, but in this environment they were-, they were*

happy to give it a go'. Since the Girls Health project and accompanying research, the wellbeing department is committed to working on the recommendations of the research and continuing the project in the 2020-2021 academic year. The project will be extended to reach another 2 schools and aims to work with a larger number of girls in the future.

Individual level: Participant Follow Up

School A and B agreed to the researcher returning to the project groups to conduct follow up focus groups at 9 months post-project (April 2019).

Some participants felt that since being involved with the Girls Health project, they had gained confidence and felt that they were able now to talk to people – ***“Like before I wouldn’t talk to anyone you but you kinda like, not had to but you kinda had to [during the project]”***, while others shared that they felt happier in themselves and they didn’t worry so much about being judged by others - ***“I have got more confident and know that not everyone will judge me”***. For those who felt that their confidence had not improved, participants suggested that sessions could focus on confidence building activities throughout the project. One participant reported that since the project had ended, she had gone downhill – ***“Can we do it again?...since that stopped, I’ve gone downhill”***. Another group member felt that this was true for many of the project members – ***“I think we all have in a way”***. All participants felt that they benefitted from accessing a girl-only, safe space and enjoyed being able to attend the sessions each week.

School Variations affecting Project Feasibility

Given the multi-site nature of the delivery of this project, it is important to present the key feasibility outcomes for each school separately. There were no variations in Reach as all schools used the same recruitment processes, while there were no variations between self-report measures between school groups. Variations in participant evaluations of the project are presented in the section above. The key outcome variations for Adoption, Implementation and Maintenance between schools are presented in Table 6.3 below.

Table 6.3: Adoption, Implementation and Maintenance variation between schools

RE-AIM Element	School A	School B	School C
<p>Adoption The commitment of participating schools to take on the project and the factors affecting this</p>	<p>There was no regular communication between the deliverer and school liaison and school timetabling clashes led to classroom space being unavailable and sessions being cancelled without warning.</p>	<p>Communication between the deliverer and school liaison in this school was originally good, which supported the organisation and delivery of the project, however as the project continued, this became inconsistent. Along with this, school timetabling clashes led to classroom space being unavailable and sessions being cancelled without warning.</p>	<p>Communication between the deliverer and school liaison in this school was originally good, which supported the organisation and delivery of the project, however as the project continued, this became inconsistent. Along with this, school timetabling clashes led to classroom space being unavailable.</p>
<p>Implementation The extent to which the planned project was implemented, and the adaptations made to the project over time</p>	<p>There were participant engagement and participation issues in this school, which resulted in difficulties in project delivery. Participant misbehaviour and friendship clashes also featured during delivery, which led the deliverer to query whether the correct participants had been selected for the project. Participants in this school had some issues in understanding the project content which also impacted project delivery and implementation. Solo delivery pressures and</p>	<p>There were participant engagement and participation issues in this school, which resulted in difficulties in project delivery. Issues in session participation were present here, which was also affected by participant misbehaviour. Some participants had issues in understanding project content which also impacted project delivery and implementation. The latter led the deliverer to query whether the correct</p>	<p>There were participant engagement and participation issues in this school, which resulted in difficulties in project delivery. Friendship clashes were also present, which led to inconsistencies in participant attendance toward the end of the project. Solo delivery pressures and difference in delivery styles between school groups affected the implementation in this school.</p>

	<p>difference in delivery styles between school groups affected the implementation in this school.</p>	<p>participants had been selected for the project. In this school, a member of teaching staff was present in the first term of sessions which affected participant confidence in contributing to sessions. Solo delivery pressures and difference in delivery styles between school groups affected the implementation in this school.</p>	
<p>Maintenance The extent to which the schools' maintained project implementation and the project's ability to become an integrated part of daily life</p>	<p>School feedback to the wellbeing lead was positive. The project was able to run until the end of the delivery cycle in this school. The school was also keen to sign up to another year of the project in the following academic year. Participants in this school took part in a 6 month follow up focus group and shared that they had benefitted from the project, although felt that they would benefit from further sessions.</p>	<p>School feedback to the wellbeing lead was positive, with teacher feedback being very supportive of the improvements observed in participant conduct in school and in the celebration event. Participants in this school took part in a 6 month follow up focus group and shared that they had benefitted from the project, although felt that they would benefit from further session. Participants were enthusiastic about the project and felt that other girls would benefit from taking part in future delivery.</p>	<p>School feedback to the wellbeing lead was positive. The project was able to run until the end of the delivery cycle in this school. Feedback from this school was positive, however participants did not take part in the follow up focus groups post-project.</p>

6.4.6 Recommendations for Improvement of the Girls Health project

Participant Recommendations

The most popular suggestion for improving the project was the incorporation of mental health sessions. This centred around education on topics such as anxiety and depression and approaches to help others currently living with poor mental health - *“Like how to help people with it...because when she has her anxiety attacks I dunno what to do”*. When asked why mental health sessions needed to be incorporated into the project, one participant shared that despite being a pressing issue for young people, mental health was not spoken about enough – *“Yeah because it’s [mental health] not talked about... really anywhere but then it’s [mental health] everywhere at the same time”*. Other participants suggested that it would be useful to be visited by speakers with inspirational mental health stories to share their experiences.

Participants felt that the project could be improved by incorporating more trips and days out into the delivery and shared several ideas regarding where and what would be useful. These suggestions included swimming trips, archery and outdoor activities, parks and nature walks and visits to historical venues. Some participants shared that going to places to socialise would be useful, providing opportunities to interact with other people, practice social skills and build confidence - *“Oh yeah, like socialising...because I wasn’t very good at it before...so maybe with people you don’t know would make it easier for other people”*. In contrast, other participants didn’t know if they wanted to spend time with other project groups and felt that this would be dependent on who the other people were. Participants suggested spending more time outside of the classroom would be beneficial and suggested using this opportunity for PA – *“So, what we were doing but outdoors and then sporty activities but not like...I dunno, it’s hard to explain, like sport but not-, like whatever [sports] everyone wants to do”*.

Participants suggested that it would be beneficial to have a dedicated time slot after every session where project members are able to talk to the session deliverer about issues and to feedback on experiences – *“...if someone had a problem, just one on one after the session or something...so we could explain how something feels when*

you give us advice...yeah just like, does anybody need to talk to the deliverer separately?”.

Wellbeing Department Reflections

School Feedback

The Wellbeing Lead (WL) shared that feedback from schools had been positive, with some schools sharing an improvement in pupil attendance over the course of the project – *‘what we had back from the schools was quite positive...I think in School A they were measuring with some of the pupils that you know, their attendance was-, was actually improving etc. so it was having a knock on effect on other things you know, during school life.* Teacher feedback from the end of the year was very positive, with teachers sharing that they were surprised at how engaged participants were during the Girls Health project celebration event – *‘The teachers were really pleased with the girls and how you know, they saw a different side of them and they were saying that they were actually doing things that perhaps they thought that they wouldn’t do, but in this environment they were-, they were happy to give it a go’.*

Managing the Girls Health Project

WL reflections of project management were positive, however several themes surrounding communication, school liaison issues and hard to reach schools were discussed. The WL shared that communication with teachers was on times difficult, especially when teachers were managing several responsibilities at challenging times during the academic calendar. However, despite the difficulties, WL reflected that the project partners were able to organise project activities in most schools, throughout the academic year. Following this, WL shared that working with School B was difficult which posed a challenge for the department – *‘School B was harder to work with maybe than the others umm-, and they-, they probably are the hardest secondary school that I work with across the whole of [AREA] and when it comes to open dialogue with the school they are hard to get hold of sometimes, they’re hard to get responses from’.* Despite the difficulties with engaging the school, WL felt that trying to work with the school was a good challenge for the department – *‘It was a good challenge for us you know because you know-, we didn’t just go for the easy schools and the schools that we have a really good relationship with, we did challenge*

ourselves and because that was a school possibly that would need this intervention more than maybe, some of the other schools that we work with’.

Selection Criteria

The WL felt that the selection criteria for the project participants was not translated across to schools effectively which meant that some schools did not select the right individuals – *‘I don’t [know] whether or not there was a miscommunication, but I don’t think we quite had the right girls on the programme, in one school in particular, I would suggest’.* Further to this, there were concerns around why participants had been selected, and whether this related to pupil misbehaviour – *‘I mean we did say we’re not looking for young people that have any behavioural issues, we’re looking for young people that have A, B, C but I think that got a bit-, I think sometimes schools just think right there’s a nice programme there, they [pupils] are causing problems in my lessons at the moment, that would be a lovely place for them to go’.* Year group selection was also left to the discretion of the project schools to provide as much of a bespoke experience as possible, however the WL stipulated that there should be no more than two academic years between participants.

School Relationships

The WL felt that the relationships that the department had established with project schools positively affected the receptivity and willingness of schools to commit time and take participants off timetable to attend the sessions - *‘So I think having that past umm-, quality work that we’ve done with schools already that helped I think immensely because they were quite open and receptive to have another programme come into their schools’.* Along with this, the WL felt that the working relationships between the wellbeing departments and schools was strengthened by the partnership agreement in place and because the department were running a number of other projects alongside the Girls Health project in the school – *‘But managing it, it was okay with the schools, I felt that you know, we’ve got that relationship with them anyway because we’re running a number of different projects within each of the schools that we worked in so that wasn’t difficult and it was part of their partnership agreement. So that made it easier’.*

Future Progressions, Meeting Demand and Department Capacity

The WL reflected that moving forward, the participant selection criteria needed to be more specific and felt that project schools needed to fully understand the desired project outcomes before being able to select participants for the project. Along with this, the project delivery timeline would need to be modified in order to maintain contact with participants over the Summer holidays - ***'I didn't like finishing it at the end of the Summer term because then I felt that we have a massive six week block of losing them and now if I want to go back in and make contact with them again, it's going to be hard and I feel that we're going to lose touch'***. By delaying project commencement to November, the department would be able to deliver sessions to the groups over the Summer holidays and for the first 6 weeks of the new academic year – ***'...we'll run things during the Summer holidays for them but then they come back and they'll still have half a term of the programme where we'll finish off'***.

Due to a growing demand for similar projects to be made available to boys, the wellbeing department has opened up the project to boys, offering schools the option of choosing to implement a project for selected girls, boys or both if the school felt the need was there – ***'It was highlighted I think from many schools that boys are having issues...with their confidence etc. so we said right okay, we're happy to support both, or one or the other, depending on where your school needs are'***. This raised questions about capacity for the WL, who reflected on the growing demand for wellbeing projects in school settings and the need to partner with external deliverers to ensure positive impacts – ***'Wellbeing is massive and we can't change it on our own and it's just making sure that we make sure that we partner up with the right people within [AREA] and you know, external partners that can help and support this so that we can have maximum impact'***. In closing, the WL reflected on capacity, partnerships and making meaningful impacts in the lives of the young people they work with – ***'Where does what we do stop and other people pick up...we're an old sport development unit, we're quite limited on the skillset that we have so it's about partnering up and linking with our partners and agencies that can support and deliver on some of these things when we start going off on a tangent really, away from physical activity and health. You know, we don't want it to be tokenistic, we want it to have the biggest impact that it possibly can and we do want to make a***

difference so it's just trying to get the right people delivering on the right things and that's going to take a while I think, to get that right'.

6.5 Discussion

The aim of this study was to evaluate the feasibility of implementing a 39-week multisite adolescent health promotion project to 13-15-year-old girls in a local authority area in Wales. This study contributes to current literature unique insights into the processes and complexities of implementing a health promotion project in multi-school contexts (Pinnock et al., 2017) and provides evidence to the county council wellbeing department that commissioned the delivery of the project.

Using the RE-AIM framework, this study reported on the feasibility of implementing a 39-week, multi-school health promotion project to pre-identified 13-15-year-old girls in Wales. The Girls Health project aimed to promote positive health behaviours through the delivery of a weekly, one-hour classroom-based session that was delivered by a trained youth worker during school hours. Three secondary schools were enrolled onto the project, although these were limited to schools who had pre-existing partnerships with the wellbeing department who commissioned the work. Recruitment and project reach were further limited by the subjective assessment of senior leadership teams as to the needs of their school and pupils, which informed whether a school enrolled onto the project or not. Eligible participants were identified for the project based on no-to-low PE attendance and the subjective assessments of pupil wellbeing made by school staff. The participant selection criteria lacked a rigorous pre-assessment stage which meant that individuals who could have benefited from the project may have been overlooked, while others may have unfairly nominated based on inadequate teacher assessments. Questions were raised by the deliverer, researcher and wellbeing lead regarding whether the right participants had been enrolled into the project, and how this may have affected project outcomes and participant enthusiasm toward the project (Sargeant, 2013).

Although quantitative measures of effectiveness demonstrated small improvements in measures of self-objectification, all other results remained unchanged. It is unclear how well participants understood each measure, and despite being briefed and the researcher being present to assist, some participants faced issues completing written

measures which led to missing data (Fargas-Malet et al., 2010). Issues relating to participant comprehension and completion of self-report measures have previously been reported, and although cost-effective, self-report measures have been criticized for issues with response bias and participants providing socially desirable answers (Holbrook, 2011). Time constraints, classroom issues and session cancellations at the end of the project meant that several participants completed self-report measures in a rush, affecting the quality of their responses. Given the latter, a review of the self-report measures used in the project should be conducted, to ensure the selection of the most efficient and appropriate methods of capturing participant development.

During the Girls Health project, participants displayed varying levels of understanding of project topics, with some lacking pre-knowledge of topics such as gender equality and PA. Other participants were dismissive of nutritional health promotion messages and had opposing ideals around body image and feminine stereotypes. Qualitative responses from participants both during the project and at follow up demonstrated the positive impact on subjective appraisals of wellbeing gained through accessing a dedicated, girl-only safe space. Participants reported enjoying having a space where they could share experiences and engage with topics related to their lives away from judgemental peers (Marcus & Brodbeck, 2015; Saltzman et al., 2015). This finding raises questions about the relevance of the effectiveness measures used in this study and highlights the importance of creating safe spaces for project participants. Qualitative responses relating to project content and improvement demonstrate that while the project was enjoyable, changes to delivery style, session structure and content may improve the experience and usefulness of the project for future participants. Some participants reported that repetitive session formats could become boring and felt that low participant attendance and peer misbehaviour impacted on session enjoyment and implementation of group work activities. These findings suggest that although some aspects of the project had significant value for the participants, there were several features that could be improved and raise questions about what adolescent girls need from a health promotion project, and how outcome expectations and measurements set by research partners may lack context for the end project users (Darlington et al., 2018).

Following this, the wellbeing lead shared positive feedback from project schools around participant attendance as a result of engaging with the project and teachers reflected a change in the participants during a celebration event at the end of the project. Based on the latter, we recommend including school attendance data and teacher participant appraisals in measures of effectiveness in future health promotion projects and recommend project designers work with participants to identify and agree upon project outcomes that are relevant to the lived experiences of participants to promote sustained, meaningful impact (Darlington et al., 2018; Muellmann et al., 2017; Verloigne et al., 2017). In the case of the Girls Health project, a consultation and project orientation period between deliverer and participants would be helpful to provide participants with the opportunity to share lived experiences and help the deliverer understand the group on a deeper level. Participants would work collaboratively with the deliverer to set appropriate and meaningful content, tailored to the specific needs of the group. Along with this, a project steering group formed of relevant stakeholders to oversee the attainment of project outcomes across the project lifespan would be of significant value (Wiltsey Stirman et al., 2012).

Schools are complex, challenging environments with numerous moving parts, creating unique obstacles when trying to plan, implement and evaluate school-based health promotion projects (Jaycox et al., 2006). The project was delivered across multiple sites which required a significant amount of flexibility when working with schools who were juggling competing priorities set in individual school and pupil cultures (Jaycox et al., 2006). Adoption, in this study, focused on the commitment of participating schools to take on the project and the factors affecting this. Across the three schools, breakdown in regular face-to-face contact with school liaison staff meant that communication became sporadic and uncoordinated (Muellmann et al., 2017). Classroom allocation and availability caused problems throughout which, in School B, resulted in sessions being conducted in an open corridor space. This led to several participants becoming anxious and caused the wider group to become disengaged. Session cancellations became problematic toward the end of the project and resulted in some groups missing out on visits from external deliverers. Similar issues have previously been reported when working within and across diverse organisational settings that have unique agendas, cultures, and operational procedures

(Darlington et al., 2018; Muellmann et al., 2017). Past research recommendations suggest the need for an extensive assessment of individual school agendas and the social environments in which the schools are situated before project implementation (Darlington et al., 2018).

In this study, implementation referred to the extent to which the planned project was implemented, and the adaptations made to the project over time, covering both individual (participant) and organisational (project) levels. At the individual level, friendship clashes, poor behaviour and engagement issues complicated delivery and affected session atmosphere. While the project deliverer approached these issues in a proactive manner by adapting session delivery to best suit the needs of the group (Watts-Taffe et al., 2012), implementation at the individual level remained a challenge. Participant misbehaviour featured throughout the project and was heavily influenced by the school social climate, friendships, and school events. Participant behaviour was on times explosive and led to chaotic events that resulted in the deliverer using alternative strategies to diffuse the situation and increase pupil task motivation (Clemens & Kern, 2007). Fluctuations in participant misbehaviour between sessions meant that it was difficult to pre-empt group dynamics from one week to the next which had an effect when designing future sessions and materials. The disruptive nature of participants' misbehaviour also affected those who struggled with confidence and worked against the deliverer's attempts to facilitate a positive session atmosphere. Along with this, friendship clashes produced similar outcomes and led to prolonged participant absence in School C. Participants demonstrated mixed levels of prior knowledge of project topic areas which made project delivery and planning difficult.

Implementation issues at the organisational level were based around solo delivery, session differences and balancing competing session and research priorities. Both project deliverer and researcher reflected on the issues encountered as a result of the pressures of solo delivery and the issues at the individual level that influenced this. Differences in delivery style and activity format across groups were influenced by the project deliverer's reflections and assessment of group needs. Although a positive approach, this approach may have led to differences in group experiences and learning, by deviating from a standardised delivery protocol and thus influencing project implementation and outcomes (Muellmann et al., 2017; Wiltsey Stirman et al., 2012).

Maintenance referred to the extent to which schools' maintained project implementation and integrated wellbeing principles into daily life for participants. At the 9 months follow up, participants reported increases in anxiety, decreases in social interaction and reported that they missed having access to the 'safe space' that the project provided. These findings raise questions about the long-term impact of the project, the need for girl-only safe spaces in schools and opportunities for developing progression routes for project users. At the school level, all schools re-enrolled in the Girls Health project for the following academic year and the wellbeing department is committed to embedding the feasibility recommendations into project planning in the future.

Participants made several recommendations to improve the Girls Health project which included the addition of mental health content, opportunities to engage in non-traditional physical activities and sports, outdoor learning and the provision of post-session drop ins with the project deliverer. The need for mental health content was expressed by participants who wanted to have adequate education regarding their own mental health, guidance on how to assist family and friends with mental health conditions and help with developing coping strategies to deal with exam stress (Neagle et al., 2018). Throughout the project, participants discussed having opportunities to engage in non-traditional and non-competitive physical activities and sports (Allender et al., 2006; Mitchell et al., 2013; Owen et al., 2019) and expressed an interest in accessing outdoor learning opportunities.

6.6 Conclusion

The aim of this study was to evaluate the feasibility of implementing a 39-week multisite health promotion project to 13-15 year old girls in Wales. This study contributes to current literature unique insights into the processes and complexities of implementing a health promotion project in multi-school contexts (Pinnock et al., 2017) and provides evidence to the wellbeing department about the feasibility of the Girls Health project using the RE-AIM framework. The project was directed at promoting healthy behaviours in 13-15-year-old adolescent girls from deprived communities in Wales. Despite minimal changes in quantitative outcomes, qualitative responses from participants demonstrated that the groups found the project enjoyable,

and participants felt they benefited from accessing a girl-only space away from judgemental peers. There were a number adoption and implementation issues that affected project delivery that raises questions about the feasibility and sustainability of the project in its current form. The findings from this study suggest that in its current form, the Girls Health project is not feasible and needs further feasibility work and development. Future Girls Health type projects should engage girls throughout the planning, design, implementation and sustainability phases of the project, develop a steering group to guide project implementation, include measures of attendance, teacher appraisals and work in continuous close partnership with senior leadership teams, teachers and other relevant stakeholders to ensure optimal conditions for project implementation and sustainability (Muellmann et al., 2017).

Thesis Map

Study	Title		
1	Predictors of Fitness and BMI in 9-11-year-old girls	Aim	To explore the associations between cardiorespiratory fitness (CRF), obesity (BMI) and multiple lifestyle factors in 9–11-year-old girls
		Key Findings	CRF and BMI z-score were significantly associated with a number of lifestyle factors. CRF was associated with seven lifestyle factors accounting for 17.8% of the variance in girls' fitness, while 13.4% of the variance in girls' BMI z-score was attributed to fitness and perception of health. Interventions and health promotion projects for girls should include components to improve fitness and obesity outcomes, through promoting physical activity and other associated positive lifestyle factors, especially when working with girls from areas of high deprivation.
2	Using the theory of normative social behaviour to explore adolescent girls' experiences of physical activity	Aim	To contribute to the literature surrounding adolescent girls and physical activity and gain insight into the social norms that temper the relationship between girls and their physical activity by using the TNSB as a guiding framework.
		Key Findings	The findings demonstrate that despite an awareness of the benefits of physical activity engagement, bridging the gap between awareness and action is tenuous and hindered by a number of barriers based on social norms. Future research should spend time exploring the social landscapes that girls are physically active in to gain a deeper insight into the social barriers to PA, in the hope of developing meaningful and realistic interventions and tailored support in the lives of adolescent girls.
3	The feasibility of a 39-week, school-based health promotion programme for adolescent girls – Findings from The Girls Health Project	Aim	To evaluate the feasibility of implementing a 39-week multisite health promotion project for 13-15-year-old girls in Wales.
		Key Findings	Despite minimal changes in quantitative outcomes, qualitative responses from participants demonstrated positive outcomes for participants. There were a number of adoption and implementation issues that raise questions about the feasibility and sustainability of the project in its current form. Future projects should engage girls throughout the planning, design, implementation phases of the project, to incorporate learning from the lived experiences of adolescent girls and their health behaviours.

7. Thesis Synthesis

The overall aim of the thesis was to examine the factors associated with girls' fitness and PA before assessing the feasibility of a school-based health promotion project for adolescent girls in Wales. This was achieved through three studies that aimed to address a gap in current knowledge and contributed to the evidence base surrounding girl's fitness, PA and adolescent health promotion in school settings. The novelty of this thesis stands in the use of the TNSB to explore girls' PA experiences, and the assessment of feasibility of a complex school-based adolescent health promotion project, delivered by a local authority wellbeing department charged with improving the health and wellbeing of CYP. This thesis highlights the impact of PA norms on girls' PA engagement and sets out the challenges for health promotion project implementation in schools.

PA contributes to the health and wellbeing of children and adolescents by protecting against future ill health through improvements in cardiorespiratory fitness, a well-documented protector against non-communicable diseases (Farooq, 2019; WHO, 2017; Reiner et al., 2013; Warburton et al., 2017). Engagement in regular PA also has positive outcomes for wellbeing and academic attainment and overall quality of life (Posadzki et al., 2020; Emm-Collison et al., 2022). Despite its benefits, PA engagement remains suboptimal (Farooq et al., 2019; Richards et al, 2022), thus making PA promotion a key focus for health and wellbeing professionals charged with improving outcomes in child and adolescent populations. Girls' PA engagement remains consistently lower than boys, and past research has identified a number of barriers that centre around the gender constraints that lead to low physical self-perception and a lack of confidence in abilities which impact on girls' engagement in physical pursuits (Young, 1980; Telford et al., 2016). Because of the complex interwoven nature of these barriers and the influence they have over girls' PA behaviour, it is important to design interventions and initiatives that consider the context and influences of girls' PA experiences in order to bring about meaningful change (Cowley et al., 2021). Studies 1 and 2 were developed to capture these contexts and influences, with Study 1 focusing on the associations between girls' fitness, BMI

z-score and multiple health and lifestyle factors, while Study 2 aimed to explore girls PA experiences using the Theory of Normative Social Behaviour (TNSB).

Study 1 found that girl's cardiorespiratory fitness (CRF) was associated with seven lifestyle factors (number of out of school clubs, ability to ride a bike, number of days achieving >60 mins PA, ability to swim, BMI z-score, deprivation and number of days spent sedentary) accounting for 17.8% of the variance in girls' fitness, while 13.4% of the variance in girls' BMI z-score was attributed to fitness and perception of health. The findings presented in Study 1 demonstrate that multiple lifestyle factors have a predictive role in the fitness and obesity status of girls, which adds insights to the relationship between fitness, obesity, and PA in this population. Fitness was associated with lifestyle factors that spanned PA, physical competency, sedentary behaviour, and deprivation, demonstrating the importance of positive health behaviour development across these areas. Fitness had a negative association with deprivation, highlighting the importance of developing projects that aim to improve health outcomes in deprived areas, where fitness and health outcomes tend to be lower (Nevill et al., 2018). Building on recommendations from research that supports the development of health promotion projects that nest PA within a larger programme of associated factors (Cowley et al., 2021; Warburton & Bredin, 2016; Camacho-Minano et al., 2011), the findings from this study can be used to inform the design and development of health promotion projects that include PA, fitness and their associated lifestyle factors. The findings of Study 1 supplement current insights shared from previous Welsh research that investigates the state of CYP's health and fitness (Sport Wales, 2022, Page et al., 2023, Edwards et al., 2018, Richards et al., 2022), by providing a more detailed account of how girls' fitness is related to BMI z-score, deprivation and other lifestyle factors in a large sample of girls that can be used to direct future research in this area.

Study 2 explored girls PA experiences using the Theory of Normative Social Behaviour as a guiding framework and was the first study to the authors knowledge to do so. The findings presented here demonstrate the impact that social norms had on girls' perceptions and understanding of girl's PA. The findings suggest that while girls were aware of the benefits of PA to health, there were several social factors that contributed to girls becoming disengaged in PA including exclusion from team sports, peer judgement and negative gender stereotypes and social norms. The findings were

similar to those reported by past research (Sackett et al., 2018; Martins et al., 2014; Spencer et al., 2015), which suggests that using the TNSB as a guiding framework with girls is useful in gaining insight into the social norms that surround girls' PA behaviour. The findings suggest that a deeper understanding of the role of social norms in the relationship between girls and PA is needed, especially when designing initiatives to improve PA outcomes. Future research should focus on the social landscapes that girls are physically active within to gain a deeper insight into the social barriers to PA, while interventions should focus on centring the voices and lived experiences of girls, with a focus on improving girls' physical competency and self-perception.

This study provides a number of important findings in terms of girls' PA experiences which can inform the work of health and PA professionals charged with improving health outcomes in girls. Although much work has been done to identify the barriers to girls' PA, the findings from Study 2 demonstrate the impact the social environment and its associated norms have on the PA behaviour of girls. While girls were able to recount popular PA promotion messages, girls shared their observations of other girls being physically active, and the negative treatment they observed girls receiving overruled the benefits that PA may have to their health. Navigating the social barriers impacting on girls PA is difficult, and while a successful pathway forward has yet to be found to improve girls PA engagement, acknowledging the role of the social environment while supporting girls to navigate these is the first step in bringing about change, and empowers girls to take control of the narratives that limit their PA behaviour. Our findings provide novel insights into social norms and the social environment related to girls' PA behaviour. These insights go some way to explain how and why girls engage or disengage with PA. While much work has been done to explore the underlying motivations and barriers of girls' PA engagement (Corr et al., 2019, Martins et al., 2015, Duffey et al., 2021), no research has focused solely on the role of social norms while using a social norms framework to guide the research process. The benefits of applying this approach lie in both the uncovering of novel insights into girls' lived experiences and utilising a new lens in which to explore PA with girls, as called for by Duffey et al., 2021. In their paper, Duffey and colleagues discuss the need for future research to focus on developing new approaches that

demonstrate the multi-faceted factors that underpin girls' PA engagement (Duffey et al., 2021). The findings of Study 2 align with the development of these new approaches.

Study 3 aimed to evaluate the feasibility of a 39-week school-based health promotion project for adolescent girls in Wales. This study employed robust methods, a 6 month follow up period with project participants and provides unique insights into the real world complexities of implementing a health promotion project across school settings, highlighting considerations for future research and project design. There were several factors that effected the delivery and implementation of the project such as school context, pupil misconduct and timetabling issues. Timetabling issues and lack of classroom space featured regularly, with difficulties in assigning classroom spaces affecting the delivery of content and participant engagement in sessions. Furthermore, the lack of regular communication between school contacts and project deliverer in some schools meant that these issues were sometimes difficult to resolve, with no point of contact in the school available to assist with classroom re-allocation in a timely manner. It is important to note here that the relationships the wellbeing department had with the schools were very strong and had been forged over a number of years. However, the project still experienced these issues which is important when planning future project partnerships in schools with little-to-no prior working experience. Breakdowns in pupil friendships made some sessions difficult to deliver and in one school, caused a drop in participation over a number of sessions and led to time taken away from project delivery. While the project was well received by participants and was feasible to deliver, the implementation issues highlighted through this study meant that the Girls Health project in its current form would need further development to be able to navigate similar challenges in future project delivery. Recommendations that centre around the development of project organisation, improvement of partnership working with schools and co-producing the project with girls would all lead to improvements in project organisation and delivery, while taking steps to ensure project sustainability, which is a key priority for local authority health and wellbeing departments.

The findings reported here demonstrate the disparity between the planned intervention and how the intervention is experienced in real-world settings. The project featured in

Study 3 was informed by local and national data on girls' PA, designed based on best-practice reported in the health promotion literature pertaining to school-based interventions (Lima-Serrano et al., 2014; Medeiros et al., 2018; Rasmussen, 2005; Shackleton et al., 2016) , and was delivered by a trained youth worker with many years of experience in working with girls in Wales. Despite this, there were numerous issues that affected the feasibility of the project. The findings presented here add valuable insight into the barriers to school-based project delivery which should be considered when developing future projects. This aligns with research by Jago and Colleagues (2023), who argue that in order to develop effective school-based interventions, researchers need to move away from traditional intervention design and pay more attention to the school context that an intervention is delivered within, particularly focusing on the school-based barriers to successful implementation (Jago et al., 2023).

This thesis aimed to provide the reader with an understanding of the insights and complexities of the journey into girls' fitness, PA and health in Wales. Each study provides insights from a different step in the research process, from examining population fitness and health correlations, to exploring the social norms that inform girls PA behaviour and concluding with reporting on the feasibility and real-world implementation of school-based interventions. Taken together, the findings presented in this thesis can be used by academics and practitioners to inform the design, development and forward planning of bespoke, girl-informed interventions and projects that acknowledge the multifaceted nature of girls' PA engagement and focus on improving girls' health and PA outcomes.

7.1 Application of findings

Since the completion of this doctoral research, the findings of Study 3 have been shared with the wellbeing department who ran the Girls Health project. A number of developments have been made to the Girls Health project that include the development of project modules informed by participant recommendations, improved partnership agreements with schools and the development of a teacher training pathway to improve project sustainability. The wellbeing department have also used the recommendations to inform the design and implementation of other school-based projects. The Girls Health project has continued to run and is still active at the time of writing.

The findings provided the wellbeing department with valuable insights into the implementation issues (e.g. poor communication with school staff, timetable clashes, classroom allocation issues, pressures of solo delivery) that affected the delivery of the Girls Health project and enabled them to make adjustments that would ensure the successful implementation of future project delivery cycles. The Girls Health is currently being delivered in both primary and secondary school settings, in curriculum lessons and in community settings by youth workers, wellbeing department staff and project trained school staff.

In an attempt to address issues such as classroom allocation, school staff communication and senior leadership team commitment to the project, the wellbeing department developed a set of minimum requirements for the project, which clearly sets out what the school is expected to provide in order for the project to run in school.

To ensure continuity between project content delivery between groups, project modules have been developed for both primary and secondary delivery arms. Modules cover a range of topics that include physical activity, gender awareness, risky behaviour, healthy relationships and navigating social media. The content of modules has been informed by current literature, project school input, youth workers, participants and the findings of Study 1 and Study 2 presented in this thesis. Insight from Study 1 were used to inform the development of the physical activity and healthy living modules, and findings from Study 2 were used to develop the gender awareness module and physical activity content that is specifically tailored to the experiences of girls and explores the role of social norms in their lives.

To manage poor communication with school staff and to ensure project sustainability, school-based delivery now includes teacher training, where a lead member of staff is assigned to the project for 2 years and receives bespoke mentoring from the project youth worker, enabling them to confidently deliver the project at the end of the 2-year period. To date, two teachers have completed project training and are independently delivering the project to young people in their schools.

In a bid to keep up with growing demand, the Girls Health project has diversified and now includes Adolescent Health in the Curriculum, which provides training to schoolteachers and wellbeing support staff to be able to deliver project modules in

health and wellbeing lessons. This arm of the project was developed in line with the New Curriculum for Wales and meets the requirements of the health and wellbeing area of learning. Adolescent Health in the Curriculum is currently active in several schools and continues to be a popular feature of the Girls Health project package.

While the application of findings has been beneficial for the project, the findings have also been used to inform other school-based projects and initiatives that focus on supporting the health and wellbeing of children and young people. The progress made in the Girls Health project demonstrates the value and importance of knowledge dissemination between researcher and practitioner and highlights that the findings reported in this thesis are important and relevant for research and health professionals interested in this area.

7.2 Strengths and Limitations

The findings presented in this thesis provide the reader with insights from across the girls' PA research journey, beginning with quantitative and qualitative evidence on girls' fitness and PA, before concluding with a feasibility assessment of a school-based health promotion project. Furthermore, the body of work incorporated provides findings that are relevant to academics, policy makers and practitioners. The breadth of the research presented in this thesis meets the requirements of the KESS 2 Scholarship, that aim to support the knowledge exchange between academia and industry.

A major strength of this study lies in the use of TNSB in Study 2 and the feasibility and implementation insights generated in Study 3, while Study 1 contributes valuable insights into the associations between fitness, BMI z-score, and lifestyle factors in a large sample of 9-11 year old girls. Through the use of TNSB, Study 2 was able to demonstrate the impact the social environment has on the PA experiences of girls, which highlighted the challenges for current and future work in this area. It is also important to note that methods used to develop the focus group frameworks were successful and are replicable in future studies.

Study 3 focused on assessing the feasibility of a 39-week school based adolescent health promotion project for 13-15 year old girls. This study employed a robust

research protocol that included rolling data collection, session observations, deliverer reflective practice, focus groups, photo novella and 6 month follow up period. The findings suggest that while the project was successful in delivering content and engaging girls, the multiple school-focused implementation issues highlighted the complexity of delivering long term projects in school settings. The real world application of this project provides valuable insights that can be used in the design of future health promotion projects for girls in schools. The findings of Study 3 were presented to the wellbeing department and recommendations were used to inform the ongoing development of the Girls Health project.

Despite these strengths, there are a number of limitations pertaining to the empirical work in this thesis. The data for Study 1 was collected using battery field measures, and while this enabled a large sample to be included in the study, future research may aim to utilise more precise, objective measures of fitness and body mass through lab-based measures such as VO₂ maximal exercise testing and dual-energy X-ray absorptiometry (DEXA) and PA through accelerometry to strengthen future research in this area. Study 2 was the first to utilise the TNSB as a framework for exploring girls' PA experiences in the social environment, however the small sample size meant that the findings are limited to the study group and not fit for extrapolation to the wider population. Further studies may wish to utilise TNSB as an exploratory framework for PA experiences with girls, thus contributing to the evidence base. The use of the RE-AIM framework was successful in Study 3 and provided the feasibility research with an appropriate framework to capture the real-world contexts of delivering health promotion projects in school settings. However, the subjective self-report outcome measures used in Study 3 should be reassessed for suitability in demonstrating project outcomes. While improvements in self-report measures were limited, participants shared many positive outcomes they gained through the involvement in the project and this was best captured through focus groups and visual methodologies, highlighting the importance of incorporating these into future feasibility research plans. While the style of the thesis has provided insights that are applicable across academia and industry, the overarching design and focus meant that opportunities to explore one area in depth were missed. An example of one such missed opportunity was in not being able to explore PA and social norms with a greater number of girls.

7.3 Future Directions

Girls' PA and fitness are important to current and future health outcomes, however because of low engagement levels, girls are repeatedly a population of concern for PA and health professionals globally. While past research has explored the barriers to girls' engagement, Study 2 used the TNSB to explore PA experiences and highlighted the key role played by the social environment, social norms and gender expectations placed on girls. Greater focus on the experiences of girls when being physically active in community and public spaces is needed, with this insight being used to inform the development of strategies to overcome these social barriers. The collective findings presented in this thesis should be used to inform the development of adolescent health promotion projects for girls, with a key focus on PA and the development of strategies to navigate the negative experiences of girls whilst being physically active being nested within projects.

7.4 Final Comments and Reflections

This thesis successfully investigated the factors that impact on girls' fitness and PA and examined the feasibility of a 39 week school-based adolescent health promotion project for girls in Wales. The findings of this thesis provide insight into the association of multiple lifestyle factors with girls' fitness and PA and highlights the role of social norms on girls' PA experiences. Taken together, these findings provide unique insight that can be used to inform and develop health promotion projects which aim to improve PA and health outcomes in girls. Exploring girls PA by using TNSB provided an opportunity to explore girls PA experiences using the lens of social norms and the wider social environment, which until now has not been represented fully in one piece of research. While findings from past research have focused only sporadically on the impact of social norms, the methodology utilised in Study 2 meant that the social environment was positioned as the key phenomena for exploration with girls. Study 3 reported on the feasibility of a 39-week adolescent health promotion project for girls in Wales and found that while the project was successful in its delivery aims, barriers to implementation hindered the project reaching its full potential. While school settings are regarded as key settings for the delivery of health promotion projects, Study 3 highlights the complexities of long term implementation. Future

adolescent health promotion projects for girls should include a co-production element in project design and outcome measures should be assessed for suitability in the planning stages.

8 References

- Aanesen, F., Meland, E., & Torp, S. (2017). Gender differences in subjective health complaints in adolescence: The roles of self-esteem, stress from schoolwork and body dissatisfaction. In *Scandinavian Journal of Public Health* (Vol. 45, Issue 4, pp. 389–396). SAGE Publications Ltd.
<https://doi.org/10.1177/1403494817690940>
- Abbade, L. P. F., Abbade, J. F., & Thabane, L. (2018). Introducing the CONSORT extension to pilot trials: Enhancing the design, conduct and reporting of pilot or feasibility trials. *Journal of Venomous Animals and Toxins Including Tropical Diseases*, 24(1), 10–12. <https://doi.org/10.1186/s40409-018-0142-2>
- Adams, D., Lok Tan, K., Sandmeier, A., & Skedsmo, G. (2023). School leadership that supports health promotion in schools: A systematic literature review. *Health Education Journal*. <https://doi.org/10.1177/00178969231180472>
- Allender, S., Cowburn, G., & Foster, C. (2006). Understanding participation in sport and physical activity among children and adults: A review of qualitative studies. *Health Education Research*, 21(6), 826–835.
<https://doi.org/10.1093/her/cyl063>
- Althoff, T., Sosič, R., Hicks, J. L., King, A. C., Delp, S. L., & Leskovec, J. (2017). Large-scale physical activity data reveal worldwide activity inequality. *Nature*, 547(7663), 336–339. <https://doi.org/10.1038/nature23018>
- Amos, S., Read, K., Cobb, M., & Pabani, N. (2012). *Facilitating a Photovoice Project : What you need to know*. October.
- Arain, M., Campbell, M. J., Cooper, C. L., & Lancaster, G. A. (2010). What is a pilot or feasibility study? A review of current practice and editorial policy. *BMC Medical Research Methodology*, 10, 1–7. <https://doi.org/10.1186/1471-2288-10-67>
- Atkinson, S. (2013). Beyond Components of Wellbeing: The Effects of Relational and Situated Assemblage. *Topoi*, 32(2), 137–144.
<https://doi.org/10.1007/s11245-013-9164-0>
- Ávila-García, M., Baena-Ogalla, N., Huertas-Delgado, F. J., Tercedor, P., & Villa-González, E. (2020). The relationship between physical activity levels, cardiorespiratory fitness and academic achievement school-age children from southern Spain. *Sustainability (Switzerland)*, 12(8).
<https://doi.org/10.3390/SU12083459>
- Azzarito, L., & Hill, J. (2013). Girls looking for a ‘second home’: bodies, difference and places of inclusion. *Physical Education and Sport Pedagogy*, 18(4), 351–375. <https://doi.org/10.1080/17408989.2012.666792>

- Bai, Y., Saint-Maurice, P. F., Welk, G. J., Allums-Featherston, K., & Candelaria, N. (2016). Explaining Disparities in Youth Aerobic Fitness and Body Mass Index: Relative Impact of Socioeconomic and Minority Status. *The Journal of School Health*, 86(11), 787–793. <https://doi.org/10.1111/josh.12434>
- Balaj, M., Huijts, T., McNamara, C. L., Stornes, P., Bambra, C., & Eikemo, T. A. (2017). Non-communicable diseases and the social determinants of health in the Nordic countries: Findings from the European Social Survey (2014) special module on the social determinants of health. *Scandinavian Journal of Public Health*, 45(2), 90–102. <https://doi.org/10.1177/1403494816686026>
- Balasubramanian, B., Heurtin-Roberts, S., Krasny, S., Rohweder, C., Fair, K., Olmos, T., Stange, K., & Sheinfeld Gorin, S. (2018). Contextual Factors Related to Implementation and Reach of a Pragmatic Multisite Trial– The My Own Health Report (MOHR) Study. *J Am Board Fam Med*, 123(24), 4757–4763. <https://doi.org/10.1002/cncr.31084>. Talking
- Ball, K., Jeffery, R. W., Abbott, G., McNaughton, S. A., & Crawford, D. (2010). Is healthy behavior contagious: Associations of social norms with physical activity and healthy eating. *International Journal of Behavioral Nutrition and Physical Activity*, 7, 1–9. <https://doi.org/10.1186/1479-5868-7-86>
- Barbosa, A., Whiting, S., Simmonds, P., Moreno, R. S., Mendes, R., & Breda, J. (2020). Physical activity and academic achievement: An umbrella review. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 16, pp. 1–29). MDPI AG. <https://doi.org/10.3390/ijerph17165972>
- Barbry, A., Carton, A., Ovigneur, H., & Coquart, J. (2022). relationships between sports club participation and physical fitness and Body Mass Index in childhood. *Journal of Sports Medicine and Physical Fitness*, 62(7), 931–937. <https://doi.org/10.23736/S0022-4707.21.12643-X>
- Bearman, S., Korobov, N., & Thorne, A. (2009). The Fabric of Internalized Sexism. *Journal of Integrated Social Sciences*, 1(1), 10–47.
- Beasley, E. (2013). Navigating gender expectations for girls in coeducational physical education. *Theory into Practice*, 26, 35–37.
- Belanger, K., Barnes, J. D., Longmuir, P. E., Anderson, K. D., Bruner, B., Copeland, J. L., Gregg, M. J., Hall, N., Kolen, A. M., Lane, K. N., Law, B., MacDonald, D. J., Martin, L. J., Saunders, T. J., Sheehan, D., Stone, M., Woodruff, S. J., & Tremblay, M. S. (2018). The relationship between physical literacy scores and adherence to Canadian physical activity and sedentary behaviour guidelines. *BMC Public Health*, 18. <https://doi.org/10.1186/s12889-018-5897-4>
- Berenson, G., Srinivasan, S., Bao, W., Newman, W., Tracy, R., & Wattigney, W. (1998). Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. The Bogalusa Heart Study. *New*

England Journal of Medicine, 338(4), 1650–1656.
<https://doi.org/10.1056/NEJM199806043382302>

- Betts, L., Harding, R., Peart, S., Sjolín Knight, C., Wright, D., & Newbold, K. (2019). Adolescents' experiences of street harassment: creating a typology and assessing the emotional impact. *Journal of Aggression, Conflict and Peace Research*, 11(1), 38–46. <https://doi.org/10.1108/JACPR-12-2017-0336>
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member Checking: A Tool to Enhance Trustworthiness or Merely a Nod to Validation? *Qualitative Health Research*, 26(13), 1802–1811. <https://doi.org/10.1177/1049732316654870>
- Blain, D. O., Curran, T., & Standage, M. (2021). Psychological and behavioral correlates of early adolescents' physical literacy. *Journal of Teaching in Physical Education*, 40(1), 157–165. <https://doi.org/10.1123/JTPE.2019-0131>
- Blatch-Jones, A. J., Pek, W., Kirkpatrick, E., & Ashton-Key, M. (2018). Role of feasibility and pilot studies in randomised controlled trials: A cross-sectional study. *BMJ Open*, 8(9). <https://doi.org/10.1136/bmjopen-2018-022233>
- Boer, M., Cosma, A., Twenge, J. M., Inchley, J., Jeriček Klanšček, H., & Stevens, G. W. J. M. (2023). National-Level Schoolwork Pressure, Family Structure, Internet Use, and Obesity as Drivers of Time Trends in Adolescent Psychological Complaints Between 2002 and 2018. *Journal of Youth and Adolescence*. <https://doi.org/10.1007/s10964-023-01800-y>
- Bowen, D. J., Kreuter, M., Spring, B., Linnan, L., Weiner, D., Bakken, S., Kaplan, C. P., Squiers, L., & Fabrizio, C. (2010). How We Design Feasibility Studies. *American Journal of Preventative Medicine*, 36(5), 452–457. <https://doi.org/10.1016/j.amepre.2009.02.002.How>
- Bozsik, F., Whisenhunt, B. L., Hudson, D. L., Bennett, B., & Lundgren, J. D. (2018). Thin Is In? Think Again: The Rising Importance of Muscularity in the Thin Ideal Female Body. *Sex Roles*, 79(9–10), 609–615. <https://doi.org/10.1007/s11199-017-0886-0>
- Braveman, P., & Gottlieb, L. (2014). The Social Determinants of Health: It's Time to Consider the Causes of the Causes. In *Public Health Reports* (Vol. 129).
- Brown, A. S. (2009). Promoting Physical Activity amongst Adolescent Girls. August 2008, 49–64. <https://doi.org/10.1080/01460860902737400>
- Brown, Dudley, & Cairney. (2020). Physical literacy profiles are associated with differences in children's physical activity participation: A latent profile analysis approach. *Journal of Science and Medicine in Sport*, 23(11), 1062–1067. <https://doi.org/10.1016/j.jsams.2020.05.007>
- Brumberg, J. J. (1997). *The Body Project: An Intimate History of American Girls*. Random House.

- Brüssow, H. (2013). What is health? *Microbial Biotechnology*, 6(4), 341–348. <https://doi.org/10.1111/1751-7915.12063>
- Buchmann, M., & Steinhoff, A. (2017). Social Inequality, Life Course Transitions, and Adolescent Development: Introduction to the Special Issue. *Journal of Youth and Adolescence*, 46(10), 2083–2090. <https://doi.org/10.1007/s10964-017-0740-2>
- Bulley, C., Donaghy, M., Payne, A., Woodman, K., Bulley, C., Donaghy, M., Payne, A., Woodman, K., Bulley, B. C., Donaghy, M., Payne, A., & Woodman, K. (2004). Physical activity participation of female students : Prevalence and change during the first academic year *Physical activity participation of female students : Prevalence and change during the first academic year*. 5240(July). <https://doi.org/10.1080/14635240.2004.10708019>
- Bundy, D. A. P., de Silva, N., Horton, S., Patton, G. C., Schultz, L., Jamison, D. T., Abubakara, A., Ahuja, A., Alderman, H., Allen, N., Appleby, L., Aurino, E., Azzopardi, P., Baird, S., Banham, L., Behrman, J., Benzian, H., Bhalotra, S., Bhutta, Z., ... Sawyer, S. M. (2018). Investment in child and adolescent health and development: key messages from Disease Control Priorities, 3rd Edition. *The Lancet*, 391(10121), 687–699. [https://doi.org/10.1016/S0140-6736\(17\)32417-0](https://doi.org/10.1016/S0140-6736(17)32417-0)
- Bundy, D., Shaeffer, S., Jukes, M., Beegle, K., Gillespie, A., Drake, L., Lee, S. F., Jones, J., Mitchell, A., Barcelona, D., Golmar, C., Savioli, L., Sembene, M., & Wright, C. (2006). School-Based Health and Nutrition Programs. In *Disease Control Priorities in Developing Countries (2nd Edition)* (pp. 1091–1108). <https://doi.org/10.1596/978-0-8213-6179-5/chpt-58>
- Burke, D., & Evans, J. (2011). Embracing the creative: The role of photo novella in qualitative nursing research. *International Journal of Qualitative Methods*, 10(2), 164–177. <https://doi.org/10.1177/160940691101000205>
- Byron, M. J., Cohen, J. E., Frattaroli, S., Gittelsohn, J., & Jernigan, D. H. (2016). Using the theory of normative social behavior to understand compliance with a smoke-free law in a middle-income country. *Health Education Research*, 31(6), 738–748. <https://doi.org/10.1093/her/cyw043>
- Cairney, J., Kwan, M. Y. W., Veldhuizen, S., Hay, J., Bray, S. R., & Faught, B. E. (2012). Gender, perceived competence and the enjoyment of physical education in children: A longitudinal examination. *International Journal of Behavioral Nutrition and Physical Activity*, 9. <https://doi.org/10.1186/1479-5868-9-26>
- Camacho-Miñano, M. J., LaVoi, N. M., & Barr-Anderson, D. J. (2011). Interventions to promote physical activity among young and adolescent girls: A systematic review. In *Health Education Research (Vol. 26, Issue 6, pp. 1025–1049)*. <https://doi.org/10.1093/her/cyr040>

- Carl, J., Barratt, J., Töpfer, C., Cairney, J., & Pfeifer, K. (2022). How are physical literacy interventions conceptualized? – A systematic review on intervention design and content: Design/Content of Physical Literacy Interventions. In *Psychology of Sport and Exercise* (Vol. 58). Elsevier Ltd. <https://doi.org/10.1016/j.psychsport.2021.102091>
- Carl, J., Barratt, J., Wanner, P., Töpfer, C., Cairney, J., & Pfeifer, K. (2022). The Effectiveness of Physical Literacy Interventions: A Systematic Review with Meta-Analysis. In *Sports Medicine* (Vol. 52, Issue 12, pp. 2965–2999). Springer Science and Business Media Deutschland GmbH. <https://doi.org/10.1007/s40279-022-01738-4>
- Carlén, K., Suominen, S., Augustine, L., Saarinen, M. M., Aromaa, M., Rautava, P., Sourander, A., & Sillanpää, M. (2022). Teenagers’ mental health problems predict probable mental diagnosis 3 years later among girls, but what about the boys? *Child and Adolescent Psychiatry and Mental Health*, 16(1). <https://doi.org/10.1186/s13034-022-00473-y>
- Carson, V., Hunter, S., Kuzik, N., Gray, C. E., Poitras, V. J., Chaput, J. P., Saunders, T. J., Katzmarzyk, P. T., Okely, A. D., Connor Gorber, S., Kho, M. E., Sampson, M., Lee, H., & Tremblay, M. S. (2016). Systematic review of sedentary behaviour and health indicators in school-aged children and youth: An update. In *Applied Physiology, Nutrition and Metabolism* (Vol. 41, Issue 6, pp. S240–S265). Canadian Science Publishing. <https://doi.org/10.1139/apnm-2015-0630>
- Casey, M., Mooney, A., Smyth, J., & Payne, W. (2016). ‘Power, regulation and physically active identities’: the experiences of rural and regional living adolescent girls. *Gender and Education*, 28(1), 108–127. <https://doi.org/10.1080/09540253.2015.1093098>
- Castro HM, Ferreira JC. Linear and logistic regression models: when to use and how to interpret them? *J Bras Pneumol*. 2023 Jan 13;48(6):e20220439. [https://doi: 10.36416/1806-3756/e20220439](https://doi.org/10.36416/1806-3756/e20220439)
- Cavallo, F., Zambon, A., Borraccino, A., Raven-Sieberer, U., Torsheim, T., Lemma, P., Fürth, K., Lepp, K., Välimäa, R., Vignes, C., Thomas, C., Haehne, C., Kökönyei, G., Jece, I., Naumova, K., Vollebergh, W., Van Dorsselaer, S., Hetland, J., Gaspar De Matos, M., ... Kiaer, T. (2006). Girls growing through adolescence have a higher risk of poor health. *Quality of Life Research*, 15(10), 1577–1585. <https://doi.org/10.1007/s11136-006-0037-5>
- Chalkley, A., & Milton, K. (2021). A critical review of national physical activity policies relating to children and young people in England. *Journal of Sport and Health Science*, 10(3), 255–262. <https://doi.org/10.1016/j.jshs.2020.09.010>
- Chaput, J. P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., Jago, R., Ortega, F. B., & Katzmarzyk, P. T. (2020). 2020 WHO guidelines on

physical activity and sedentary behaviour for children and adolescents aged 5–17 years: summary of the evidence. In *International Journal of Behavioral Nutrition and Physical Activity* (Vol. 17, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s12966-020-01037-z>

Cheng, J., East, P., Blanco, E., Kang Sim, E., Castillo, M., Lozoff, B., & Gahagan, S. (2016). Obesity leads to declines in motor skills across childhood. *Child: Care, Health and Development*, 42(3), 343–350. <https://doi.org/10.1111/cch.12336>

Children’s Commissioner for Wales. (2023). *Ambitions for Wales: Survey Report*. Retrieved on 25/09/2023, from <https://www.childcomwales.org.uk/our-work/ambitions-for-wales/ambitions-for-wales-findings/>

Choi, P. (2000). *Femininity and the Physically Active Woman*. New York, Routledge.

Clark, M., Spence, J., & Holt, N. (2011). In the shoes of young adolescent girls: understanding physical activity experiences through interpretive description. *Journal of Sports Science & Medicine*, 3(2), 193–210. <https://doi.org/10.1080/2159676X.2011.572180>

Clark, S. L. (2018). Fitness, fatness and healthism discourse: girls constructing ‘healthy’ identities in school. *Gender and Education*, 30(4), 477–493. <https://doi.org/10.1080/09540253.2016.1216953>

Clemens, N. H., & Kern, L. (2007). Antecedent strategies to promote appropriate classroom behavior. *Psychology in the Schools*, 44(1), 65–75.

Coakley, J., & White, A. (1992). Making Decisions: Gender and Sport Participation Among British Adolescents. *Sociology of Sport Journal*, 9, 20–35.

Cole, T. J. (1997). Growth monitoring with the British 1990 growth reference. *Archives of Disease in Childhood*, 76(1), 47–49. <https://doi.org/10.1136/adc.76.1.47>

Coleman, L., Cox, L., & Roker, D. (2008). Girls and young women’s participation in physical activity: Psychological and social influences. *Health Education Research*, 23(4), 633–647. <https://doi.org/10.1093/her/cym040>

Corning, A. F., Gondoli, D. M., Bucchianeri, M. M., & Blodgett, E. H. (2010). Preventing the development of body issues in adolescent girls through intervention with their mothers. *Body Image*, 7(4), 289–295. <https://doi.org/10.1016/j.bodyim.2010.08.001>

Corning, A., Gondoli, D., Bucchianeri, M., & Blodgett-Salafia, E. (2010). The Body Parts Dissatisfaction Scale (BPDS). *Body Image*, 7, 289–295.

Corr, M., McSharry, J., & Murtagh, E. M. (2018). Adolescent Girls’ Perceptions of Physical Activity: A Systematic Review of Qualitative Studies. *American Journal of Health Promotion*. <https://doi.org/10.1177/0890117118818747>

- Council of Europe. (1993). Eurofit: Handbook for the Eurofit tests of physical fitness (2nd ed.). Council of Europe Publishing and Documentation Service.
- Cowley, E. S., Watson, P. M., Foweather, L., Belton, S., Thompson, A., Thijssen, D., & Wagenmakers, A. J. M. (2021). “Girls Aren’t Meant to Exercise”: Perceived Influences on Physical Activity among Adolescent Girls—The HERizon Project. *Children*, 8(1). <https://doi.org/10.3390/children8010031>
- Crocker, P.; Bailey, D.; Faulkner, R.; Kowalski, K.; McGrath, R. (1997). Measuring general levels of physical activity: preliminary evidence for the Physical Activity Questionnaire for Older Children. *Medicine & Science in Sports & Exercise*, 29(10), 1344–1349.
- Curie, C., Zanotti, C., Morgan, A., Currie, D., de Looz, M., Roberts, C., Samdal, O., Smith, O. R. F., & Barnekow, V. (2010). Social determinants of health and well-being among young people. 6.
- Dai, C. L., Sharma, M., Chen, C. C., & Lockley, H. (2020). Physical activity interventions targeting perceived body image among adolescent girls. *Journal of Physical Education and Sport*, 20(6), 3691–3698. <https://doi.org/10.7752/jpes.2020.06496>
- Darker, C. D., & French, D. P. (2009). What sense do people make of a theory of planned behaviour questionnaire?: A think-aloud study. *Journal of Health Psychology*, 14(7), 861–871. <https://doi.org/10.1177/1359105309340983>
- Darlington, E. J., Violon, N., & Jourdan, D. (2018). Implementation of health promotion programmes in schools: An approach to understand the influence of contextual factors on the process? *BMC Public Health*, 18(1), 1–17. <https://doi.org/10.1186/s12889-017-5011-3>
- Davidson, M. M., Butchko, M. S., Robbins, K., Sherd, L. W., & Gervais, S. J. (2016). The Mediating Role of Perceived Safety on Street Harassment and Anxiety. *Psychology of Violence*, 6(4), 553–561. <https://doi.org/10.1037/a0039970>
- Davidson, P. M., McGrath, S. J., Meleis, A. I., Stern, P., DiGiacomo, M., Dharmendra, T., Correa-De-Araujo, R., Campbell, J. C., Hochleitner, M., Messias, D. A. K. H., Brown, H., Teitelman, A., Sindhu, S., Reesman, K., Richter, S., Sommers, M. S., Schaeffer, D., Stringer, M., Sampselle, C., ... Covan, E. K. (2011). The health of women and girls determines the health and well-being of our modern world: A white paper from the international council on women’s health issues. *Health Care for Women International*, 32(10), 870–886. <https://doi.org/10.1080/07399332.2011.603872>
- De Ferranti, S. D., Steinberger, J., Ameduri, R., Baker, A., Gooding, H., Kelly, A. S., Mietus-Snyder, M., Mitsnefes, M. M., Peterson, A. L., St-Pierre, J., Urbina, E. M., Zachariah, J. P., & Zaidi, A. N. (2019). Cardiovascular Risk Reduction in High-Risk Pediatric Patients: A Scientific Statement From the American

- Heart Association. *Circulation*, 139(13), E603–E634.
<https://doi.org/10.1161/CIR.0000000000000618>
- de Kleijn, M. J. J., Farmer, M. M., Booth, M., Motala, A., Smith, A., Sherman, S., Assendelft, W. J. J., & Shekelle, P. (2015). Systematic review of school-based interventions to prevent smoking for girls. *Systematic Reviews*, 4(1), 1–12. <https://doi.org/10.1186/s13643-015-0082-7>
- de Oliveira, R. G., & Guedes, D. P. (2016). Physical activity, sedentary behavior, cardiorespiratory fitness and metabolic syndrome in adolescents: Systematic review and meta-analysis of observational evidence. In *PLoS ONE* (Vol. 11, Issue 12). Public Library of Science.
<https://doi.org/10.1371/journal.pone.0168503>
- De Rosis, S., Pennucci, F., Noto, G., & Nuti, S. (2020). Healthy living and co-production: Evaluation of processes and outcomes of a health promotion initiative co-produced with adolescents. *International Journal of Environmental Research and Public Health*, 17(21), 1–19.
<https://doi.org/10.3390/ijerph17218007>
- del Pozo-Cruz, J., García-Hermoso, A., Alfonso-Rosa, R. M., Alvarez-Barbosa, F., Owen, N., Chastin, S., & del Pozo-Cruz, B. (2018). Replacing Sedentary Time: Meta-analysis of Objective-Assessment Studies. In *American Journal of Preventive Medicine* (Vol. 55, Issue 3, pp. 395–402). Elsevier Inc.
<https://doi.org/10.1016/j.amepre.2018.04.042>
- Denton, S. J., Trenell, M. I., Plötz, T., Savory, L. A., Bailey, D. P., & Kerr, C. J. (2013). Cardiorespiratory Fitness Is Associated with Hard and Light Intensity Physical Activity but Not Time Spent Sedentary in 10-14 Year Old Schoolchildren: The HAPPY Study. *PLoS ONE*, 8(4).
<https://doi.org/10.1371/journal.pone.0061073>
- Department of Health and Social Care. (2019). UK Chief Medical Officers' Physical Activity Guidelines.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf
- Derwig, M., Tiberg, I., Björk, J., Welander Tärneberg, A., & Hallström, I. K. (2022). A child-centered health dialogue for the prevention of obesity in child health services in Sweden – A randomized controlled trial including an economic evaluation. *Obesity Science and Practice*, 8(1), 77–90.
<https://doi.org/10.1002/osp4.547>
- Dodge, R., Daly, A., Huyton, J., & Sanders, L. (2012). The challenge of defining wellbeing. *International Journal of Wellbeing*, 2(3), 222–235.
<https://doi.org/10.5502/ijw.v2i3.4>
- Dooris, M. (2006). Health promoting settings: future directions. *Promotion & Education*, 13(1), 2–4. <https://doi.org/10.1177/10253823060130010101>

- Drenowatz, C., Greier, K., Ruedl, G., & Kopp, M. (2019). Association between club sports participation and physical fitness across 6-to 14-year-old austrian youth. *International Journal of Environmental Research and Public Health*, 16(18). <https://doi.org/10.3390/ijerph16183392>
- Duffey, K., Barbosa, A., Whiting, S., Mendes, R., Yordi Aguirre, I., Tcymbal, A., Abu-Omar, K., Gelius, P., & Breda, J. (2021). Barriers and Facilitators of Physical Activity Participation in Adolescent Girls: A Systematic Review of Systematic Reviews. *Frontiers in Public Health*, 9. <https://doi.org/10.3389/fpubh.2021.743935>
- Duncan, M. C. (1994). The politics of women's body images and practices: Foucault, the panopticon, and Shape magazine. *Journal of Sport and Social Issues*, 48–65.
- Edwards, L. C., Bryant, A. S., Keegan, R. J., Morgan, K., Cooper, S. M., & Jones, A. M. (2018). 'Measuring' Physical Literacy and Related Constructs: A Systematic Review of Empirical Findings. In *Sports Medicine* (Vol. 48, Issue 3, pp. 659–682). Springer International Publishing. <https://doi.org/10.1007/s40279-017-0817-9>
- Edwards, L. C., Bryant, A. S., Keegan, R. J., Morgan, K., & Jones, A. M. (2017). Definitions, Foundations and Associations of Physical Literacy: A Systematic Review. *Sports Medicine*, 47(1), 113–126. <https://doi.org/10.1007/s40279-016-0560-7>
- Edwards, L. C., Tyler, R., Blain, D., Bryant, A., Canham, N., Carter-Davies, L., Clark, C., Evans, T., Greenall, C., Hobday, J., Jones, A., Mannello, M., Marchant, E., Miller, M., Moore, G., Morgan, K., Nicholls, S., Roberts, C., Sheldrick, M., Stratton, G. (2018). Results From Wales' 2018 Report Card on Physical Activity for Children and Youth. *Journal of Physical Activity & Health*, 15(S2), S430–S432. <https://doi.org/10.1123/jpah.2018-0544>
- Eleuteri, S., Saladino, V., & Verrastro, V. (2017). Identity, relationships, sexuality, and risky behaviors of adolescents in the context of social media. *Sexual and Relationship Therapy*, 32(3–4), 354–365. <https://doi.org/10.1080/14681994.2017.1397953>
- Emm-Collison, L., Cross, R., Gonzalez, M. G., Watson, D., Foster, C., & Jago, R. (2022). Children's Voices in Physical Activity Research: A Qualitative Review and Synthesis of UK Children's Perspectives. In *International Journal of Environmental Research and Public Health* (Vol. 19, Issue 7). MDPI. <https://doi.org/10.3390/ijerph19073993>
- Emmons, K. M., Barbeau, E. M., Gutheil, C., Stryker, J. E., & Stoddard, A. M. (2007). Social influences, social context, and health behaviors among working-class, multi-ethnic adults. *Health Education and Behavior*, 34(2), 315–334. <https://doi.org/10.1177/1090198106288011>

- Estabrooks, P. A., & Gyurcsik, N. C. (2003). Evaluating the impact of behavioral interventions that target physical activity: Issues of generalizability and public health. *Psychology of Sport and Exercise*, 4(1), 41–55. [https://doi.org/10.1016/S1469-0292\(02\)00016-X](https://doi.org/10.1016/S1469-0292(02)00016-X)
- Evaristo, O. S., Moreira, C., Lopes, L., Abreu, S., Agostinis-Sobrinho, C., Oliveira-Santos, J., Oliveira, A., Mota, J., & Santos, R. (2019). Cardiorespiratory fitness and health-related quality of life in adolescents: A longitudinal analysis from the LabMed Physical Activity Study. *American Journal of Human Biology*, 31(6). <https://doi.org/10.1002/ajhb.23304>
- Everson, B., Mackintosh, K. A., McNarry, M. A., Todd, C., & Stratton, G. (2019). Can wearable cameras be used to validate school-aged children’s lifestyle behaviours? *Children*, 6(2). <https://doi.org/10.3390/children6020020>
- Fairchild, K., & Rudman, L. A. (2008). Everyday stranger harassment and women’s objectification. *Social Justice Research*, 21(3), 338–357. <https://doi.org/10.1007/s11211-008-0073-0>
- Fairclough, S. J., Boddy, L. M., Hackett, A. F., & Stratton, G. (2009). Associations between children’s socioeconomic status, weight status, and sex, with screen-based sedentary behaviours and sport participation. *International Journal of Pediatric Obesity*, 4(4), 299–305. <https://doi.org/10.3109/17477160902811215>
- Fargas-Malet, M., McSherry, D., Larkin, E., & Robinson, C. (2010). Research with children: Methodological issues and innovative techniques. *Journal of Early Childhood Research*, 8(2), 175–192. <https://doi.org/10.1177/1476718X09345412>
- Farooq, A., Martin, A., Janssen, X., Wilson, M. G., Gibson, A. M., Hughes, A., & Reilly, J. J. (2020). Longitudinal changes in moderate-to-vigorous-intensity physical activity in children and adolescents: A systematic review and meta-analysis. In *Obesity Reviews* (Vol. 21, Issue 1). Blackwell Publishing Ltd. <https://doi.org/10.1111/obr.12953>
- Farrow, K., Grolleau, G., & Ibanez, L. (2017). Social Norms and Pro-environmental Behavior: A Review of the Evidence. *Ecological Economics*, 140, 1–13. <https://doi.org/10.1016/j.ecolecon.2017.04.017>
- Finch, L., Hargrave, R., Nicholls, J., & Van Vliet, A. (2014). Measure what you treasure: Well-being and young people, how it can be measured and what the data tells us. Retrieved 25/09/2023, from <https://www.thinknpc.org/resource-hub/measure-what-you-treasure/> Accessed: 25/09/2023
- Fitzgerald, A., Fitzgerald, N., & Aherne, C. (2012). Do peers matter? A review of peer and/or friends’ influence on physical activity among American adolescents. *Journal of Adolescence*, 35(4), 941–958. <https://doi.org/10.1016/j.adolescence.2012.01.002>

- Franke, T., Sims-Gould, J., Lusina-Furst, S., & McKay, H. (2022). "I Didn't Think I Needed It. But I Find I Look Forward to It Very Much": Social Connectedness and Physical Health through the Eyes of Older Adults. *Activities, Adaptation & Aging*, 46(1).
<https://doi.org/https://doi.org/10.1080/01924788.2020.1845586>
- Fuhrmann, D., Knoll, L., & Blakemore, S. (2015). Adolescence as a Sensitive Period of Brain Development. *Trends in Cognitive Science*, 19(10), 558–566.
<https://doi.org/10.1016/j.tics.2015.07.008>
- Furnham, A., Badmin, N., & Sneade, I. (2002). Body image dissatisfaction: Gender differences in eating attitudes, self-esteem, and reasons for exercise. *Journal of Psychology: Interdisciplinary and Applied*, 136(6), 581–596.
<https://doi.org/10.1080/00223980209604820>
- García-Hermoso, A., Ramírez-Vélez, R., García-Alonso, Y., Alonso-Martínez, A. M., & Izquierdo, M. (2020). Association of Cardiorespiratory Fitness Levels during Youth with Health Risk Later in Life: A Systematic Review and Meta-analysis. In *JAMA Pediatrics* (Vol. 174, Issue 10, pp. 952–960). American Medical Association. <https://doi.org/10.1001/jamapediatrics.2020.2400>
- Gibbs, G. (1988). *Learning by Doing: A Guide to Teaching and Learning Methods*. Oxford Further Education Unit.
- Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal*, 204(6), 291–295. <https://doi.org/10.1038/bdj.2008.192>
- Glasgow, R. E., Harden, S. M., Gaglio, B., Rabin, B., Smith, M. L., Porter, G. C., Ory, M. G., & Estabrooks, P. A. (2019). RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Frontiers in Public Health*, 7(March).
<https://doi.org/10.3389/fpubh.2019.00064>
- Glasgow, R. E., Vogt, T. M., & Boles, S. M. (1999). Evaluating the Public Health Impact of Health Promotion Interventions: The RE-AIM Framework. *American Journal of Public Health*, 89(9), 1322–1327.
<https://doi.org/10.1016/j.carbon.2015.08.016>
- Gottlieb, L., Fichtenberg, C., Alderwick, H., & Adler, N. (2019). Social Determinants of Health: What's a Healthcare System to Do? *Journal of Healthcare Management*, 64(4), 243–257. <https://doi.org/10.1097/JHM-D-18-00160>
- Graf, C. (2017). Health promotion in children and adolescents – a global challenge. In *European Journal of Preventive Cardiology* (Vol. 24, Issue 16, pp. 1776–1778). SAGE Publications Inc. <https://doi.org/10.1177/2047487317729253>
- Greenberg, M. T., Domitrovich, C. E., Graczyk, P. A., & Zins, J. E. (2005). The study of implementation in school-based preventive interventions: Theory,

research, and practice. Promotion of mental health and prevention of mental health and behavioral disorders. June 2014.

- Grieser, M., Vu, M. B., Bedimo-Rung, A. L., Neumark-Sztainer, D., Moody, J., Young, D. R., & Moe, S. G. (2006). Physical activity attitudes, preferences, and practices in African American, Hispanic, and Caucasian girls. *Health Education and Behavior, 33*(1), 40–51. <https://doi.org/10.1177/1090198105282416>
- Grown, C., Rao Gupta, G., & Pande, R. (2005). Millennium Project Taking action to improve women's health through gender equality and women's empowerment. *Www.TheLancet.Com*, 365, 541.
- Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *The Lancet Child and Adolescent Health, 4*(1), 23–35. [https://doi.org/10.1016/S2352-4642\(19\)30323-2](https://doi.org/10.1016/S2352-4642(19)30323-2)
- Hafner, M., Yerushalmi, E., Stepanek, M., Phillips, W., Pollard, J., Deshpande, A., Whitmore, M., Millard, F., Subel, S., & Van Stolk, C. (2020). Estimating the global economic benefits of physically active populations over 30 years (2020–2050). In *British Journal of Sports Medicine* (Vol. 54, Issue 24, pp. 1482–1487). BMJ Publishing Group. <https://doi.org/10.1136/bjsports-2020-102590>
- Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., Alkandari, J. R., Bauman, A. E., Blair, S. N., Brownson, R. C., Craig, C. L., Goenka, S., Heath, G. W., Inoue, S., Kahlmeier, S., Katzmarzyk, P. T., Kohl, H. W., Lambert, E. V., Lee, I. M., ... Wells, J. C. (2012). Global physical activity levels: Surveillance progress, pitfalls, and prospects. *The Lancet, 380*(9838), 247–257. [https://doi.org/10.1016/S0140-6736\(12\)60646-1](https://doi.org/10.1016/S0140-6736(12)60646-1)
- Hallingberg, B., Turley, R., Segrott, J., Wight, D., Craig, P., Moore, L., Murphy, S., Robling, M., Simpson, S. A., & Moore, G. (2018). Exploratory studies to decide whether and how to proceed with full-scale evaluations of public health interventions: A systematic review of guidance. In *Pilot and Feasibility Studies* (Vol. 4, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s40814-018-0290-8>
- Hanson, S., & Jones, A. (2017). Missed opportunities in the evaluation of public health interventions: A case study of physical activity programmes. *BMC Public Health, 17*(1), 1–10. <https://doi.org/10.1186/s12889-017-4683-z>
- Harber, M. P., Kaminsky, L. A., Arena, R., Blair, S. N., Franklin, B. A., Myers, J., & Ross, R. (2017). Impact of Cardiorespiratory Fitness on All-Cause and Disease-Specific Mortality: Advances Since 2009. In *Progress in Cardiovascular Diseases* (Vol. 60, Issue 1, pp. 11–20). W.B. Saunders. <https://doi.org/10.1016/j.pcad.2017.03.001>

- Hardy, L. L., Ding, D., Peralta, L. R., Mirshahi, S., & Merom, D. (2018). Association between sitting, screen time, fitness domains, and fundamental motor skills in children aged 5-16 years: Cross-sectional population study. *Journal of Physical Activity and Health*, 15(12), 933–940. <https://doi.org/10.1123/jpah.2017-0620>
- Harper, D. (2002). Talking about pictures : a case for photo elicitation. *Visual Studies*, 17(1). <https://doi.org/10.1080/14725860220137345>
- Hartas, D. (2021). The social context of adolescent mental health and wellbeing: parents, friends and social media. *Research Papers in Education*, 36(5), 542–560. <https://doi.org/10.1080/02671522.2019.1697734>
- Harter, S. (2012). *Self -perception profile for adolescents: manual and questionnaires*. University of Denver.
- Haukås, Å, Tishakov, T. (2024). Sharing interview questions in advance: Methodological considerations in applied linguistics research" *European Journal of Applied Linguistics*, vol. 12, no. 1, 54-68. <https://doi.org/10.1515/eujal-2023-0045>
- He, Q. qiang, Wong, T. wai, Du, L., Jiang, Z. qin, Yu, T. sun I., Qiu, H., Gao, Y., Liu, W. jia, & Wu, J. gang. (2011). Physical activity, cardiorespiratory fitness, and obesity among Chinese children. *Preventive Medicine*, 52(2), 109–113. <https://doi.org/10.1016/j.ypmed.2010.11.005>
- Heath, G. W., Parra, D. C., Sarmiento, O. L., Andersen, L. B., Owen, N., Goenka, S., Montes, F., Brownson, R. C., Alkandari, J. R., Bauman, A. E., Blair, S. N., Bull, F. C., Craig, C. L., Ekelund, U., Guthold, R., Hallal, P. C., Haskell, W. L., Inoue, S., Kahlmeier, S., ... Wells, J. C. (2012). Evidence-based intervention in physical activity: Lessons from around the world. In *The Lancet* (Vol. 380, Issue 9838, pp. 272–281). Elsevier B.V. [https://doi.org/10.1016/S0140-6736\(12\)60816-2](https://doi.org/10.1016/S0140-6736(12)60816-2)
- Hemmingsson, E., Väisänen, D., Andersson, G., Wallin, P., & Ekblom-Bak, E. (2022). Combinations of BMI and cardiorespiratory fitness categories: Trends between 1995 and 2020 and associations with CVD incidence and mortality and all-cause mortality in 471 216 adults. *European Journal of Preventive Cardiology*, 29(6), 959–967. <https://doi.org/10.1093/eurjpc/zwab169>
- Henderson, K. A., & Bialeschki, M. D. (1993). Fear as a Constraint to Active Lifestyles for Females. *Journal of Physical Education, Recreation & Dance*, 64(1), 44–47. <https://doi.org/10.1080/07303084.1993.10606673>
- Herlitz, L., MacIntyre, H., Osborn, T., & Bonell, C. (2020). The sustainability of public health interventions in schools: A systematic review. In *Implementation Science* (Vol. 15, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s13012-019-0961-8>

- Heron, L., O'Neill, C., McAneney, H., Kee, F., & Tulley, M. (2019). Direct healthcare costs of sedentary behaviour in the UK. *Journal of Epidemiology and Community Health*, 73, 625–629.
- Holbrook, J. (2011). Self-Reported Measure. In *Encyclopedia of Survey Research Methods* (pp. 805–806).
- Huber, M., André Knottnerus, J., Green, L., Van Der Horst, H., Jadad, A. R., Kromhout, D., Leonard, B., Lorig, K., Loureiro, M. I., Van Der Meer, J. W. M., Schnabel, P., Smith, R., Van Weel, C., & Smid, H. (2011). How should we define health? *BMJ (Online)*, 343(7817). <https://doi.org/10.1136/bmj.d4163>
- Hulteen, R. M., Morgan, P. J., Barnett, L. M., Stodden, D. F., & Lubans, D. R. (2018). Development of Foundational Movement Skills: A Conceptual Model for Physical Activity Across the Lifespan. *Sports Medicine*, 48(7), 1533–1540. <https://doi.org/10.1007/s40279-018-0892-6>
- Inchley, J. C., Willis, M., Mabelis, J., Brown, J., & Currie, D. B. (2023). Inequalities in health complaints: 20-year trends among adolescents in Scotland, 1998–2018. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1095117>
- Inchley, J., Kirby, J., & Currie, C. (2011). Longitudinal Changes in Physical Self-Perceptions and Associations With Physical Activity During Adolescence. In *Pediatric Exercise Science* (Vol. 23).
- Innerd, P. (2019). Physical Activity Assessment: A Lifecourse Approach. <https://doi.org/https://doi.org/10.4324/9781315163260>
- Irwin, C. C., Pharr, J. R., Irwin, R. L., & Layne, T. E. (2018). Youth swimming ability and associated factors in the United States, 2010-17. In *American Journal of Health Behavior* (Vol. 42, Issue 5, pp. 32–42). PNG Publications. <https://doi.org/10.5993/AJHB.42.5.3>
- Jaakkola, T., Huhtiniemi, M., Seppälä, S., Lahti, J., Hakonen, H., & Stodden, D. (2019). Motor competence, perceived physical competence, physical fitness, and physical activity within Finnish children. *Scandinavian Journal of Medicine & Science in Sports*, 29(7), 1013–1021. <https://doi.org/https://doi.org/10.1111/sms.13412>
- Jago, R., Salway, R., Emm-Collison, L., Sebire, S. J., Thompson, J. L., & Lawlor, D. A. (2019). Association of BMI category with change in children's physical activity between ages 6 and 11 years: a longitudinal study. *International Journal of Obesity*, 44(1), 104–113. <https://doi.org/10.1038/s41366-019-0459-0>
- Jago, R., Salway, R., House, D., Beets, M., Lubans, D. R., Woods, C., & de Vocht, F. (2023). Rethinking children's physical activity interventions at school: A

- new context-specific approach. *Frontiers in Public Health*, 11.
<https://doi.org/10.3389/fpubh.2023.1149883>
- James, K., & Embrey, L. (2002). Adolescent Girls' Leisure: A Conceptual Framework Highlighting Factors That Can Affect Girls' Recreational Choices. *Annals of Leisure Research*, 5(1), 14–26.
<https://doi.org/10.1080/11745398.2002.10600896>
- Janz, K. F., Dawson, J. D., & Mahoney, L. T. (2000). Tracking physical fitness and physical activity from childhood to adolescence : the Muscatine study. *Medicine & Science in Sports & Exercise*, 32(7), 1250-1257.
<https://doi.org/10.1097/00005768-200007000-00011>
- Jarden, A., & Roache, A. (2023). What Is Wellbeing? In *International Journal of Environmental Research and Public Health* (Vol. 20, Issue 6). MDPI.
<https://doi.org/10.3390/ijerph20065006>
- Jaycox, L. H., McCaffrey, D. F., Ocampo, B. W., Shelley, G. A., Blake, S. M., Peterson, D. J., Richmond, L. S., & Kub, J. E. (2006). Challenges in the evaluation and implementation of school-based prevention and intervention programs on sensitive topics. *American Journal of Evaluation*, 27(3), 320–336. <https://doi.org/10.1177/1098214006291010>
- Johansson, L., Brissman, M., Morinder, G., Westerståhl, M., & Marcus, C. (2020). Reference values and secular trends for cardiorespiratory fitness in children and adolescents with obesity. *Acta Paediatrica, International Journal of Paediatrics*, 109(8), 1665–1671. <https://doi.org/10.1111/apa.15163>
- John, J. M., Haug, V., & Thiel, A. (2020). Physical Activity Behavior from a Transdisciplinary Biopsychosocial Perspective: a Scoping Review. In *Sports Medicine - Open* (Vol. 6, Issue 1). Springer Science and Business Media Deutschland GmbH. <https://doi.org/10.1186/s40798-020-00279-2>
- Johnson, F., Wardle, J., & Griffith, J. (2002a). The Adolescent Food Habits Checklist. 15–16. Accessed:
https://epi.grants.cancer.gov/diet/shortreg/instruments/johnson_adolescent_food_habits_checklist.pdf
- Johnson, F., Wardle, J., & Griffith, J. (2002b). The Adolescent Food Habits Checklist : reliability and validity of a measure of healthy eating behaviour in adolescents The Adolescent Food Habits Checklist : reliability and validity of a measure of healthy eating behaviour in adolescents. *Journal of Clinical Nutrition*, 56, 644–649. <https://doi.org/10.1038/sj.ejcn.1601371>
- Jones, N. L., Gilman, S. E., Cheng, T. L., Drury, S. S., Hill, C. V., & Geronimus, A. T. (2019). Life Course Approaches to the Causes of Health Disparities. *American Journal of Public Health*, 109(S1), S48–S55.
<https://doi.org/10.2105/AJPH.2018.304738>

- Júdice, P. B., Silva, A. M., Berria, J., Petroski, E. L., Ekelund, U., & Sardinha, L. B. (2017). Sedentary patterns, physical activity and health-related physical fitness in youth: A cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1). <https://doi.org/10.1186/s12966-017-0481-3>
- Kågesten, A., Gibbs, S., Blum, R. W., Moreau, C., Chandra-Mouli, V., Herbert, A., & Amin, A. (2016). Understanding factors that shape gender attitudes in early adolescence globally: A mixed-methods systematic review. *PLoS ONE*, 11(6). <https://doi.org/10.1371/journal.pone.0157805>
- Kamath, C. C., Vickers, K. S., Ehrlich, A., McGovern, L., Johnson, J., Singhal, V., Paulo, R., Hettinger, A., Erwin, P. J., & Montori, V. M. (2008). Behavioral interventions to prevent childhood obesity: A systematic review and metaanalyses of randomized trials. In *Journal of Clinical Endocrinology and Metabolism* (Vol. 93, Issue 12, pp. 4606–4615). Endocrine Society. <https://doi.org/10.1210/jc.2006-2411>
- Kawulich, B. B. (2005). Participant observation as a data collection method. *Forum Qualitative Sozialforschung*, 6(2). <https://doi.org/10.17169/fqs-6.2.466>
- Kearl, H. (2010). *Stop Street Harassment: Making Public Spaces Safe and Welcoming for Women*. Bloomsbury Publishing. ISBN: 9780313384967.
- Kennedy, E., & Markula, P. (2011). *Women and Exercise: The Body, Health and Consumerism* (E. Kennedy & P. Markula, Eds.). New York: Routledge.
- Killedar, A., Lung, T., Petrou, S., Teixeira-Pinto, A., Tan, E. J., & Hayes, A. (2020). Weight status and health-related quality of life during childhood and adolescence: effects of age and socioeconomic position. *International Journal of Obesity*, 44(3), 637–645. <https://doi.org/10.1038/s41366-020-0529-3>
- Kim, J., Dunn, E., Rellinger, K., Robertson-Wilson, J., & Eys, M. (2019). Social norms and physical activity in American and Canadian contexts: a scoping review. In *International Review of Sport and Exercise Psychology* (Vol. 12, Issue 1, pp. 26–48). Routledge. <https://doi.org/10.1080/1750984X.2017.1354229>
- King, T. L., Scovelle, A. J., Meehl, A., Milner, A. J., & Priest, N. (2021). Gender stereotypes and biases in early childhood: A systematic review. In *Australasian Journal of Early Childhood* (Vol. 46, Issue 2, pp. 112–125). SAGE Publications Ltd. <https://doi.org/10.1177/1836939121999849>
- Kokkinos, P., Myers, J., Franklin, B., Narayan, P., Lavie, C. J., & Faselis, C. (2018). Cardiorespiratory Fitness and Health Outcomes: A Call to Standardize Fitness Categories. *Mayo Clinic Proceedings*, 93(3), 333–336. <https://doi.org/10.1016/j.mayocp.2017.10.011>

- Korstjens, I. & Moser, A. (2018) Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing, *European Journal of General Practice*, 24:1, 120-124, DOI: 10.1080/13814788.2017.1375092
- Kortetmäki, T., Puurtinen, M., Salo, M., Aro, R., Baumeister, S., Duflot, R., Elo, M., Halme, P., Husu, H. M., Huttunen, S., Hyvönen, K., Karkulehto, S., Katajaho, S., Keskinen, K. E., Kulmunki, I., Mäkinen, T., Näyhä, A., Okkolin, M. A., Perälä, T., ... Kotiaho, J. S. (2021). Planetary well-being. *Humanities and Social Sciences Communications*, 8(1). <https://doi.org/10.1057/s41599-021-00899-3>
- Kowalski, K. C., Crocker, P. R. E., & Donen, R. M. (2004). The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual. College of Kinesiology, University of Saskatchewan, August, 1–37. <https://doi.org/>Accessed on 15 September 2017
- Kunz, J. H., Greenley, R. N., Mussatto, K. A., Roth-Wojcicki, B., Miller, T., Freeman, M. E., & Lerand, S. (2014). Personal attitudes, perceived social norms, and health-risk behavior among female adolescents with chronic medical conditions. *Journal of Health Psychology*, 19(7), 877–886. <https://doi.org/10.1177/1359105313481077>
- Lang, J. J., Belanger, K., Poitras, V., Janssen, I., Tomkinson, G. R., & Tremblay, M. S. (2018). Systematic review of the relationship between 20 m shuttle run performance and health indicators among children and youth. In *Journal of Science and Medicine in Sport* (Vol. 21, Issue 4, pp. 383–397). Elsevier Ltd. <https://doi.org/10.1016/j.jsams.2017.08.002>
- Langford, R., Bonell, C., Jones, H., Poulidou, T., Murphy, S., Waters, E., Komro, K., Gibbs, L., Magnus, D., & Campbell, R. (2015). The World Health Organization's Health Promoting Schools framework: A Cochrane systematic review and meta-analysis. In *BMC Public Health* (Vol. 15, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s12889-015-1360-y>
- Larsen, M. N., Nielsen, C. M., Ørntoft, C. Ø., Randers, M. B., Manniche, V., Hansen, L., Hansen, P. R., Bangsbo, J., & Krstrup, P. (2017). Physical fitness and body composition in 8-10-year-old Danish children are associated with sports club participation. *Journal of Strength and Conditioning Research*, 31(12). www.nsc.com
- Laski, L. (2015). Realising the health and wellbeing of adolescents. *BMJ (Online)*, 351, 15–18. <https://doi.org/10.1136/bmj.h4119>
- Lee, D., Sui, X., Church, T., Lavie, C., Jackson, A., & Blair, S. (2012). Changes in fitness and fatness on the development of cardiovascular disease risk factors: Hypertension, metabolic syndrome, and hypercholesterolemia. *Journal of the American College of Cardiology*, 59(7), 665–672. <https://doi.org/10.1016/j.jacc.2011.11.013>

- Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., Alkandari, J. R., Andersen, L. B., Bauman, A. E., Brownson, R. C., Bull, F. C., Craig, C. L., Ekelund, U., Goenka, S., Guthold, R., Hallal, P. C., Haskell, W. L., Heath, G. W., Inoue, S., ... Wells, J. C. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *The Lancet*, 380(9838), 219–229. [https://doi.org/10.1016/S0140-6736\(12\)61031-9](https://doi.org/10.1016/S0140-6736(12)61031-9)
- Léger, L. A., Mercier, D., Gadoury, C., & Lambert, J. (1988). The multistage 20 metre shuttle run test for aerobic fitness. *Journal of Sports Science*, 6, 93–101.
- Leonardi, F. (2018). The Definition of Health: Towards New Perspectives. *International Journal of Health Services*, 48(4), 735–748. <https://doi.org/10.1177/0020731418782653>
- Li, Z., Li, M., Patton, G. C., & Lu, C. (2018). Global Development Assistance for Adolescent Health from 2003 to 2015. *JAMA Network Open*, 1(4). <https://doi.org/10.1001/jamanetworkopen.2018.1072>
- Lian, Q., Li, R., Elgar, F. J., & Su, Q. (2022). Early physical maturation and subjective health complaints in adolescent girls: A pooled cross-sectional analysis. *Journal of Epidemiology and Community Health*, 77(2), 108–114. <https://doi.org/10.1136/jech-2022-219547>
- Lima-Serrano, M., & Lima-Rodríguez, J. S. (2014). Impact of school-based health promotion interventions aimed at different behavioral domains: A systematic review. In *Gaceta Sanitaria* (Vol. 28, Issue 5, pp. 411–417). Ediciones Doyma, S.L. <https://doi.org/10.1016/j.gaceta.2014.05.003>
- Lindqvist, A. K., Kostenius, C., & Gard, G. (2012). Peers, parents and phones—Swedish adolescents and health promotion. *International Journal of Qualitative Studies on Health and Well-Being*, 7. <https://doi.org/10.3402/qhw.v7i0.17726>
- London, R. A., & Castrechini, S. (2011). A longitudinal examination of the link between youth physical fitness and academic achievement. *Journal of School Health*, 81(7), 400–408. <https://doi.org/10.1111/j.1746-1561.2011.00608.x>
- López-Gil, J. F., Cavero-Redondo, I., Sánchez-López, M., Martínez-Hortelano, J. A., Berlanga-Macias, C., Soriano-Cano, A., & Martínez-Vizcaino, V. (2022). The moderating role of physical fitness in the relationship between sugar-sweetened beverage consumption and adiposity in schoolchildren. *Scientific Reports*, 12(1). <https://doi.org/10.1038/s41598-022-23092-1>
- Love, R., Adams, J., & van Sluijs, E. M. F. (2019). Are school-based physical activity interventions effective and equitable? A meta-analysis of cluster randomized controlled trials with accelerometer-assessed activity. In *Obesity Reviews* (Vol. 20, Issue 6, pp. 859–870). Blackwell Publishing Ltd. <https://doi.org/10.1111/obr.12823>

- Maguire, J., & Mansfield, L. (1998). “No-Body’s Perfect”: Women, Aerobics, and the Body Beautiful. *Sociology of Sport Journal*, 15, 109–137.
- Marcus, R., & Brodbeck, S. (2015). Girls’ clubs and empowerment programmes. September.
- Marks, D. F. (2008). The quest for meaningful theory in health psychology. *Journal of Health Psychology*, 13(8), 977–981.
<https://doi.org/10.1177/1359105308098002>
- Martins, J., Marques, A., Sarmiento, H., & Carreiro Da Costa, F. (2014). Adolescents’ perspectives on the barriers and facilitators of physical activity: A systematic review of qualitative studies. *Health Education Research*, 30(5), 742–755. <https://doi.org/10.1093/her/cyv042>
- Martin-Smith, R., Cox, A., Buchan, D. S., Baker, J. S., Grace, F., & Sculthorpe, N. (2020). High intensity interval training (HIIT) improves cardiorespiratory fitness (CRF) in healthy, overweight and obese adolescents: A systematic review and meta-analysis of controlled studies. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 8). MDPI AG.
<https://doi.org/10.3390/ijerph17082955>
- Marzi, I., Tcymbal, A., Gelius, P., Abu-Omar, K., Reimers, A. K., Whiting, S., & Wickramasinghe, K. (2022). Monitoring of physical activity promotion in children and adolescents in the EU: Current status and future perspectives. *European Journal of Public Health*, 32(1), 95–104.
<https://doi.org/10.1093/eurpub/ckab193>
- McBride Murry, V., Berkel, C., Gaylord-Harden, N. K., Copeland-Linder, N., & Nation, M. (2011). Neighborhood poverty and adolescent development. *Journal of Research on Adolescence*, 21(1), 114–128.
<https://doi.org/10.1111/j.1532-7795.2010.00718.x>
- McCartney, G., Popham, F., McMaster, R., & Cumbers, A. (2019). Defining health and health inequalities. *Public Health*, 172, 22–30.
<https://doi.org/https://doi.org/10.1016/j.puhe.2019.03.023>
- McMahan, E. A., & Estes, D., (2011). Hedonic Versus Eudaimonic Conceptions of Well-being: Evidence of Differential Associations With Self-reported Well-being. *Social Indicators Research*, 103(1), 93–108.
<https://doi.org/10.1007/s11205-010-9698-0>
- McMahon S. A., & Winch P. J., (2018). Systematic debriefing after qualitative encounters: an essential analysis step in applied qualitative research. *BMJ Glob Health*, 3:e000837. doi:10.1136/bmjgh-2018-000837
- Mead, E. L., Rimal, R. N., Ferrence, R., & Cohen, J. E. (2014). Understanding the sources of normative influence on behavior: The example of tobacco. *Social Science and Medicine*, 115, 139–143.
<https://doi.org/10.1016/j.socscimed.2014.05.030>

- Meade, T., & Dowswell, E. (2016). Adolescents' health-related quality of life (HRQoL) changes over time: A three year longitudinal study. *Health and Quality of Life Outcomes*, 14(1). <https://doi.org/10.1186/s12955-016-0415-9>
- Medeiros, E. R. de, Rebouças, D. G. da C., Paiva, A. C. de S., Nascimento, C. P. A. do, Silva, S. Y. B. e, & Pinto, E. S. G. (2018). Studies evaluating of health interventions at schools: an integrative literature review. *Revista Latino-Americana de Enfermagem*, 26(0). <https://doi.org/10.1590/1518-8345.2463.3008>
- Meixner, L., Cohrdes, C., Schienkiewitz, A., & Mensink, G. B. M. (2020). Health-related quality of life in children and adolescents with overweight and obesity: results from the German KIGGS survey. *BMC Public Health*, 20(1). <https://doi.org/10.1186/s12889-020-09834-8>
- Menting, B., Van Lier, P., Koot, H., Pardini, D., & Loeber, R. (2015). Cognitive impulsivity and the development of delinquency from late childhood to early adulthood: Moderating effects of parenting behavior and peer relationships. *Development and Psychopathology*, 28(1), 167–183.
- Messing, S., Rütten, A., Abu-Omar, K., Ungerer-Röhrich, U., Goodwin, L., Burlacu, I., & Gediga, G. (2019). How can physical activity be promoted among children and adolescents? A systematic review of reviews across settings. In *Frontiers in Public Health* (Vol. 7, Issue MAR). Frontiers Media S.A. <https://doi.org/10.3389/fpubh.2019.00055>
- Mieziene, B., Jankauskiene, R., & Mickuniene, R. (2014). Can Internalization of Sociocultural Beauty Standards Predict Adolescents' Physical Activity? *Procedia - Social and Behavioral Sciences*, 116, 956–961. <https://doi.org/10.1016/j.sbspro.2014.01.327>
- Mintjens, S., Menting, M. D., Daams, J. G., van Poppel, M. N. M., Roseboom, T. J., & Gemke, R. J. B. J. (2018). Cardiorespiratory Fitness in Childhood and Adolescence Affects Future Cardiovascular Risk Factors: A Systematic Review of Longitudinal Studies. In *Sports Medicine* (Vol. 48, Issue 11, pp. 2577–2605). Springer International Publishing. <https://doi.org/10.1007/s40279-018-0974-5>
- Mitchell, F., Gray, S., & Inchley, J. (2013). 'This choice thing really works ... ' Changes in experiences and engagement of adolescent girls in physical education classes, during a school-based physical activity programme. *Physical Education and Sport Pedagogy*, 20(6), 593–611. <https://doi.org/10.1080/17408989.2013.837433>
- Mond, J. M., Hay, P. J., Rodgers, B., & Owen, C. (2006). An update on the definition of 'excessive exercise' in eating disorders research. *International Journal of Eating Disorders*, 39(2), 147–153. <https://doi.org/10.1002/eat.20214>

- Moore, G., Anthony, R., Angel, L., Hawkins, J., Morgan, K., Copeland, L., Murphy, S., Van Godwin, J., & Shenderovich, Y. (2022). Mental health and life satisfaction among 10–11-year-olds in Wales, before and one year after onset of the COVID-19 pandemic. *BMC Public Health*, 22(1). <https://doi.org/10.1186/s12889-022-12752-6>
- Mota, J., Santos, R. M., Silva, P., Aires, L., Martins, C., & Vale, S. (2012). Associations Between Self-Rated Health With Cardiorespiratory Fitness and Obesity Status Among Adolescent Girls. In *Journal of Physical Activity and Health* (Vol. 9).
- Muellmann, S., Steenbock, B., De Cocker, K., De Craemer, M., Hayes, C., O’Shea, M. P., Horodyska, K., Bell, J., Luszczynska, A., Roos, G., Langøien, L. J., Rugseth, G., Terragni, L., De Bourdeaudhuij, I., Brug, J., & Pischke, C. R. (2017). Views of policy makers and health promotion professionals on factors facilitating implementation and maintenance of interventions and policies promoting physical activity and healthy eating: Results of the DEDIPAC project. *BMC Public Health*, 17(1). <https://doi.org/10.1186/s12889-017-4929-9>
- Murphy, J., Sweeney, M. R., & McGrane, B. (2020). Physical activity and sports participation in Irish adolescents and associations with anxiety, depression and mental wellbeing. Findings from the physical activity and wellbeing (Paws) study. In *Physical Activity and Health* (Vol. 4, Issue 1, pp. 107–119). Ubiquity Press. <https://doi.org/10.5334/paah.58>
- Myers, J., McAuley, P., Lavie, C. J., Despres, J. P., Arena, R., & Kokkinos, P. (2015). Physical Activity and Cardiorespiratory Fitness as Major Markers of Cardiovascular Risk: Their Independent and Interwoven Importance to Health Status. *Progress in Cardiovascular Diseases*, 57(4), 306–314. <https://doi.org/10.1016/j.pcad.2014.09.011>
- National Children’s Bureau. (2016). Local authorities’ role in public health. February, 1–16. Retrieved on 25/09/2023, from <https://www.ncb.org.uk/sites/default/files/uploads/files/Local%2520Authorities%2520Role%2520In%2520Public%2520Health.pdf>
- NCD Risk Factor Collaboration. (2020). Height and body-mass index trajectories of school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a pooled analysis of 2181 population-based studies with 65 million participants. *The Lancet*, 396, 1151–24. www.thelancet.com
- Neagle, L., Brown, M., Griffiths, J., Millar, D., Reckless, M., David, H., Gruffydd, L., & Morgan, J. (2018). Mind over Matter: A report on the step change needed in emotional and mental health support for children and young people in Wales. In *National Assembly for Wales* (Issue April). <https://doi.org/10.2307/29503852>

- Neil-Sztramko, S. E., Caldwell, H., & Dobbins, M. (2021). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Cochrane Database of Systematic Reviews*, 2021(9). <https://doi.org/10.1002/14651858.CD007651.pub3>
- Neumark-Sztainer, D., Paxton, S. J., Hannan, P. J., Haines, J., & Story, M. (2006). Does Body Satisfaction Matter? Five-year Longitudinal Associations between Body Satisfaction and Health Behaviors in Adolescent Females and Males. *Journal of Adolescent Health*, 39(2), 244–251. <https://doi.org/10.1016/j.jadohealth.2005.12.001>
- Nevill, A. M., Duncan, M. J., Lahart, I. M., & Sandercock, G. (2018). Cardiorespiratory fitness and activity explains the obesity-deprivation relationship in children. *Health Promotion International*, 33(3), 479–487. <https://doi.org/10.1093/heapro/daw106>
- NHS. (2019). The NHS Long Term Plan. <https://www.longtermplan.nhs.uk/wp-content/uploads/2019/01/nhs-long-term-plan-june-2019.pdf>. Retrieved on 25/09/2023, from <https://www.ncb.org.uk/sites/default/files/uploads/files/Local%2520Authorities%2520Role%2520In%2520Public%2520Health.pdf>
- NHS Digital. (2019). Statistics on Obesity, Physical Activity and Diet, England, 2019. Retrieved on 25/09/2023, from <https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-obesity-physical-activity-and-diet/statistics-on-obesity-physical-activity-and-diet-england-2019#>
- Niven, A., Fawkner, S., Knowles, A. M., Henretty, J., & Stephenson, C. (2009). Social physique anxiety and physical activity in early adolescent girls: The influence of maturation and physical activity motives. *Journal of Sports Sciences*, 27(3), 299–305. <https://doi.org/10.1080/02640410802578164>
- Noble, M., Wright, G., Smith, G., & Dibben, C. (2006). Measuring multiple deprivation at the small-area level. *Environment and Planning A*, 38(1), 169–185. <https://doi.org/10.1068/a37168>
- Noble, H., & Smith, J., (2015). Issues of validity in qualitative research. *Evidence-Based Nursing*, 18(2), 34-5. <https://doi.org/10.1136/eb-2015-102054>
- Nyumba, O.T., Wilson., K., Derrick, C.,J., Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods Ecol Evol.*; 9: 20–32. <https://doi.org/10.1111/2041-210X.12860>
- O’Byrne, D., Jones, J., Sen·hai, Y., & Macdonald, H. (1996). WHO’s Global School Health Initiative. In *World Health • (Issue 4)*. <https://iris.who.int/bitstream/handle/10665/330492/WH-1996-Jul-Aug-p5-6-eng.pdf>

- OECD. (2013). OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth. OECD Publishing. Retrieved on 25/09/2023, from <https://www.oecd.org/statistics/framework-for-statistics-on-the-distribution-of-household-income-consumption-and-wealth-9789264194830-en.htm>
- OECD. (2019). Education at a Glance 2019: OECD Indicators. OECD Publishing. <https://doi.org/10.1787/f6dc8198-es>
- Oliver, K. L., & Hamzeh, M. (2010). “The boys won’t let us play”: Fifth-grade mestizas challenge physical activity discourse at school. *Research Quarterly for Exercise and Sport*, 81(1), 38–51. <https://doi.org/10.1080/02701367.2010.10599626>
- O’Loughlin, R., Hiscock, H., Devlin, N., & Dalziel, K. (2023). Distinct developmental trajectories of health-related quality of life for boys and girls throughout childhood and adolescence; a national level longitudinal study. *Health and Quality of Life Outcomes*, 21(1), 82. <https://doi.org/10.1186/s12955-023-02171-5>
- Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjörström, M. (2008). Physical fitness in childhood and adolescence: A powerful marker of health. In *International Journal of Obesity* (Vol. 32, Issue 1, pp. 1–11). <https://doi.org/10.1038/sj.ijo.0803774>
- Ostlin, P., Eckermann, E., Mishra, U. S., Nkowane, M., & Wallstam, E. (2006). Gender and health promotion: a multisectoral policy approach. *Health Promotion International*, 21 Suppl 1, 25–35. <https://doi.org/10.1093/heapro/dal048>
- Ottová-Jordan, V., Smith, O. R. F., Gobina, I., Mazur, J., Augustine, L., Cavallo, F., Välimaa, R., Moor, I., Torsheim, T., Katreniakova, Z., Vollebergh, W., & Ravens-Sieberer, U. (2015). Trends in multiple recurrent health complaints in 15-year-olds in 35 countries in Europe, North America and Israel from 1994 to 2010. In *European Journal of Public Health* (Vol. 25, pp. 24–27). Oxford University Press. <https://doi.org/10.1093/eurpub/ckv015>
- Owen, M. B., Curry, W. B., Kerner, C., Newson, L., & Fairclough, S. J. (2017). The effectiveness of school-based physical activity interventions for adolescent girls: A systematic review and meta-analysis. In *Preventive Medicine* (Vol. 105, pp. 237–249). Academic Press Inc. <https://doi.org/10.1016/j.ypmed.2017.09.018>
- Owen, M., Kerner, C., Newson, L., Noonan, R., Curry, W., Kosteli, M.-C., & Fairclough, S. (2019). Investigating Adolescent Girls’ Perceptions and Experiences of School-Based Physical Activity to Inform the Girls’ Peer Activity Intervention Study. *Journal of School Health*, 1–9. <https://doi.org/10.1111/josh.12812>

- Öztürk, Ö., Aydoğdu, O., Yıkılmaz, S. K., Feyzioğlu, Ö., & Pişirici, P. (2023). Physical literacy as a determinant of physical activity level among late adolescents. *PLoS ONE*, 18(4 APRIL).
<https://doi.org/10.1371/journal.pone.0285032>
- Page, N., Angel, L., Ogada, E., Young, H., & Murphy, S. (2023). Student Health and Wellbeing in Wales: Report of the 2021/22 health behaviour in school-aged children survey and school health research network. CARDIFF UNIVERSITY SCHOOL. Retrieved on 25/09/2023 from,
<https://orca.cardiff.ac.uk/id/eprint/158974/1/SHRN-2021-22-National-Indicators-Report-FINAL-en.pdf>
- Parker, K., Eddy, S., Nunns, M., Xiao, Z. M., Ford, T., Eldridge, S., & Ukoumunne, O. C. (2022). Systematic review of the characteristics of school-based feasibility cluster randomised trials of interventions for improving the health of pupils in the UK. In *Pilot and Feasibility Studies* (Vol. 8, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s40814-022-01098-w>
- Pate, R. R., Hillman, C. H., Janz, K. F., Katzmarzyk, P. T., Powell, K. E., Torres, A., & Whitt-Glover, M. C. (2019). Physical Activity and Health in Children Younger than 6 Years: A Systematic Review. In *Medicine and Science in Sports and Exercise* (Vol. 51, Issue 6, pp. 1282–1291). Lippincott Williams and Wilkins. <https://doi.org/10.1249/MSS.0000000000001940>
- Patton, G. C., Sawyer, S. M., Santelli, J. S., Ross, D. A., Afifi, R., Nicholas, B., Arora, M., Azzopardi, P., Baldwin, W., Bonell, C., Kennedy, E., Mahon, J., Mcgovern, T., Mokdad, A. H., Patel, V., Petroni, S., Reavley, N., Taiwo, K., Waldfoegel, J., ... Viner, R. M. (2016). Lancet Commission on Child health. *Lancet*, 387(10036), 2423–2478. [https://doi.org/10.1016/S0140-6736\(16\)00579-1](https://doi.org/10.1016/S0140-6736(16)00579-1)
- Pearson, N., Braithwaite, R., & Biddle, S. J. H. (2015). The effectiveness of interventions to increase physical activity among adolescent girls: A meta-analysis. *Academic Pediatrics*, 15(1), 9–18.
<https://doi.org/10.1016/j.acap.2014.08.009>
- Peterhans, E., Worth, A., & Woll, A. (2013). Association between health behaviors and cardiorespiratory fitness in adolescents: Results from the cross-sectional MoMo-study. *Journal of Adolescent Health*, 53(2), 272–279.
<https://doi.org/10.1016/j.jadohealth.2013.02.011>
- Phillips, L. R. S., Parfitt, G., & Rowlands, A. V. (2013). Calibration of the GENEActiv accelerometer for assessment of physical activity intensity in children. *Journal of Science and Medicine in Sport*, 16(2), 124–128.
<https://doi.org/10.1016/j.jsams.2012.05.013>
- Pinnock, H., Barwick, M., Carpenter, C. R., Eldridge, S., Grandes, G., Griffiths, C. J., Rycroft-Malone, J., Meissner, P., Murray, E., Patel, A., Sheikh, A., & Taylor, S. J. C. (2017). Standards for Reporting Implementation Studies

(StaRI) Statement. *BMJ (Online)*, 356(March), 1–9.
<https://doi.org/10.1136/bmj.i6795>

- Plunkett, R., Leipert, B. D., & Ray, S. L. (2013). Unspoken phenomena : using the photovoice method to enrich phenomenological inquiry. *20(2)*, 156–164.
<https://doi.org/10.1111/j.1440-1800.2012.00594.x>
- Poitras, V. J., Gray, C. E., Borghese, M. M., Carson, V., Chaput, J. P., Janssen, I., Katzmarzyk, P. T., Pate, R. R., Connor Gorber, S., Kho, M. E., Sampson, M., & Tremblay, M. S. (2016). Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. In *Applied Physiology, Nutrition and Metabolism (Vol. 41, Issue 6, pp. S197–S239)*. Canadian Science Publishing.
<https://doi.org/10.1139/apnm-2015-0663>
- Posadzki, P., Pieper, D., Bajpai, R., Makaruk, H., Könsgen, N., Neuhaus, A. L., & Semwal, M. (2020). Exercise/physical activity and health outcomes: an overview of Cochrane systematic reviews. *BMC Public Health*, *20(1)*.
<https://doi.org/10.1186/s12889-020-09855-3>
- Potrebny, T., Wium, N., Haugstvedt, A., Sollesnes, R., Torsheim, T., Wold, B., & Thuen, F. (2019). Health complaints among adolescents in Norway: A twenty-year perspective on trends. *PLoS ONE*, *14(1)*.
<https://doi.org/10.1371/journal.pone.0210509>
- Powell, B. J., Powell, B. J., Bosk, E. A., Wilen, J. S., Danko, C. M., Scoyoc, A. Van, & Banman, A. (2015). Evidence-Based Programs in ‘Real World’ Settings: Finding the Best Fit. In *Advances in Child Abuse Prevention Knowledge (Vol. 5, Issue June)*. <https://doi.org/10.1007/978-3-319-16327-7>
- Priebe, C. S., & Spink, K. S. (2011). When in Rome: Descriptive norms and physical activity. *Psychology of Sport and Exercise*, *12(2)*, 93–98.
<https://doi.org/10.1016/j.psychsport.2010.09.001>
- Pronin, E., Berger, J., & Molouki, S. (2007). Alone in a Crowd of Sheep: Asymmetric Perceptions of Conformity and Their Roots in an Introspection Illusion. *Journal of Personality and Social Psychology*, *92(4)*, 585–595.
<https://doi.org/10.1037/0022-3514.92.4.585>
- Public Health England. (2017). Wellbeing of adolescent girls: An analysis of data from the Health Behaviour in School-aged Children (HBSC) survey for England, 2014. Retrieved on 25/09/2023 from, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/621069/Health_behaviour_in_school_age_children_wellbeing_of_adolescent_girls.pdf
- Public Health Wales. (2018). Public Health Wales | Long Term Strategy 2018-30. Retrieved on 25/09/2023, from <https://phw.nhs.wales/news/latest-publications/public-health-wales-long-term-strategy-2018-30/>

- Public Health Wales. (2023). Child Measurement Programme 2021-2022. Retrieved on 25/09/2023, from <https://phw.nhs.wales/services-and-teams/child-measurement-programme/>
- Public Health Wales Observatory. (2013). Health of Children and Young People in Wales. In Public Health Wales Observatory. Retrieved on 25/09/2023, from www.publichealthwalesobservatory.wales.nhs.uk/childprofi
- Pucher, K. K., Boot, N. m. w. m., & de Vries, N. K. (2013). Systematic review: School health promotion interventions targeting physical activity and nutrition can improve academic performance in primary- and middle school children. In *Health Education* (Vol. 113, Issue 5, pp. 372–391). <https://doi.org/10.1108/HE-02-2012-0013>
- Raghuveer, G., Hartz, J., Lubans, D. R., Takken, T., Wiltz, J. L., Mietus-Snyder, M., Perak, A. M., Baker-Smith, C., Pietris, N., & Edwards, N. M. (2020). Cardiorespiratory Fitness in Youth: An Important Marker of Health: A Scientific Statement From the American Heart Association. In *Circulation* (Vol. 142, Issue 7, pp. E101–E118). Lippincott Williams and Wilkins. <https://doi.org/10.1161/CIR.0000000000000866>
- Raphael, D. (2008). Grasping at straws: A recent history of health promotion in Canada. *Critical Public Health*, 18(4), 483–495. <https://doi.org/10.1080/09581590802443604>
- Rasmussen, V. (2005). The European Network of Health Promoting Schools - from Iceland to Kyrgyzstan. *IUHPE - Promotion & Education*, 12, 169–172. DOI: 10.1177/10253823050120030120
- Reiner, M., Niermann, C., Jekauc, D., & Woll, A. (2013). Long-term health benefits of physical activity - A systematic review of longitudinal studies. In *BMC Public Health* (Vol. 13, Issue 1). <https://doi.org/10.1186/1471-2458-13-813>
- Rhodes, R. E., Janssen, I., Bredin, S. S. D., Warburton, D. E. R., & Bauman, A. (2017). Physical activity: Health impact, prevalence, correlates and interventions. *Psychology and Health*, 32(8), 942–975. <https://doi.org/10.1080/08870446.2017.1325486>
- Richards, A. B., Klos, L., Swindell, N., Griffiths, L. J., De Martelaer, K., Edwards, L. C., Brophy, S., & Stratton, G. (2022). Associations between swimming & cycling abilities and fitness in 9-11 year old boys and girls. *Journal of Sports Sciences*, 40(6), 658–666. <https://doi.org/10.1080/02640414.2021.2013616>
- Richards, A. B., Mackintosh, K. A., Swindell, N., Ward, M., Marchant, E., James, M., Edwards, L. C., Tyler, R., Blain, D., Wainwright, N., Nicholls, S., Mannello, M., Morgan, K., Evans, T., & Stratton, G. (2022). WALES 2021 Active Healthy Kids (AHK) Report Card: The Fourth Pandemic of Childhood Inactivity. *International Journal of Environmental Research and Public Health*, 19(13). <https://doi.org/10.3390/ijerph19138138>

- Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms a test of the theory of normative social behavior. *Communication Research*, 32(3), 389–414. <https://doi.org/10.1177/0093650205275385>
- Roberts, S. R., Maheux, A. J., Hunt, R. A., Ladd, B. A., & Choukas-Bradley, S. (2022). Incorporating social media and muscular ideal internalization into the tripartite influence model of body image: Towards a modern understanding of adolescent girls' body dissatisfaction. *Body Image*, 41, 239–247. <https://doi.org/10.1016/j.bodyim.2022.03.002>
- Robinson, L., Prichard, I., Nikolaidis, A., Drummond, C., Drummond, M., & Tiggemann, M. (2017). Idealised media images: The effect of fitspiration imagery on body satisfaction and exercise behaviour. *Body Image*, 22, 65–71. <https://doi.org/10.1016/j.bodyim.2017.06.001>
- Ross, D. A., Hinton, R., Melles-Brewer, M., Engel, D., Zeck, W., Fagan, L., Herat, J., Phaladi, G., Imbago-Jácome, D., Anyona, P., Sanchez, A., Damji, N., Terki, F., Baltag, V., Patton, G., Silverman, A., Fogstad, H., Banerjee, A., & Mohan, A. (2020). Adolescent Well-Being: A Definition and Conceptual Framework. *Journal of Adolescent Health*, 67(4), 472–476. <https://doi.org/10.1016/j.jadohealth.2020.06.042>
- Rowe, S. L., Zimmer-Gembeck, M. J., & Hood, M. (2016). From the child to the neighbourhood: Longitudinal ecological correlates of young adolescents' emotional, social, conduct, and academic difficulties. *Journal of Adolescence*, 49, 218–231. <https://doi.org/10.1016/j.adolescence.2016.04.001>
- Royal College of Paediatrics and Child Health. (2020). State of Child Health 2020: Wales. Retrieved on 25/09/2023, from www.rcpch.ac.uk/state-of-child-health
- Ruedl, G., Franz, D., Frühauf, A., Kopp, M., Niedermeier, M., Drenowatz, C., & Greier, K. (2018). Development of physical fitness in Austrian primary school children: A longitudinal study among overweight and non-overweight children over 2.5 years. *Wiener Klinische Wochenschrift*, 130(9–10), 321–327. <https://doi.org/10.1007/s00508-018-1336-x>
- Ruiz, J. R., Cavero-Redondo, I., Ortega, F. B., Welk, G. J., Andersen, L. B., & Martinez-Vizcaino, V. (2016). Cardiorespiratory fitness cut points to avoid cardiovascular disease risk in children and adolescents; What level of fitness should raise a red flag? A systematic review and meta-analysis. In *British Journal of Sports Medicine* (Vol. 50, Issue 23, pp. 1451–1458). BMJ Publishing Group. <https://doi.org/10.1136/bjsports-2015-095903>
- Sackett, C. R., Newhart, S., Jenkins, A. M., & Cory, L. (2018). Girls' Perspectives of Barriers to Outdoor Physical Activity Through Photovoice: A Call for Counselor Advocacy. *Journal of Creativity in Mental Health*, 13(1), 2–18. <https://doi.org/10.1080/15401383.2017.1343166>
- Saldaña, J. (2016). *The Coding Manual for Qualitative Researchers* (S. Publications, Ed.; 3rd ed.). ISBN: 9781529731743

- Saltzman, J. A., Liechty, J. M., & Badskey, E. A. (2015). Holistic health promotion for adolescent girls in an alternative school setting: Lessons learned. *School Social Work Journal*, 40(1), 58–77.
- Sargeant, J. (2013). Qualitative Research Part II: Participants, Analysis, and Quality Assurance. *Journal of Graduate Medical Education*, 4(1), 1–3. <https://doi.org/10.4300/jgme-d-11-00307.1>
- Sarma, S., Sockalingam, S., & Dash, S. (2021). Obesity as a multisystem disease: Trends in obesity rates and obesity-related complications. In *Diabetes, Obesity and Metabolism* (Vol. 23, Issue S1, pp. 3–16). Blackwell Publishing Ltd. <https://doi.org/10.1111/dom.14290>
- Savina, E., & Moran, J. (2022). *Well-being in Adolescent Girls*. New York: Routledge. DOI: 10.4324/9781003105534
- Sawyer, S. M., Afifi, R. A., Bearinger, L. H., Blakemore, S. J., Dick, B., Ezeh, A. C., & Patton, G. C. (2012). Adolescence: A foundation for future health. *The Lancet*, 379(9826), 1630–1640. [https://doi.org/10.1016/S0140-6736\(12\)60072-5](https://doi.org/10.1016/S0140-6736(12)60072-5)
- Scarpa, S., Carraro, A., Gobbi, E., & Nart, A. (2012). Peer-victimization during physical education and enjoyment of physical activity. *Perceptual and Motor Skills*, 115(1), 319–324. <https://doi.org/10.2466/06.05.10.PMS.115.4.319-324>
- Schuch, F. B., Vancampfort, D., Richards, J., Rosenbaum, S., Ward, P. B., & Stubbs, B. (2016). Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. *Journal of Psychiatric Research*, 77, 42–51. <https://doi.org/10.1016/j.jpsychires.2016.02.023>
- Shackleton, N., Jamal, F., Viner, R. M., Dickson, K., Patton, G., & Bonell, C. (2016). School-Based Interventions Going beyond Health Education to Promote Adolescent Health: Systematic Review of Reviews. *Journal of Adolescent Health*, 58(4), 382–396. <https://doi.org/10.1016/j.jadohealth.2015.12.017>
- Sheldrick, M. P. R., Tyler, R., Mackintosh, K. A., & Stratton, G. (2018). Relationship between sedentary time, physical activity and multiple lifestyle factors in children. *Journal of Functional Morphology and Kinesiology*, 3(1). <https://doi.org/10.3390/jfmk3010015>
- Shephard, R. J., Allen, C., Benade, A. J. S., Davies, C. T. M., Di Prampero, P. E., Hedman, R., Merriman, J. E., Myhre, K., & Simmons, R. (1968). The Maximum Oxygen Intake* An International Reference Standard of Cardiorespiratory Fitness. In *Bull. Org. mond. Sante* (Vol. 38).
- Silva, A. O. da, Diniz, P. R. B., Santos, M. E. P., Ritti-Dias, R. M., Farah, B. Q., Tassitano, R. M., & Oliveira, L. M. F. T. (2019). Health self-perception and its association with physical activity and nutritional status in adolescents.

Jornal de Pediatria, 95(4), 458–465.
<https://doi.org/10.1016/j.jpmed.2018.05.007>

- Simovska, V., Nordin, L. L., & Madsen, K. D. (2016). Health promotion in Danish schools: Local priorities, policies and practices. *Health Promotion International*, 31(2), 480–489. <https://doi.org/10.1093/heapro/dav009>
- Slater, A., & Tiggemann, M. (2010). ‘Uncool to do sport’: A focus group study of adolescent girls’ reasons for withdrawing from physical activity. *Psychology of Sport and Exercise*, 11(6), 619–626.
<https://doi.org/10.1016/j.psychsport.2010.07.006>
- Slater, J. M., Guthrie, B. J., & Boyd, C. J. (2001). A feminist theoretical approach to understanding health of adolescent females. *Journal of Adolescent Health*, 28(6), 443–449. [https://doi.org/10.1016/S1054-139X\(00\)00207-X](https://doi.org/10.1016/S1054-139X(00)00207-X)
- Smedegaard, S., Christiansen, L. B., Lund-Cramer, P., Bredahl, T., & Skovgaard, T. (2016). Improving the well-being of children and youths: a randomized multicomponent, school-based, physical activity intervention. *BMC Public Health*, 16(1), 1–11. <https://doi.org/10.1186/s12889-016-3794-2>
- Spencer, R. A., Rehman, L., & Kirk, S. F. L. (2015). Understanding gender norms, nutrition, and physical activity in adolescent girls: A scoping review. In *International Journal of Behavioral Nutrition and Physical Activity* (Vol. 12, Issue 1). BioMed Central Ltd. <https://doi.org/10.1186/s12966-015-0166-8>
- Spink, K. S. (1992). Relation of anxiety about social physique to location of participation in physical activity. *Perceptual and Motor Skills*, 74(1075–1078), 1075–1078.
- Sport Wales, (2022). School Sport Survey: State of the Nation. Retrieved on 13/06/2024 from,
<https://www.sport.wales//files/4726cc7e1cb672efe0e1fb6ed9560256.pdf>
- Statistics for Wales. (2014). Welsh Index of Deprivation 2014: Executive Summary. Retrieved on 25/09/2023 from,
<https://www.gov.wales/sites/default/files/statistics-and-research/2019-05/welsh-index-of-multiple-deprivation-wimd-2014-executive-summary.pdf>
- Stewart, R., Wright, B., Smith, L., Roberts, S., & Russell, N. (2021). Gendered stereotypes and norms: A systematic review of interventions designed to shift attitudes and behaviour. In *Heliyon* (Vol. 7, Issue 4). Elsevier Ltd.
<https://doi.org/10.1016/j.heliyon.2021.e06660>
- Svalastog, A. L., Donev, D., Kristoffersen, N. J., & Gajović, S. (2017). Concepts and definitions of health and health-related values in the knowledge landscapes of the digital society. *Croatian Medical Journal*, 58(6), 431–435.
<https://doi.org/10.3325/cmj.2017.58.431>
- Taber, D. R., Pratt, C., Charneco, E. Y., Dowda, M., Phillips, J. A., & Going, S. B. (2014). Participation in vigorous sports, not moderate sports, is positively

- associated with cardiorespiratory fitness among adolescent girls. *Journal of Physical Activity and Health*, 11(3), 596–603.
<https://doi.org/10.1123/jpah.2011-0280>
- Talboys, S. L., Kaur, M., VanDerslice, J., Gren, L. H., Bhattacharya, H., & Alder, S. C. (2017). What is eve teasing? A mixed methods study of sexual harassment of young women in the rural Indian context. *SAGE Open*, 7(1).
<https://doi.org/10.1177/2158244017697168>
- Tambalis, K. D., Panagiotakos, D. B., Psarra, G., & Sidossis, L. S. (2019). Association of cardiorespiratory fitness levels with dietary habits and lifestyle factors in schoolchildren. *Applied Physiology, Nutrition and Metabolism*, 44(5), 539–545. <https://doi.org/10.1139/apnm-2018-0407>
- Taukobong, H. F. G., Kincaid, M. M., Levy, J. K., Bloom, S. S., Platt, J. L., Henry, S. K., & Darmstadt, G. L. (2016). Does addressing gender inequalities and empowering women and girls improve health and development programme outcomes? *Health Policy and Planning*, 31(10), 1492–1514.
<https://doi.org/10.1093/heapol/czw074>
- Telama, R., Yang, X., Viikari, J., & Välimäki, I. (2005). Physical Activity from Childhood to Adulthood. 28(3), 267–273.
<https://doi.org/10.1016/j.amepre.2004.12.003>
- Telford, R. M., Telford, R. D., Olive, L. S., Cochrane, T., & Davey, R. (2016). Why are girls less physically active than boys? Findings from the LOOK longitudinal study. *PLoS ONE*, 11(3).
<https://doi.org/10.1371/journal.pone.0150041>
- The Children’s Society. (2010). Developing an index of children’s subjective well-being in England. The Children’s Society: London; 2010
- The Lancet. (2009). What is health? The ability to adapt. In *The Lancet* (Vol. 373, Issue 9666, p. 781). Elsevier B.V. [https://doi.org/10.1016/S0140-6736\(09\)60456-6](https://doi.org/10.1016/S0140-6736(09)60456-6)
- The Prince’s Trust. (2018). The Prince’s Trust Macquarie: Youth Index 2018. Retrieved on 25/09/2023, from <https://www.princes-trust.org.uk/about-us/research-policies-reports/youth-index-2021/youth-index-2018>
- Thomas, D. R. (2016). Feedback from research participants: are member checks useful in qualitative research? *Qualitative Research in Psychology*, 14(1), 23–41. <https://doi.org/10.1080/14780887.2016.1219435>
- Thyne, M., Robertson, K., Thomas, T., & Ingram, M. (2016). “It is amazing how complete is the delusion that beauty is goodness”: expectancies associated with tween makeup ownership. *International Journal of Consumer Studies*, 40(5), 543–551. <https://doi.org/10.1111/ijcs.12299>

- Tickle-Degnen, L. (2013). Nuts and bolts of Conducting Feasibility Studies. *American Journal of Occupational Therapy*, 67, 171–176. <https://doi.org/10.5014/ajot.2013.006270>
- Tinson, J. (2009). *Conducting Research with Children and Adolescents: Design, Methods and Empirical Cases*. Goodfellow Publishers Limited.
- Tolman, D. L., Impett, E. A., Tracy, A. J., & Michael, A. (2006). Looking good , sounding good : femininity ideology and adolescent girls ' mental health developmental framework. 30, 85–95.
- Tolman, D. L., Porche, M. V, Keiley, M., Rabinowitz, V., Tracy, A., Chu, J., Doherty, J., Manning, M., & Martin, N. (2000). Development and Validation of a New Measure for Girls. 24, 365–376.
- Van Droogenbroeck, F., Spruyt, B., & Keppens, G. (2018). Gender differences in mental health problems among adolescents and the role of social support: Results from the Belgian health interview surveys 2008 and 2013. *BMC Psychiatry*, 18(1), 1–9. <https://doi.org/10.1186/s12888-018-1591-4>
- Verloigne, M., Altenburg, T. M., Chinapaw, M. J. M., Chastin, S., Cardon, G., & De Bourdeaudhuij, I. (2017). Using a co-creational approach to develop, implement and evaluate an intervention to promote physical activity in adolescent girls from vocational and technical schools: A case control study. *International Journal of Environmental Research and Public Health*, 14(8), 1–19. <https://doi.org/10.3390/ijerph14080862>
- Viner, R., & Macfarlane, A. (2005). ABC of Adolescence: Health promotion. *British Medical Journal*, 330, 527–529. <https://doi.org/10.1136/bmj.330.7490.527>
- Vondung, C., Demetriou, Y., Reimers, A. K., Schlund, A., & Bucksch, J. (2020). A sex/gender perspective on interventions to reduce sedentary behaviour in girls and boys: Results of the geneffects systematic review. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 14, pp. 1–18). MDPI AG. <https://doi.org/10.3390/ijerph17145231>
- Wales Audit Office. (2019). *The well-being of young people: Mental Health*. Retrieved on 25/09/2023, from https://audit.wales/sites/default/files-old/download_documents/mental-health-english.pdf
- Wallander, J. L., Kerbawy, S., Toomey, S., Lowry, R., Elliott, M. N., Escobar-Chaves, S. L., Franzini, L., & Schuster, M. A. (2013). Is obesity associated with reduced health-related quality of life in Latino, black and white children in the community? *International Journal of Obesity*, 37(7), 920–925. <https://doi.org/10.1038/ijo.2013.31>
- Wang, C. Y., McPherson, K., Marsh, T., Gortmaker, S. L., & Brown, M. (2011). Obesity 2 Health and economic burden of the projected obesity trends in the USA and the UK. In *Lancet* (Vol. 378). www.thelancet.com

- Warburton, D. E. R., Nicol, C. W., & Bredin, S. S. D. (2006). Health benefits of physical activity: the evidence. *CMAJ : Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne*, 174(6), 801–809. <https://doi.org/10.1503/cmaj.051351>
- Ward, L. M., & Grower, P. (2020). Media and the Development of Gender Role Stereotypes. *Annu. Rev. Dev. Psychol.* 2020, 2, 177–199. <https://doi.org/10.1146/annurev-devpsych-051120>
- Watts-Taffe, S., Laster, B. P., Broach, L., Marinak, B., Connor, C. M. D., & Walker-Dalhouse, D. (2012). Differentiated instruction: Making informed teacher decisions. *Reading Teacher*, 66(4), 303–314. <https://doi.org/10.1002/TRTR.01126>
- Webber, L. S., Catellier, D. J., Lytle, L. A., Murray, D. M., Pratt, C. A., Young, D. R., Elder, J. P., Lohman, T. G., Stevens, J., Jobe, J. B., & Pate, R. R. (2008). Promoting Physical Activity in Middle School Girls Trial of Activity for Adolescent Girls. *AMEPRE*, 34(3), 173–184. <https://doi.org/10.1016/j.amepre.2007.11.018>
- Weissová, M., & Prokop, P. (2020). Alternative conceptions of obesity and perception of obese people amongst children. *Journal of Biological Education*, 54(5), 463–475. <https://doi.org/10.1080/00219266.2019.1609549>
- Welsh Government. (2015). Wellbeing of Future Generations (Wales) Act 2015. Retrieved on 25/09/2023, from <https://www.futuregenerations.wales/wp-content/uploads/2017/02/150623-guide-to-the-fg-act-en.pdf>
- Welsh Government. (2022). Wellbeing of Wales, 2022: children and young people's wellbeing. Retrieved on 25/09/2023, from <https://gov.wales/wellbeing-wales-2022-children-and-young-peoples-wellbeing>
- Whitehead, M. (2001). The Concept of Physical Literacy. *European Journal of Physical Education*, 6(2), 127–138. <https://doi.org/10.1080/1740898010060205>
- Whitehead, S., & Biddle, S. (2008). Adolescent girls' perceptions of physical activity: A focus group study. *European Physical Education Review*, 14(2), 243–262. <https://doi.org/10.1177/1356336X08090708>
- Widdows, H. (2018). *Perfect Me: Beauty as an Ethical Ideal*. Princeton University Press.
- Wiklund, M., Malmgren-Olsson, E. B., Öhman, A., Bergström, E., & Fjellman-Wiklund, A. (2012). Subjective health complaints in older adolescents are related to perceived stress, anxiety and gender - A cross-sectional school study in Northern Sweden. *BMC Public Health*, 12(1). <https://doi.org/10.1186/1471-2458-12-993>
- Wiltsey Stirman, S., Kimberly, J., Cook, N., Calloway, A., Castro, F., & Charns, M. (2012). The sustainability of new programs and innovations: A review of the

- empirical literature and recommendations for future research. *Implementation Science*, 7(1), 17. <https://doi.org/10.1186/1748-5908-7-17>
- Wisnieski, L., Dalimonte-Merckling, D., & Robbins, L. B. (2019). Cardiorespiratory fitness as a mediator of the association between physical activity and overweight and obesity in adolescent girls. *Childhood Obesity*, 15(5), 338–345. <https://doi.org/10.1089/chi.2018.0360>
- World Health Organisation. (2016). Strategy on women's health and well-being in the WHO European Region (Issue September). Retrieved on 25/09/2023, from <https://www.who.int/europe/publications/i/item/WHO-EURO-2016-4173-43932-61910>
- World Health Organization. (2018). Global Action Plan on Physical Activity 2018-2030: More Active People for a Healthier World. Retrieved on 25/09/2023, from <https://www.who.int/publications/i/item/9789241514187>
- World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour. Retrieved on 25/09/2023, from <https://www.who.int/publications/i/item/9789240015128>
- World Health Organization. (2023a). Health and Wellbeing. Retrieved on 25/09/2023, from <https://www.who.int/data/gho/data/major-themes/health-and-well-being>
- World Health Organization. (2023b). Health Promotion: The 1st International Conference on Health Promotion, Ottawa, 1986. Retrieved on 25/09/2023, from <https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference>
- Yager, Z., Diedrichs, P. C., Ricciardelli, L. A., & Halliwell, E. (2013). What works in secondary schools? A systematic review of classroom-based body image programs. *Body Image*, 10(3), 271–281. <https://doi.org/10.1016/j.bodyim.2013.04.001>
- Yoon, Y., Eisenstadt, M., Lereya, S. T., & Deighton, J. (2022). Gender difference in the change of adolescents' mental health and subjective wellbeing trajectories. *European Child and Adolescent Psychiatry*. <https://doi.org/10.1007/s00787-022-01961-4>
- Yungblut, H. E., Schinke, R. J., & McGannon, K. R. (2012). Views of adolescent female youth on physical activity during early adolescence. *Journal of Sports Science and Medicine*, 11(1), 39–50.

9 Appendices

Appendix I – Swan-Linx & Girls Health Project Ethics Applications



Applied Sports Technology Exercise and Medicine Research Centre (A-STEM) Sport and Health Portfolio, College of Engineering

APPLICATION FOR ETHICAL COMMITTEE APPROVAL OF A RESEARCH PROJECT

In accordance with A-STEM and College of Engineering Safety Policy, all research undertaken by staff or students linked with A-STEM must be approved by the A-STEM Ethical Advisory Committee prior to starting data collection.

Applications for approval should be submitted on this form. The researcher(s) should complete the form in consultation with the project supervisor. Where appropriate, the application must include the following appendices: (i) Participant Information Sheet, (ii) Participant Consent Form, (iii) Participant Health Screening Questionnaire.

After completing and signing the form students should ask their supervisor to complete and sign the declaration section. Staff members should submit the form directly to the Chair of the A-STEM Ethical Advisory Committee.

Applicants will be informed of the decision of the Committee via email to the project leader/supervisor.

1. TITLE OF PROJECT

What is the state of motor skills (physical competency), fitness and lifestyle in children aged 8-13 years in Wales?

2. NAMES AND STATUS OF RESEARCH TEAM



3. RATIONALE

Childhood obesity and physical inactivity is a problem within the United Kingdom with one-quarter of UK children being classed as obese by the time they leave primary school (Reilly, 2006). Fitness levels are decreasing (23% decrease from 1998-2004; Stratton *et al.* 2007) which is resulting in poor health and an increased risk of premature death for children in the UK. There is evidence that a high body mass index (BMI) negatively affects motor performance (Okley *et al.* 2010) and that taking part in physical activity can increase ability to perform motor skills (Okley *et al.* 2001). Although childhood obesity and physical inactivity is a national concern many parents do not recognise that their children are obese (Parry *et al.* 2008) which presents a problem because although the parents know how to have a healthy lifestyle they are not promoting it (Onnerfalt *et al.* 2012). In 2008, Stodden *et al.* created a conceptual model that identifies fundamental movement skills as being a key underlying factor that can influence participation in physical activity and, consequently, health status. These are the foundation skills that, if mastered, form the platform for motor skill competence (physical competency). The authors explain that higher physical competency levels will cause a positive trajectory toward perceived competence, health-related fitness and, sequentially, physical activity levels. This in turn, will promote the child to maintain a healthy weight. More recently, authors have reviewed the growing literature around the conceptual model (Robinson *et al.* 2015). This review confirmed that evidence shows motor skill competence (physical competency) is positively associated with perceived competence and multiple aspects of health such as, physical activity, cardio-respiratory fitness, muscular strength and endurance, and a healthy weight status. Therefore, understanding the relationships between factors that influence children's health and well-being could aid in addressing the current declining levels of fitness and high levels of obesity.

This research project seeks to quantify motor fitness, physical competency, physical activity, and health related behaviours, and seek to establish interrelationships between them. Further, this study will use an accelerometer (REC PG/2014/009) to generate raw, unfiltered data to analyse the movements of children in this context. The data generated by this programme will be used to develop support programmes for children based on their individual needs.

4. REFERENCES

- Council of Europe (1983). *Testing physical fitness: Eurofit: Experimental Battery: Provisional Handbook*. Strasbourg: Council of Europe.
- McArdle, W.D., Katch, I. and McArdle, V.L. (2001). *Exercise Physiology: Energy, Nutrition and Human Performance*. Philadelphia: Lippincott Williams & Wilkins.
- Okley, A.D., Booth, M.L. and Chey, T. (2004). Relationships between body composition and

fundamental movement skills among children and adolescents. *Research Quarterly for Exercise and Sport*, 75, 238-247

Okely, A.D., Booth, M.L. and Patterson, J.W. (2001). Relationship of physical activity to fundamental movement skills among adolescents. *Medicine and Science in Sports and Exercise*, 33, 1899-1904.

Parry, L., Netuveli, G., Parry, J. and Saxena, S. (2008). A systematic review of parental perception of overweight status in children. *Journal of Ambulatory Care Management*, 31, 253-268.

Reilly, J. (2006). Tackling the obesity epidemic: new approaches. *Archives of Disease in Childhood*, 9, 724-726.

Robertson, R.J., Goss, F.L., Boer, N.F., Peoples, J.A., Foreman, A.J., Dabayeb, I.M., et al. (2000). Children's OMNI Scale of Perceived Exertion: mixed gender and race validation. *Medicine & Science in Sports & Exercise*, 32, 452.

Robinson, L. E., Stodden, D. F., Barnett, L. M., Lopes, V. P., Logan, S. W., Rodrigues, L. P., & D'Hondt, E. (2015). Motor competence and its effect on positive developmental trajectories of health. *Sports Medicine*, 45(9), 1273-1284.

Stodden, D. F., Goodway, J. D., Langendorfer, S. J., Robertson, M. A., Rudisill, M. E., Garcia, C., & Garcia, L. E. (2008). A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest*, 60(2), 290-306.

Stratton, G., Canoy, D., Boddy, L.M., Taylor, S.R., Hackett, A.F., and Buchan, I.E. (2007). Cardio respiratory fitness and body mass index of 9-11 year old English children: a serial cross-sectional study from 1998-2004. *International Journal of Obesity*, 31, 1172-1178.

5. AIMS and OBJECTIVES

The aim of the project is to establish levels of motor fitness, physical competency and lifestyle behaviours of children who attend schools in Wales. This will be done using a series of tasks from the Eurofit test battery (Council of Europe, 1983) and the Dragon Challenge V1.0 activities. Sedentary behaviours, diet and wellbeing will be assessed using an online questionnaire (the CHAT tool). The study will also examine correlates of motor skills, physical competency, physical activity, lifestyle and fitness. There are many objectives, for example: To determine the relationship between motor fitness and BMI. To quantify the differences between motor skills and fitness in boys and girls. To establish whether motor skills and fitness, are related to lifestyle behaviours. To determine the general level of motor fitness, physical competency, health, wellbeing and lifestyle of children in Wales. Further, this study will seek to use the SlamTracker accelerometer to determine specific signals related to physical activity, fitness and motor performance (as in ethics approval code PG/2014/009).

6. METHODOLOGY

6.1 Study Design

This study will involve boys and girls aged 8-13 years schools in Wales. The children will be asked to complete three parts for the study.

1. The first part will be to complete an online questionnaire (CHAT) which will take about 30-45 minutes; this will be administered on schools premises' by the research team. The questionnaire focuses on and asks questions regarding diet, physical activity, lifestyle, sporting interest and mental wellbeing.

2. The second part of the study will involve a fitness fun day that will take half a day to complete. The fun day will involve a variety of motor fitness activities from the Council of Europe European Physical Fitness Test battery (Eurofit), as well as the measurement of height, sitting height and weight to determine BMI.

3. The children will complete further motor performance assessments in “dragon challenge” (third part). The dragon challenge includes 9 motor skill assessments completed serially. These further quantify motor fitness/fundamental movement tasks, including; running, jogging, balancing on a bench, balancing on the spot, basketball dribbling, jumping, catching and throwing. Dragon challenge is completed in 3 minutes. These tasks involve exertion commensurate with physical education lesson demands.

6.2 Experimental Procedures

(1) Completion of the CHAT tool (online questionnaire); (2) Fitness Fun Day tasks; (3) Dragon Challenge Tasks. The study involves completing a 30-45 minute questionnaire which will take part at the school. The fitness fun day will take half a day to complete and will take part at respective schools premises (sports halls) e.g. Pentrehafod school sports hall, and Swansea University indoor training centre. The participant will be given an assent form and therefore the choice of opting out of all or part of the project. Active consent will be gained from the head teacher of each school, consent will be gained from the parents and assent will be gained from the children. The online questionnaire, which has been developed by members of Swansea University, based on the Sportslix questionnaire has 29 questions is available in both Welsh and English and can be completed on computers, iPads and tablets. The questionnaire includes items on diet, sport participation, physical activity and sedentary behaviour, parents’ physical activity and lifestyle behaviours including sleep times, mode of travel to and from school, and perceptions about their fitness, health, school, friends and family. The fitness fun day will take place in the sports hall of the respective schools or Swansea University’s indoor training centre and will take a half a school day to complete all of the activities. The students will complete a small warm up to increase heart rate and the activities the students will be taking part in are from the Eurofit test battery and Dragon Challenge activities. The Eurofit test was devised by the Council of Europe, for children of school age and has been used in many European schools since 1988 (Council of Europe, 1983). The Dragon Challenge activities were developed by Swansea and Edgehill Universities and Sport Wales. In sum the tasks include the sit and reach test to measure flexibility, speed bounce to measure agility, standing broad jump to measure explosive leg power, the handgrip test to measure static arm strength, and running tests, the 10 x 5 meter shuttle run to measure speed and agility and then 20m endurance shuttle run to measure cardio respiratory endurance, all of these activities are commensurate with physical education lessons within a school. Additionally, participants will take part in “Dragon Challenge” activities, which include; running, jumping over hurdles, balancing, core agility/flexibility, ball throwing, ball catching and ball bouncing. Throughout, participants will be asked to wear the SlamTracker accelerometer (as in ethics approval code PG/2014/009 & PG14/2014/007). The student’s height, sitting height and weight will also be measured, by a member of the listed research team, so that BMI and maturation offset can be calculated. For some activities the participants may be asked to give their rating of

exertion (RPE) using the Omni Scale of Perceived Exertion Scale (Robertson et al. 2000). During the activities, after attaining consent from parent/guardian, school, and participant, a video recording device will be used to assess movements during the motor fitness activities, post-hoc. Four cameras will be placed along the anteroposterior and mediolateral planes to capture the movements in detail. The cameras will be placed to capture the activities but will not impede the participants' movements during the motor fitness activities. These video recordings will be used to further analyse the motor fitness/fundamental movement skills of the participants.

6.3 Data Analysis Techniques

A Pearson's product moment correlation will be used to analyse BMI and performance in motor fitness tests. The data from the questionnaires will be entered into Excel and analysed using an analysis of variance (ANOVA). An independent T-test will be used to look for differences between motor fitness scores of male and female students. Postal code data will be used to portray a 'map' of areas/districts, enabling analysis of how socioeconomic status and WIMD scores relate to levels of health and motor fitness in children. Raw acceleration data from the SlamTrackers (as in ethics approval code PG/2014/009) will be analysed using an algorithm developed from a previous study (PG/2014/009 & PG14/2014/007). The trace from the accelerometer, which gives acceleration in terms of 'g' over the time period, is split into sections for clarity and ease of analysis. The data is then converted into the frequency domain by the Fast Fourier transform. The Fast Fourier transform involves taking a continuous function and representing it as a number of sine and cosine waves. It provides information about the harmonic content of a signal so that conclusions about the activity being performed can be made. Data will be analysed using MatLab, with time and frequency features from the raw acceleration trace extracted. Video recordings will be used to analyse and compare the motor fitness activities and also to compare/confirm assessor ratings.

6.4 Storage and Disposal of Data and Samples

The completed questionnaires and fitness fun day (including Dragon Challenge) data will be kept private and confidential, hard copies of information will be kept in a secure office and any personal information will be changed into a number rather than a name. All files on a computer will be password protected and files with personal details will only be accessible by only accessible by Professor Gareth Stratton, Dr Kelly Mackintosh, Dr Melitta McNarry, Mr Cain Clark, Ms Claire Barnes, Mr Nils Swindell, Mr Richard Tyler, Mr Luke Martin, Mr Michael Sheldrick, Ms Tabatha Pace and Mr Andrew Beveridge. The schools will have access to the anonymous data for educational and curriculum use. The data is part of a longitudinal study and will not be disposed of. Data may be also used, with consent, in further data linkage projects. This involves linking the collected data to health and education outcomes using Secure Anonymised Information Linkage (SAIL) through the Information Governance Review Panel (IGRP). Any and all video recorded data will be kept separate from any identifying documents and will be managed under the Data Protection

Act 1998, concluding each day of testing, video recordings will be transferred to a password encrypted device. The video recorded data will be kept for educational purposes, such as for training, and demonstrating the motor fitness activities to future participants. Alternatively, any video recorded data not used for academic or educational purposes will be destroyed by the lead investigator, Richard Tyler, overseen by project director Gareth Stratton, after no longer than 7 years.

7. LOCATION OF THE PREMISES WHERE THE RESEARCH WILL BE CONDUCTED.

The fitness fun day will take place on the premises of Swansea University's indoor training centre, or at the respective schools' premises/sports hall (for example, Pentrehafod School sports hall). The research team, Sport Wales Sport Ambassadors, volunteers, and a member(s) of City and County of Swansea sport and recreation team will all be present. The session will also be overseen by school teachers, and a qualified first aider (either Swansea indoor training centre staff, or school sports hall attendant)

8. PARTICIPANT RISKS AND DISCOMFORTS

The students will not be put under any greater risk than what they would face when in a PE class in school. However, there is a possibility that whilst taking part in the fitness fun day they will get an injury, feel sick or faint. A first aid trained staff will always be present during any activity. All anthropometric measures will be taken sensitively. All lead researchers will have a DBS check and no researcher will be on their own with any individual child.

9. INFORMATION SHEET AND INFORMED CONSENT

The submission should be specific about the type of consent that will be sought, which should be indicated below:

- Have you included a Participant Information Sheet for the participants of the study?
YES/~~NO~~
- Have you included a Participant Consent Form for the participants of the study?
YES/~~NO~~

10. COMPUTERS

- Are computers to be used to store data?
YES/~~NO~~
- If so, is the data registered under the Data Protection Act?
YES/~~NO~~

11. STUDENT DECLARATION

Please read the following declarations carefully and provide details below of any ways in which your project deviates from these. Having done this, each student listed in section 2 is required to sign where indicated.

- ***“I have ensured that there will be no active deception of participants.***
- ***I have ensured that no data will be personally identifiable.***
- ***I have ensured that no participant should suffer any undue physical or psychological discomfort***
- ***I certify that there will be no administration of potentially harmful drugs, medicines or foodstuffs.***
- ***I will obtain written permission from an appropriate authority before recruiting members of any outside institution as participants.***
- ***I certify that the participants will not experience any potentially unpleasant stimulation or deprivation.***
- ***I certify that any ethical considerations raised by this proposal have been discussed in detail with my supervisor.***
- ***I certify that the above statements are true with the following exception(s):”***

Student/Researcher signature: (include a signature for each student in research team)

Date:

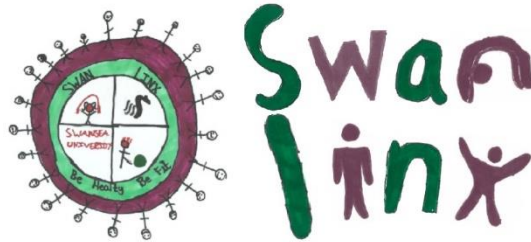
12. SUPERVISOR'S DECLARATION

In the supervisor's opinion, this project (delete those that do not apply):

- ***“Does not raise any significant issues.***
- ***Raises some ethical issues, but I consider that appropriate steps and precautions have been taken and I have approved the proposal.***
- ***Raises ethical issues that need to be considered by the Departmental Ethics Committee.***
- ***Raises ethical issues such that it should not be allowed to proceed in its current form.”***

Supervisor's signature:

Date:



PARENT INFORMATION SHEET
(Version 1.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:



Please read the information below carefully before deciding whether to consent for your child's participation.

1. Invitation Paragraph

The children in your child's class have been invited to take part in a new study that will look at the relationships between lifestyle behaviours, such as, sitting time, computer game play, fitness, sleep time, type of foods eaten and so forth. The data we collect from all of the children taking part in the study will help us assess different aspects of children's motor skills (physical competency), fitness and lifestyle.

2. What is the purpose of the study?

The purpose of this study is to investigate motor skills (physical competency), fitness and lifestyle in children. The study will also test an accelerometer which measures body movement. The data collected will be used in a postgraduate student's thesis and will assist in tracking children's health, physical activity and physical competency, to decide how best to help children become healthier and more involved in sport and physical activity in the future. The data collected will also be used to map results across Wales. This will help us to further analyse levels of health and fitness in children in terms of demographics.

3. Why has my child been chosen?

All of the children in your child's class, including your child, have been invited to take part in the Fitness Fun Day. During the day, if your child does not feel happy about anything that they are asked to do, they can stop at any time, without fear of penalty. If you need any more information about the study then please contact any member of the team on the details above.

4. What will happen to your child if they take part?

Your child will attend a Fitness Fun Day with the rest of their class. This will involve a half day of fun physical activities which will measure children's strength, speed, agility, endurance and flexibility. These activities include; 20m shuttle run (measures endurance), 10x5m sprint (measures speed and agility), handgrip (measures strength), sit and reach (measures flexibility), standing long jump (measures leg explosive power), and speed bounce (measures leg speed, agility and endurance).

During the physical activities, some of the children may be asked to wear the SlamTracker accelerometer. This device will measure how fast your child moves forwards and backwards, side to side and up and down.

Your child will also have weight, height and sitting height measurements recorded, taken by a member of the research team listed. Measures of body weight are taken privately in a separate room or behind a screen, there will always be other children in the room or next to the screen but they will not be party to the results or be able to view the measures and no results are shared with the rest of the class, however, your child will not have to have them taken if they do not want to. All activities will be no harder than your child would do during school PE lessons. Finally, during the Fitness Fun Day session or at your child's school, your child will also be asked complete a questionnaire, about their health, physical activity and lifestyle, which will take about 30 minutes. There will be members of the research team and teachers present to assist your child in filling them in. All the activities during the Fitness Fun Day are aimed for the children's enjoyment and not as a competition. With your permission, a video camera will also be used to capture some of the activities the children are performing.

Your child may also be invited to take part in a further Fitness Fun Day within 12 months of their initial Fitness Fun Day. This can help evaluate school-based interventions and track changes in children's fitness and health. You and your child will be notified when this second Fitness Fun Day will take place, and are free to withdraw at any point.

5. What are the possible disadvantages of taking part?

Taking part in the Fitness Fun Day activities poses no greater risk than a child participating in school physical education lessons. However, in the unlikely event that a child feels unwell, there will be people monitoring the children during all parts of the fitness fun day, and the children's teachers will remain present at all times. A qualified first aider will always be present during the Fitness Fun Day.

6. What are the possible benefits of taking part?

The Fitness Fun Day will be an active and very enjoyable day for the children and they will get to take part in a variety of different activities that they might not have taken part in before. They will be able to find out about their skills and fitness in relation to health and well-being. Further we want children to engage with their results. Therefore school data will be anonymised and made available to the school for educational purposes.

7. Will my child taking part in the study be kept confidential?

All the data we collect from your child will be kept private and confidential; the children's names will be changed to numbers. Any hard copies of the questionnaires and fitness fun day data will be kept in a secure office and computer files with any personal information will be password protected. The data obtained will only be looked at by responsible individuals of the research team from Swansea University, City & County of Swansea, and the PLPS team (Sport Wales), or from regulatory authorities where it is relevant to your

child's participation in the research. To enable us to track changes in health over time we will also keep the secure data available for future linkage with other sets of data collected in the future such as GP visits or educational results for example.

8. What if I have any questions?

If you have any questions about what is written above or anything to do with the study please don't hesitate to contact me or anyone from the research team (see contact details above). If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee, [REDACTED]

PARENT CONSENT FORM
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

PLEASE RETURN THIS FORM TO SCHOOL TO CONSENT FOR YOUR CHILD TO TAKE PART IN THE PROJECT.

Contact Details:

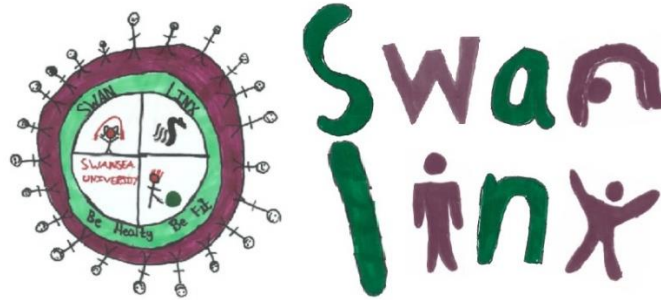
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Please INITIAL each box

below

- | | |
|--|---|
| 1. I confirm that I have read and understood the information sheet dated 01/06/2017 (Version number 2.0) for the above study and have had the opportunity to ask questions. | <input style="width: 80px; height: 40px;" type="text"/> |
| 2. I am happy for my child to participate in this Fitness Fun Days and a second Fitness Fun Day within 12 months, and wear the SlamTracker accelerometer. | <input style="width: 80px; height: 40px;" type="text"/> |
| 3. I understand that my child’s participation is voluntary and that I am free to withdraw my child at any time, without giving any reason, without their medical care or legal rights being affected. | <input style="width: 80px; height: 40px;" type="text"/> |
| 4. I understand that sections of the data obtained may be looked at by responsible individuals from the Swansea University or from regulatory authorities where it is relevant to the children’s taking part in research | <input style="width: 80px; height: 40px;" type="text"/> |
| 5. I am happy for any data collected in this study to be used in future health related studies where data collected will be linked to health outcomes and educational records. | <input style="width: 80px; height: 40px;" type="text"/> |
| 6. I am happy for the activities to be video recorded for academic use ONLY.
I agree to allow my child to take part in the above study. | <input style="width: 80px; height: 40px;" type="text"/> |

Name of Participant (child)	Date	Signature
Name of Parent/Guardian	Date	Signature
Researcher	Date	Signature



HEADTEACHER INFORMATION SHEET

(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of Swansea School Children

Contact Details:



1. Invitation Paragraph

The children in your school have been invited to take part in a new study that will look at the relationships between lifestyle behaviours, such as, sitting time, computer game play, fitness, sleep time, type of foods eaten and so forth. Other schools are also taking part in the study. They will be asked to take part in a Fitness Fun Day, where they will complete a series of physical activities and a questionnaire. The data we collect will help us assess different aspects of children's motor skills (physical competency), fitness and lifestyle. Please consider whether you are able to commit to the requirements stated below before signing the consent form.

2. What is the purpose of the study?

The purpose of this study is to investigate the health, motor skills (physical competence), fitness, lifestyle of children from selected schools. The study will also test an accelerometer which measures body movement. The data collected will be used in a postgraduate student's thesis and will assist in tracking children's health, physical activity and physical competency, to decide how best to help children become healthier and more involved in sport and physical activity in the future. The data collected will also be used to map results across Wales. This will help us to further analyse levels of health and fitness in children in terms of demographics.

3. Why have I been chosen?

The children in your school have been invited take part in the Fitness Fun Day as they attend school in Wales. During the day if any of the children do not feel happy about

anything they are asked to do, they can stop at any time, without fear of penalty. If you need any more information about the study then please contact any member of the team on the details above.

4. What will happen to the children if they take part?

Your pupils will attend a Fitness Fun Day; this will involve a half day of fun physical activities which will measure the children's strength, speed, agility, endurance and flexibility. These activities include; 20m Multi Stage shuttle runs (measures endurance), 10x5m sprint (measures speed and agility), handgrip (measures strength), sit and reach (measures flexibility), standing long jump (measures leg explosive power), and speed bounce (measures leg speed, agility and endurance).

During these physical activities, some of the children may be asked to wear a sensor called a SlamTracker accelerometer. This device will measure how fast the child moves forwards and backwards, side to side and up and down, and will only be worn during some activities. The activities will be no harder than what a child would do during school PE lessons. The children will also have weight, height and sitting height measurements recorded, take by a member of the research team listed. Measures of body weight are taken privately in a separate room or behind a screen, there will always be other children in the room or next to the screen but they will not be party to the results or be able to view the measures and no results are shared with the rest of the class. Children can choose not to have their anthropometric measurements taken if they do not want to be measured. We have followed this approach with around 70000 children in Liverpool since 1996. Finally, during the Fitness Fun Day session, the children will also be asked complete a questionnaire, about their health, physical activity and lifestyle, which will take about 30 minutes. There will be members of the research team and teachers present to assist the children in filling them in. All the activities during the Fitness Fun Day are aimed for the children's enjoyment and not as a competition. With your permission, a video camera will also be used to capture some of the activities the children are performing.

Your school may also be invited to participate in a further Fitness Fun Day within 12 months of your initial Fitness Fun Day. This helps to evaluate school-based interventions and track changes in children's fitness and health. You are free to withdraw your school at any point.

5. What are the possible disadvantages of taking part?

Taking part in the Fitness Fun Day activities poses no greater risk than a child would face during physical education lessons in school. However, in the unlikely event that a child feels unwell, there will be people monitoring the children during all parts of the fitness fun day, and the children's teachers will remain present at all times. A qualified first aider will always be present during the fitness fun day.

6. What are the possible benefits of taking part?

The Fitness Fun Day will be an active and very enjoyable day for the children and they will get to take part in a variety of different activities that they might not have taken part in before. They will be able to find out about their skills and fitness in relation to health and well-being. Further we want children to engage with their results. Therefore school data will be anonymised and made available to the school for educational purposes.

7. Will my taking part in the study be kept confidential?

All the data we collect from the children will be kept private and confidential; the children's names will be changed to numbers. Any hard copies of the questionnaires and fun day data will be kept in a secure office and computer files with any personal information will be password protected. The data obtained will only be looked at by responsible individuals of the research team from Swansea University and the City & County of Swansea, and the PLPS team (Sport Wales), or from regulatory authorities where it is relevant to the children's participation in the research. To enable us to track changes in health over time we

will also keep the secure data available for future linkage with other sets of data collected in the future such as GP visits or educational results for example.

8. What if I have any questions?

If you have any questions about what I have written above or anything to do with the study please don't hesitate to contact me or anyone from the research team as detailed above. If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee, [REDACTED]

HEADTEACHER CONSENT FORM
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:

████████████████████
████████████████████
████████████████████

Please INITIAL each box
below

- | | |
|---|---|
| 1. I confirm that I have read and understood the information sheet dated 01/06/2017 (Version number 2.0) for the above study and have had the opportunity to ask questions. | <input style="width: 60px; height: 40px;" type="text"/> |
| 2. I understand that the children’s participation is voluntary and that I am free to withdraw my pupils at any time, without giving any reason, without their medical care or legal rights being affected. | <input style="width: 60px; height: 40px;" type="text"/> |
| 3. I understand that sections of the data obtained may be looked at by responsible individuals from the Swansea University or from regulatory authorities where it is relevant to the children’s taking part in research. | <input style="width: 60px; height: 40px;" type="text"/> |
| 4. I am happy for any data collected in this study to be used in future health related studies where data collected will be linked to health outcomes and educational records | <input style="width: 60px; height: 40px;" type="text"/> |
| 5. I am happy for the activities to be video recorded for academic use ONLY.
I agree to allow the pupils in my school to take part in the above study. | <input style="width: 60px; height: 40px;" type="text"/> |

Name of School

Date

Signature

Name of Head Teacher

Date

Signature

Researcher

Date

Signature



PARTICIPANT INFORMATION SHEET
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:



You have been invited to take part in a Swansea University study. You have been chosen because you are between the ages of 8-13 years old and go to a school in Wales.

In this study you have the chance to take part in a fitness fun day, and complete a questionnaire about your health and lifestyle and about how physically active you are.

Physical activity is any movement that requires your body to work harder than it does whilst sitting, or resting. The fitness fun day will involve lots of fun physical activities that you may not have tried before which should be really enjoyable. These activities will include a 20m shuttle run to see how long you can run for, a shuttle sprint to see how quick you can run back and forth, gripping with your hands to find out your strength, sit and reach to find out how flexible you are, standing long jump to see how far you can jump, and speed bounce to see how many times you can jump in 30 seconds. You may also be invited to take part in another fitness fun day over the next year. You will be told when this will happen and are free to withdraw at any point.

You may also get asked to wear our BRAND NEW devices, and use the NEWEST technology to measure how fast you move forwards and backwards, side to side and up and down. This will be worn on your wrist and ankle during some of the physical activities. You may also be video recorded during some of the physical activities. This will help us see how well you have done.

You will not be forced to do any of the activities and can stop at any time without fear of penalty or having to worry about being in trouble.

If you have any questions, please ask.

THANK YOU!











PARTICIPANT ASSENT FORM
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:



<i>Please look at the following statements and put your initials if you agree. Example Sarah Jones: SJ</i>		
	I have read the Participant Information Sheet	<input type="checkbox"/>
	I understand what I will be doing if I take part	<input type="checkbox"/>
	I have had a chance to think about taking part	<input type="checkbox"/>
	I have had a chance to ask any questions	<input type="checkbox"/>
	I agree that my data can be used in a research report and that I will not be named so no-one will know it was my information	<input type="checkbox"/>
	I understand that all of the information will be kept private and only shared with the research team	<input type="checkbox"/>
	I am happy to try to do the activities that the Swan-Linx Team want me to do during the fitness fun day, and complete the questionnaire at both times	<input type="checkbox"/>
	I am happy to take part in this study	<input type="checkbox"/>

Name of Participant

Date

Signature

Researcher

Date

Signature

APPLICATION FOR ETHICAL COMMITTEE APPROVAL OF A RESEARCH PROJECT

In accordance with A-STEM and College of Engineering Safety Policy, all research undertaken by staff or students linked with A-STEM must be approved by the A-STEM Ethical Committee.

RESEARCH MAY ONLY COMMENCE ONCE ETHICAL APPROVAL HAS BEEN OBTAINED

The researcher(s) should complete the form in consultation with the project supervisor. After completing and signing the form students should ask their supervisor to sign it. The form should be submitted electronically to Coeresearchethics@swansea.ac.uk.

Applicants will be informed of the Committee's decision via email to the project leader/supervisor.

1. TITLE OF PROJECT

The [REDACTED] Project – a feasibility study

2. DATE OF PROJECT COMMENCEMENT AND PROPOSED DURATION OF THE STUDY

Proposed commencement - September 2017
Duration - 39 weeks

3. NAMES AND STATUS OF RESEARCH TEAM

State the names of all members of the research group including the supervisor(s). State the current status of the student(s) in the group i.e. Undergraduate, Postgraduate, Staff or Other (please specify).

[REDACTED]

4. RATIONALE AND REFERENCES

With reference to appropriate sources of information (using the Harvard system), describe **in no more than 200 words** the background to the proposed project.

Engagement in physical activity and exercise during childhood has numerous benefits to the developing child and future adult (Janz et al., 2000; Telama et al., 2005). During the Primary school years, participation in physical activities and sport remains relatively constant until the onset of adolescence, where a sharp decline in participation is observed in girls. This decline is commonly sustained throughout adolescence into young adulthood, posing a threat to the physiological and psychosocial health of the individual (Bulley et al., 2004). In order to address this, numerous projects have been designed to tackle common problem areas reported by girls with varying degrees of long term success (Brown, 2009; Webber et al., 2008).

This project aims to evaluate the feasibility and effectiveness of a 39-week behaviour change intervention (the [redacted] project) that is currently being run by the [redacted] and delivered [redacted]. The [redacted] project aims to improve the physical activity participation, physical competence, nutritional behaviours, body image, self-objectification and aspirations of 13-14-year-old females via weekly semi-structured group sessions (Appendix 1).

5. OBJECTIVES

State the objectives of the project, i.e. one or more precise statements of what the project is designed to achieve.

1. To evaluate the feasibility of the current project
2. To investigate the association between self-objectification and physical competence
3. To evaluate the effectiveness of the [redacted] intervention on physical activity participation, physical competence, nutritional behaviours, aspirations, body image and perceptions of physical activity

6.1 STUDY DESIGN

- outline the chosen study design (e.g. cross-section, longitudinal, intervention, RCT, questionnaire etc)

This study will use a feasibility and process evaluation design, capturing quantitative and qualitative pre-, mid- and post-intervention measures to establish to (i) what degree the programme and its sub elements work and (ii) the effectiveness of the intervention.

6.2 STUDY DESIGN

- state the number and characteristics of study participants
- state the inclusion criteria for participants
- state the exclusion criteria for participants and identify any requirements for health screening
- state whether the study will involve vulnerable populations (i.e. young, elderly, clinical etc.)
- state the requirements/commitments expected of the participants (e.g. time, exertion level etc)

Expected participants – 60 participants (10 to 20 participants per school, with 3 schools taking part in the project).

Inclusion criteria –Participants will be identified by teachers and other professional persons for entry into the programme. Indicative criteria are: low levels of physical activity, low self-esteem and low aspirations.

Exclusion criteria – participants must be able to communicate in English

Child population –12-15 year old girls

Requirement of participants – to complete the Dragon Challenge V1.0 (PG/2014/39), complete a series of questionnaires, take part in focus groups and/or interviews, maintain weekly attendance to the programme sessions and activities, wear an accelerometer.

6.3 PARTICIPANT RECRUITMENT

How and from where will participants be recruited?

Participants are identified by schoolteachers and other professional persons prior to the start of the project and will be recruited for the study from this pre-identified group. The project will be run in 3 schools [REDACTED]. Participants will be invited to take part in the proposed study via an introduction session, and will be given a participant information sheet and assent form (Appendix 2), a parent information sheet and consent form (Appendix 3) to take home and return should they wish to take part in the study. Informed parental consent and participant assent will be sought for all participants, while Headteacher consent (Appendix 4) will be sought for each participating school.

6.4 DATA COLLECTION METHODS

- describe all of the data collection/experimental procedures to be undertaken
- state any dietary supplementation that will be given to participants and provide full details in Section 6.5
- state the inclusion of participant information and consent forms (in appendices)
- refer to the use of the ACA/ACSM health screening questionnaire where appropriate (usually for maximal effort exercise)

Physical activity – quantity of physical activity will be measured by using accelerometry and self-reported physical activity will be assessed using the Physical Activity Questionnaire for Older Children (Appendix 5) (Crocker, P.; Bailey, D.; Faulkner, R.; Kowalski, K.; McGrath, 1997). Participants will be asked to wear a small accelerometer on the right hip for seven days and will be required to record the time they wake up and go to sleep in a sleep diary. Participants will also need to record when they take off/put on the accelerometer for water-based activities (e.g. swimming, bathing).

Physical competence – The Dragon Challenge (http://www.swansea.ac.uk/sports-science/research/documents/files/Dragon%20Challenge%20Manual_English.pdf) includes 9 motor skill assessments completed serially. These further quantify motor fitness/fundamental movement tasks, including; running, jogging, balancing on a bench, balancing on the spot, basketball dribbling, jumping, catching and throwing. Dragon challenge is completed in 3 minutes. These tasks involve exertion commensurate with physical education lesson demands.

Self-Perception - the Self-Perception Profile for Adolescents (Harter, 2012) will be used to measure a number of domains (scholastic competence, social competence, athletic competence, physical appearance, job competence, romantic appeal, behavioural conduct, close friendships and global self-worth). Participants will be asked to indicate which statement is ‘most like me’ and responses will be grouped and scored in order to produce overall scores for each domain (Appendix 6).

Self-objectification – Self-objectification will be measured using a 20-item scale called the Adolescent Femininity Ideology Scale (Appendix 7) (Tolman et al., 2000).

Body Image – assessed using the Body Parts Dissatisfaction Scale (A. F. Corning et al., 2010) which lists 7 body areas and asks participants to identify if they would like to change any part by making it bigger, smaller or other (Appendix 8).

Dietary Behaviours – Food habits and situational dietary behaviours will be measured using the 23 question Adolescent Food Habits Checklist tool (Johnson et al., 2002b) (Appendix 9).

Experiences – participant and program deliver experiences and feedback may be obtained through semi-structured interviews and focus groups. Participants will be asked questions related to topics covered in questionnaires for further exploration and discussion. For examples, please see Appendix 10.

Safeguarding - A debriefing session will be held after questionnaire completion to offer the participants a safe space to discuss any questions that may have come to light during filling in the questionnaire or to provide support to anybody who has experienced a negative impact as a result of participating. During the debriefing session, a list of contact details will be made available for organization/charity support (See Appendix 14) (Draucker, Martsolf and Poole, 2009). Participants will be reminded at the start of the questionnaires that they are not obliged to complete the form and can hand it in blank if they wish.

Photo Novella - Participants will be invited to take part in 1-3 photo novella tasks, where participants engage with a photography task that aims to engage the participants in the research process while documenting their experiences and realities through still image (Amos et al., 2012). The photographs produced during these tasks will form the basis of subsequent focus groups focusing on project areas (physical activity, nutrition, self-esteem, self-perception, physical competence, body image) and will provide insight into the lived-experience of the participants (Harper, 2002; Plunkett et al., 2013). For a clear breakdown of task timeline, methodology, participant guidelines, consent and subject/property permission slips, please see Appendix 15 - 19.

Personal Journaling – Participants will be invited to record their experiences of the [REDACTED] project, thoughts and feelings around project topic areas and any other information/narrative that they feel they would like to share in written format throughout the project. The aim of this is to enable the research to capture the experiences and input of participants would prefer to communicate via written word as opposed to traditional verbal formats. The participants will each be given a scrapbook and asked to use this to record their written reflections over the course of the project and these will be collected in at the end of the project.

6.5 DATA ANALYSIS TECHNIQUES

- describe the techniques that will be used to analyse the data

Objective 1 will be assessed using qualitative thematic analysis.

Objective 2 will be assessed using correlation analyses to estimate the associations between variables depending on the type of data used, these will be parametric or non-parametric approaches.

Objective 3 will be assessed using descriptive statistics and effect sizes will be used to estimate changes in quantitative data.

6.6 STORAGE AND DISPOSAL OF DATA AND SAMPLES

describe the procedures to be undertaken for the storage and disposal of data and samples

- identify the people who will have the responsibility for the storage and disposal of data and samples

- Identify the people who will have access to the data and samples

- state the period for which the data will be retained on study completion (normally 5 years, or end of award)

Hannah Spacey will have the responsibility for the storage and disposal of data in this study.

Quantitative/Qualitative data and personal details will only be accessible by Professor Gareth Stratton, Professor Sinead Brophy [REDACTED] and Hannah Spacey. Data will be retained until the end of award (September 2019) and destroyed by Hannah Spacey.

6.7 HOW DO YOU PROPOSE TO ENSURE PARTICIPANT CONFIDENTIALITY AND ANONYMITY?

All data and personal details will be kept on password-protected files on a secure hard drive. All data and personal details will be kept private and confidential, participants will be assigned a study ID to use as an identifier in place of their name and will be managed under the Data Protection Act 1998.

Photo Novella – Participants are required to obtain permissions when taking photographs of identifiable persons and private properties. In the event that;

1. A photograph containing an identifiable person(s) as it's subject is taken without the required permissions; the photograph will be destroyed by the researcher.
2. A photograph contains an identifiable person or private property in the background of the photograph, the researcher will decide whether the image can be blurred/cropped to protect privacy/anonymity in indirect subjects. In the case where blurring/cropping the photograph is acceptable, the researcher will scan the original image into a research laptop, edit the photograph and destroy the original. If blurring/cropping is not an option, the photograph will be destroyed by the researcher.

Personal Journaling – In the event that an individual becomes directly identifiable (name, personal information, address etc.) in the personal journals of research participants, the researcher will redact the identifiable information to ensure the anonymity and privacy of persons mentioned. In the event that sensitive information is recorded by participants, the researcher will flag this with appropriate persons at the participant's school for follow up.

7. LOCATION OF THE PREMISES WHERE THE RESEARCH WILL BE CONDUCTED.

- list the location(s) where the data collection and analysis will be carried out
- identify the person who will be present to supervise the research at that location
- If a first aider is relevant, please specify the first aider

Research sessions will be conducted at Secondary schools within [REDACTED]. The primary researcher (Hannah L Spacey) will present during all research sessions, along with the programme deliverer ([REDACTED]). As the research and project delivery will take place in school settings, the current procedure followed by [REDACTED] is to refer any injuries/issues to the school first aider in line with individual school protocols.

8. POTENTIAL PARTICIPANT RISKS AND DISCOMFORTS

- identify any potential physical risk or discomfort that participants might experience as a result of participation in the study.
- identify any potential psychological risk or discomfort that participants might experience as a result of participation in the study.
- Identify the referral process/care pathway if any untoward events occur

The participants will not be put under any greater risk than what they would face when in a PE class in school. However, there is a possibility that whilst taking part in the Dragon Challenge they will get an injury, feel sick or faint. A first aid trained staff will always be present during the activity. All lead researchers will have a DBS check and no researcher will be on their own with any individual child. In the case of participant distress during interviews/focus groups, the research team will follow the steps outlined in Appendix 12 and will debrief with supervisor and write up the steps that were taken throughout to manage the situation. During qualitative measures (questionnaires, focus groups and interviews), some participants may experience distress or negative effects during or after engaging with the research. In an attempt to limit this, participants will be debriefed after every research session and provided with further resources should they wish to seek support (Appendix 14).

9.1 HOW WILL INFORMED CONSENT BE SOUGHT?

*Will any organisations be used to access the sample population?
Will parental/coach/teacher consent be required? If so, please specify which and how this will be obtained and recorded?*

Informed consent will be needed from participants, parents and headteacher of the schools involved in the project (Appendices 3,4,5). An electronic record of all consent obtained will be input and kept on a password protected Excel file, stored on a password protected hard drive and kept in a locker in the ASTEM hub on the Bay Campus. Paper versions of consent will be stored in the same locker, to which only Hannah Spacey and Prof Gareth Stratton have access.

9.2 INFORMATION SHEETS AND CONSENT/ASSENT FORMS

Have you included a Participant Information Sheet for the participants of the study?

YES

Have you included a Parental/Guardian Information Sheet for the parents/guardians of the study?

YES

Have you included a Participant Consent (or Assent) Form for the participants of the study? **YES**

Have you included a Parental/guardian Consent Form for the participants of the study? **YES**

10. IF YOUR PROPOSED RESEARCH IS WITH VULNERABLE POPULATIONS (E.G. CHILDREN, PEOPLE WITH A DISABILITY), HAS AN UP-TO-DATE DISCLOSURE AND BARRING SERVICE (DBS) CHECK (PREVIOUSLY CRB) IF UK, OR EQUIVALENT NON-UK, CLEARANCE BEEN REQUESTED AND/OR OBTAINED FOR ALL RESEARCHERS? EVIDENCE OF THIS WILL BE REQUIRED.

Yes - Please see Appendix 11

11. STUDENT DECLARATION

Please read the following declarations carefully and provide details below of any ways in which your project deviates from these. Having done this, each student listed in section 2 is required to sign where indicated.

- "I have ensured that there will be no active deception of participants.***
- I have ensured that no data will be personally identifiable.***
- I have ensured that no participant should suffer any undue physical or psychological discomfort (unless specified and justified in methodology).***
- I certify that there will be no administration of potentially harmful drugs, medicines or foodstuffs.***

- I will obtain written permission from an appropriate authority before recruiting members of any outside institution as participants.*
- I certify that the participants will not experience any potentially unpleasant stimulation or deprivation.*
- I certify that any ethical considerations raised by this proposal have been discussed in detail with my supervisor.*
- I certify that the above statements are true with the following exception(s):"*

Student/Researcher signature:

Hannah L Spacey

Date: 9/9/2017

12. SUPERVISOR'S APPROVAL

Supervisor's signature:

Date

Example Focus Group Questions

Participants –

Project related interview questions

1. Have you enjoyed the project so far?
2. What have you enjoyed? Why?
3. What haven't you enjoyed about the project so far?
4. Do you think the project has helped you? If so, how?
5. What would you change about the project?
6. What are you looking forward to doing in the coming weeks?

Deliverers –

Pre – programme –

1. What are your main aims for the programme?
2. How do you believe these aims will be best achieved?
3. What issues do you think you may have in trying to achieve your aims?
4. How will you work around these issues?

Mid – programme –

1. How do you feel the programme is progressing?
2. Have you enjoyed delivering the programme?
3. What has worked well?
4. What hasn't worked well?
5. What would you like to change?
6. What processes were taken to achieve your goal?

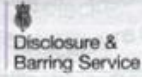
End of programme –

1. Did you meet your programme aims?
2. If so, how did you achieve these?
3. Did the programme work out as you expected?
4. What has worked well?
5. What hasn't worked well?
6. What barriers did you face?

7. Did you manage to work around those barriers, if so, how?
8. Did you enjoy delivering the programme?
9. What would you change for future application?

Enhanced Certificate

Page 1 of 2



DBS Fee Charged

Certificate Number

[REDACTED]

Date of Issue:

29 JULY 2015

Applicant Personal Details

Surname: SPACEY

Forename(s): HANNAH LOUISE

Other Names: NONE DECLARED

Date of Birth: [REDACTED]

Place of Birth: [REDACTED]

Gender: FEMALE

Employment Details

Position applied for:
CHILD WORKFORCE SPORTS COACH

Name of Employer:
[REDACTED]

Countersignatory Details

Registered Person/Body:
GB GROUP PLC

Countersignatory:
RUTH GERAGHTY

Police Records of Convictions, Cautions, Reprimands and Warnings

NONE RECORDED

Information from the list held under Section 142 of the Education Act 2002

NONE RECORDED

DBS Children's Barred List information

NONE RECORDED

DBS Adults' Barred List information

NOT REQUESTED

Other relevant information disclosed at the Chief Police Officer(s) discretion

NONE RECORDED

Enhanced Certificate

This document is an Enhanced Criminal Record Certificate within the meaning of sections 113B and 116 of the Police Act 1997.

THIS CERTIFICATE IS NOT EVIDENCE OF IDENTITY

Continued on page 2

PARTICIPANT DISTRESS

Procedures to follow in the event of participant distress during Interviews/Focus Groups

Prior to the interview:

Prior to conducting interviews, pilot interviews will be conducted in liaison with the supervisor. These interviews will provide the researcher with an opportunity to identify any questions that might lead to distress and where appropriate, take steps to rephrase or change these questions.

Before conducting the first formal interview, the student will meet with their supervisor to discuss the procedures that are in place in case a participant becomes distressed during an interview. The supervisor will also ensure the student feels prepared for the interview. The supervisor must be satisfied that the researcher is competent in conducting interviews before giving approval for the commencement of data collection.

Students will inform their supervisor where and when they are completing all interviews and in turn the supervisor will ensure the student has a means of contacting them when they are conducting interviews.

During the interview:

At the beginning of the interview the student will remind the participant that they can stop the interview at any time, that they can choose not to answer questions, and that there are no right or wrong answers to questions (so there is no fear of 'saying the wrong thing').

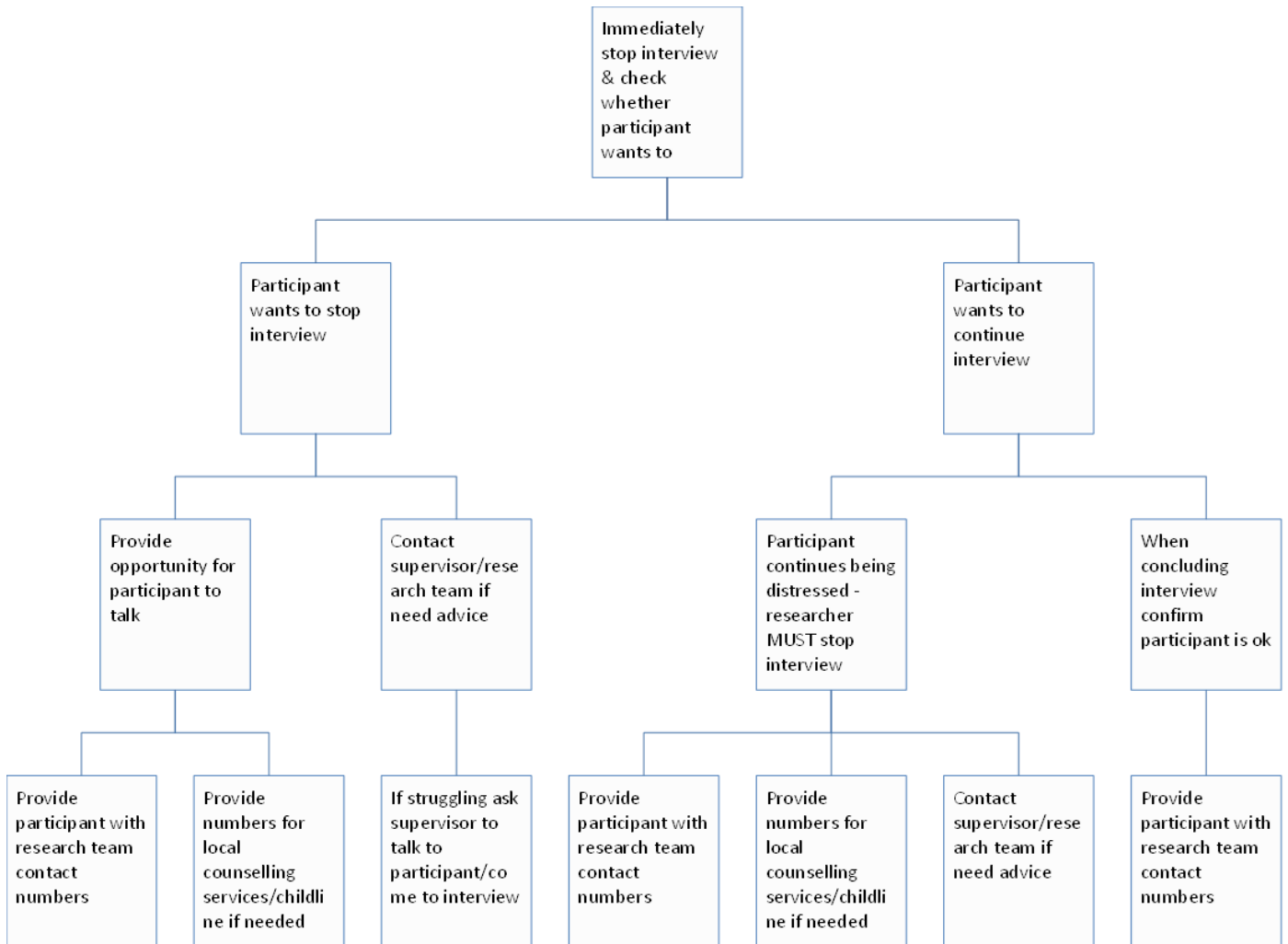
Once the interview begins, the researcher will be required to be aware of any potential indications of distress (e.g., withdrawing, visible upset, declining to answer numerous questions, shifting in seat, looking away from the interviewer, asking for the interview to end) and should air on the side of caution in all instances. If there is even the slightest indication that participants might be distressed students must immediately follow the procedure below:

- 1) The recording will be immediately stopped and the participant will be asked if they are ok. At this point the participant will be asked if they want to take a break/end the interview/continue talking – the participant's decision will be final. If the participant decides to take a break and continue with the interview, confirmation will be sought that the participant is actually comfortable continuing and they will be reminded there is no penalty for withdrawing.
- 2) If the participant wishes to continue but remains distressed, the interviewer will make the decision to draw the interview to an end. At this point, the interviewer will commit to providing the participant with an opportunity to talk and ensure the participant is not visibly distressed when leaving the interview.
- 3) If the participant remains distressed and the researcher does not feel capable of managing the situation they will contact their respective supervisor who will be available at all times during interviews by phone contact. Depending on the situation, the supervisor will either provide guidance to the student, speak directly to the participant over the phone, or make attempts to go and meet with the researcher and the participant.

- 4) If the participant has become distressed at any point in the interview, the student will ensure the participant has the contact details of the rest of the research team and remind them that they are free to contact any member of the research team if there is anything further they would like to discuss.
- 5) The interviewer will also offer to provide the participants with a list of local contacts (e.g., counselling services, sport psychology services) if they would like them.
- 6) Following the interview, the student will debrief the interview with their supervisor and (if necessary) other senior members of the research team. A written record of the incident and the procedures followed will be made.

Management of Distressed Participants During Interviews

If participant has become distressed at any point you must debrief with supervisor and write up the steps that were taken throughout to manage the situation.



Support resources

<p>Mind Cymru 3rd Floor, Castlebridge 4, Castlebridge, 5-19 Cowbridge Road East, Cardiff CF11 9AB Tel: 029 2039 5123 Email: supporterservices@mind.org.uk Web: https://www.mind.org.uk/</p>	<p>Girls Out Loud Girls Out Loud CIC, 3rd Floor, The Lexicon, Mount Street, Manchester. M2 5NT Tel:0845 164 5034 Email: hello@girlsoutloud.org.uk Web - http://girlsoutloud.org.uk/</p>
<p>Children's Food Trust The Children's Food Trust 3rd Floor 1 East Parade Sheffield S1 2ET Phone: 0114 2996901 Web - http://www.childrensfoodtrust.org.uk/</p>	<p>Be Real Campaign 10-11 Charterhouse Square London EC1M 6EH Tel: 020 7186 9552 Email: bereal@ymca.org.uk Web - https://www.berealcampaign.co.uk/</p>

PARTICIPANT INFORMATION SHEET (03/08/2017: Version 1.0)

Project: The [REDACTED] project – a feasibility study

Contact Details:

[REDACTED]
[REDACTED]

1. Invitation Paragraph

You have been invited to take part in a new study that will investigate the practicality and effectiveness of the [REDACTED] project that you have agreed to take part in. The study aims to evaluate the effects of the project on physical activity participation (how much physical activity you do), physical competence (the range of physical skills you have), self-objectification (how you think of yourself and your body) and nutritional behaviours (what you eat and drink). The data we collect from all the participants who take part in this study will help us create helpful programs.

2. What is the purpose of the study?

The purpose of this study is to assess the effectiveness of the [REDACTED] project in improving physical activity, physical competence, self-objectification and nutritional behaviours in 12-15-year-old girls in [REDACTED]. The data collected will be used in a PhD student's thesis and any subsequent publications to the scientific literature. The findings from the study will also be used by the [REDACTED] to evaluate and develop the program for future years.

3. Why have I been chosen to take part in this study?

You have been chosen to take part in the feasibility study as you have agreed to take part in the [REDACTED] project delivered by [REDACTED] in the academic year 17/18.

4. What will happen if you agree to taking part?

If you agree to take part in the study, you will be asked to take part in several activities. Firstly, you will be invited to take part in the Dragon Challenge, which is a 9-step circuit activity that will involve running, jumping over hurdles, balancing, core agility/flexibility, ball throwing, ball catching and ball bouncing. The Dragon Challenge may be video recorded for academic use only. After this, you will be invited to complete several questionnaires that will ask you questions about how much physical activity you do, what foods and drinks you have and how you think of yourself. You will then be asked to wear an accelerometer for 7 days. An accelerometer is a small black box that is attached to a stretchy elastic band that you wear on your right hip, under your clothes. The accelerometer will measure all of the movement you do during the day and night - wearing it will not interfere with your daily routine. You will be asked to do these activities at the beginning (October 2017) and end of the project (April/June 2018). During the project, you will also be invited to take part in regular focus groups/interviews which will give you an opportunity to tell the research team how you are finding the project, if you think it is helpful and what you like/don't like.

5. What are the possible disadvantages of taking part?

The risks of participating in the Dragon Challenge are no greater than those present at a PE lesson and during the session, a qualified first aider will be present. The disadvantages of taking part are of minimal risk to you however, you may find filling in the questionnaires time consuming and stressful. At the end of the questionnaire sessions, the researcher will hold a debriefing session where you will be able to discuss how you felt filling in the questionnaires and will give you the opportunity to ask any questions that you may have thought of while filling in the questionnaire. You may get a bit fed up of wearing the accelerometer toward the end of the 7 days, but wearing the accelerometer will

not stop you from doing your normal daily activities and nobody will be able to see that you are wearing it.

6. What are the possible benefits of taking part?

By taking part, you will be able to feedback your experiences of the project and help shape future projects in Wales.

7. Will my data and information be kept confidential?

All the data and questionnaire responses will be kept private and confidential; participants will be assigned a personal ID number and all data will be kept in a secure office and all electronic data will be held on password protected files. The data obtained will only be looked at by responsible individuals of the research team from Swansea University, [REDACTED].

8. What if I have any questions?

If you have any questions about what is written above or anything to do with the study please don't hesitate to contact me or anyone from the research team (see contact details above). If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee, [REDACTED].

PARTICIPANT ASSENT FORM

(03/08/2017: Version 1.0)

Project Title:

The [REDACTED] project – a feasibility study

Contact Details:

[REDACTED]
[REDACTED]

- | | |
|---|--------------------------|
| 1. I have read the Participant Information Sheet (03/08/2017 – Version 1.0) | <input type="checkbox"/> |
| 2. I understand what I will be doing if I take part | <input type="checkbox"/> |
| 3. I have had the chance to think about taking part | <input type="checkbox"/> |
| 4. I have had the chance to ask any questions | <input type="checkbox"/> |
| 5. I agree that my data can be used in research reports/papers and that I will not be named so no-one will know it was my information | <input type="checkbox"/> |
| 6. I understand that all of the information will be kept private and only shared with the research team | <input type="checkbox"/> |
| 7. I am happy to try the activities in the Dragon Challenge, complete questionnaires and wear an accelerometer as outlined in the Participant Information sheet | <input type="checkbox"/> |
| 8. I am happy for focus groups and interviews to be audio recorded for academic use | <input type="checkbox"/> |
| 9. I am happy for the Dragon Challenge to be video recorded for academic use ONLY | <input type="checkbox"/> |
| 10. I am happy to take part in this study | <input type="checkbox"/> |

Name of Participant

Date

Signature

Researcher

Date

Signature

PARENT INFORMATION SHEET

(03/08/2017: Version 1.0)

Please read the information below carefully before deciding whether to consent for your child's participation.

Project: The [REDACTED] project – a feasibility study

Contact Details:

[REDACTED]
[REDACTED]

1. Invitation Paragraph

The children attending the [REDACTED] program in your child's school have been invited to take part in a new study that will investigate the feasibility of the project. The study aims to evaluate the effects of the project on physical activity participation, physical competence, self-objectification, body image and nutritional behaviours. The data we collect from all of the participants who take part in this study will help us create effective future intervention programs to increase wellbeing and health in adolescent girls in Wales.

2. What is the purpose of the study?

The purpose of this study is to assess the effectiveness of the [REDACTED] project in improving physical activity, physical competence, self-objectification and nutritional behaviours in 12-15-year-old girls in [REDACTED]. The data collected will be used in a PhD student's thesis and any subsequent publications to the scientific literature. The findings from the study will also be used by [REDACTED] to evaluate and develop the program for future years.

3. Why has my child been chosen?

All of the children taking part in the [REDACTED] program, including your child, have been invited to take part in the study. If your child is unhappy about taking part in the study, they are free to stop at any time, without fear of penalty or further implications. If you or your child need further information about the study and the activities proposed below, please feel free to contact a member of the research team on the details above.

4. What will happen to my child if they take part?

Your child will be asked to take part in several activities. Firstly, they will be invited to take part in the Dragon Challenge, which is a 9-step circuit activity that will involve running, jumping over hurdles, balancing, core agility/flexibility, ball throwing, ball catching and ball bouncing. The Dragon Challenge may be recorded for academic use only. After this, your child will be invited to complete several questionnaires that will ask questions about surrounding physical activity participation, nutrition, self-objectification, body image and self-perception. Your child will then be asked to wear an accelerometer for 7 days which will monitor your child's movement patterns to give a precise measure of physical activity levels. Your child will be asked to complete these activities once at the beginning of the project and once at the end of the project. During the project, your child will also be invited to take part in focus groups/interviews which will give them an opportunity to tell the

research team about how they are finding the project, what they like, what they don't like and what they think can be improved etc.

5. What are the possible disadvantages of taking part?

The risks of participating in the Dragon Challenge are no greater than those present at a PE lesson and during the session, a qualified first aider will be present. Taking part in this study is of minimal risk to your child, however they may find the series of questionnaires tedious and may become fed up of wearing the accelerometer after a few days. Some participants may experience distress when completing the questionnaires. After every questionnaire session, the researcher will hold a debriefing session which will provide a safe space for the participants to talk about any negative emotions they experienced while completing the questionnaires and will provide an opportunity for the participants to ask any questions they may have regarding the material in the questionnaires. In cases where a participant displays prolonged distress, the researcher will provide support along with resources for further information.

6. What are the possible benefits of taking part?

By taking part, your child will be able to feedback their experiences of the project and help shape future projects in Wales.

7. Will my child's data and information be kept confidential?

All the data and questionnaire responses will be kept private and confidential; participants will be assigned a personal ID number and all data will be kept in a secure office and all electronic data will be held on password protected files. The data obtained will only be looked at by responsible individuals of the research team from Swansea [REDACTED]. In some cases, it may be necessary for the researcher to notify a third person if a participant discloses sensitive information that pertains to the participants rights, welfare and/or safety.

8. What if I have any questions?

If you have any questions about what is written above or anything to do with the study please don't hesitate to contact me or anyone from the research team (see contact details above). If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee, [REDACTED].

PARENT CONSENT FORM

(03/08/2017: Version 1.0)

Project Title:

The [REDACTED] project – a feasibility study

Contact Details:

[REDACTED]
[REDACTED]

1. I have read the Parent Information Sheet (26/07/2017: Version 1.0) and have had the opportunity to ask questions

2. I am happy for my child to take part in the study and complete the activities listed in the Parent Information Sheet (26/07/2017: Version 1.0)

3. I understand that my child's participation is voluntary and that I am free to withdraw my child at any time

4. I understand that sections of the data obtained may be looked at by responsible Individual from Swansea University [REDACTED]

5. I am happy for any data collected in this study to be used in any reports/scientific papers

6. I understand that all of the data collected during the study will be anonymised and my child will remain unidentifiable

7. I am happy for focus groups and/or interviews that my child may take part in to be audio recorded

8. I am happy for the Dragon Challenge to be video recorded for academic use ONLY

Name of Participant

Date

Signature

Researcher

Date

Signature

HEAD TEACHER INFORMATION SHEET

(03/08/2017: Version 1.0)

Please read the information below carefully before deciding whether to consent for your schools' participation.

Project: The [REDACTED] project – a feasibility study

Contact Details:

[REDACTED]
[REDACTED]

1. Invitation Paragraph

The children attending the [REDACTED] program in your school have been invited to take part in a new study that will investigate the feasibility of the project and its effectiveness in improving physical activity participation, nutritional behaviours, physical competence, self-objectification and body image. The data we collect from all of the participants who take part in this study will help us create effective future intervention programs to increase wellbeing and health in adolescent girls in Wales.

2. What is the purpose of the study?

The purpose of this study is to assess the effectiveness of the [REDACTED] project in improving physical activity, physical competence, self-objectification and nutritional behaviours in 12-15-year-old girls in [REDACTED]. The data collected will be used in a PhD student's thesis and subsequent publications to the scientific literature. The findings from the study will also be used [REDACTED] to evaluate and develop the program for future years.

3. Why has my school been chosen?

All the schools taking part in the [REDACTED] program have been invited to take part in the study. During the project, if any of the children in your school become unhappy, they are free to stop at any time, without fear of penalty or further implications. If you need further information about the study and the activities proposed below, please feel free to contact a member of the research team on the details above.

4. What will happen to my child if they take part?

Your pupils will be asked to take part in several activities. Firstly, they will be invited to take part in the Dragon Challenge, which is a 9-step circuit activity that will involve running, jumping over hurdles, balancing, core agility/flexibility, ball throwing, ball catching and ball bouncing. The Dragon Challenge may be video recorded for academic use only. After this, your pupils will be invited to complete several questionnaires that will ask questions about surrounding physical activity participation, nutrition, self-objectification, body image and self-perception. Your pupils will then be asked to wear an accelerometer for 7 days which will monitor their movement patterns to give a precise measure of physical activity levels for the week. Pupils will be asked to complete these activities once at the beginning of the project and once at the end of the project. During the project, your pupils will also be invited to take part in focus groups/interviews which will give them an opportunity to tell the research team about how they are finding the project, what they like, what they don't like and what they think can be improved etc.

5. What are the possible disadvantages of taking part?

The risks of participating in the Dragon Challenge are no greater than those present at a PE lesson and during the session, a qualified first aider will be present. Taking part in this study is of minimal risk to your pupils, however they may find the series of questionnaires tedious and may become fed up of wearing the accelerometer after a few days. Some participants may experience distress when completing the questionnaires. After every questionnaire session, the researcher will hold a debriefing session which will provide a safe space for the participants to talk about any negative emotions they experienced while completing the questionnaires and will provide an opportunity for the participants to ask any questions they may have regarding the material in the questionnaires. In cases where a participant displays prolonged distress, the researcher will provide support along with resources for further information.

6. What are the possible benefits of taking part?

By taking part, your pupils will be able to feedback their experiences of the project and help shape future projects in Wales.

7. Will my child's data and information be kept confidential?

All the data and questionnaire responses will be kept private and confidential; participants will be assigned a personal ID number and all data will be kept in a secure office and all electronic data will be held on password protected files. The data obtained will only be looked at by responsible individuals of the research team from Swansea University, [REDACTED]. In some cases, it may be necessary for the researcher to notify a third person if a participant discloses sensitive information that pertains to the participants rights, welfare and/or safety.

8. What if I have any questions?

If you have any questions about what is written above or anything to do with the study please don't hesitate to contact me or anyone from the research team (see contact details above). If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee [REDACTED].

HEADTEACHER CONSENT FORM

(03/08/2017: Version 1.0)

Project Title:

The [REDACTED] project – a feasibility study

Contact Details:

[REDACTED]
[REDACTED]

1. I have read the Head Teacher Information Sheet (03/08/2017: Version 1.0) and have had the opportunity to ask questions
2. I understand that the children's participation is voluntary and that I am free to withdraw my pupils at any time
3. I understand that sections of the data obtained may be looked at by responsible Individual from Swansea University, [REDACTED]
4. I am happy for any data collected in this study to be used in any reports/scientific papers
5. I understand that all the data collected during the study will be anonymised and the children will remain unidentifiable
6. I am happy for focus groups and/or interviews that my child may take part in to be audio recorded
7. I am happy for the Dragon Challenge to be video recorded for academic use ONLY

Name of Participant

Date

Signature

Researcher

Date

Signature

Field Measures of Health and Fitness in Children



Practical Workbook and Training Tool

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1. Introduction

1.1 Swan-Linx Overview

Swan-Linx is a longitudinal project run by A-STEM researchers at Swansea University that collects data on the health, fitness and physical competence of primary age children in Swansea. Schools are invited to attend a Fitness Fun Day where the children take part in a range of health and skill related fitness measures before going back to school to complete the Child Health and Activity Tool (CHAT) with HAPPEN researchers. The CHAT is an online questionnaire that collects data on a wide spectrum of health and lifestyle-related behaviours including; sleep, diet, physical activity, mental health, active travel and environment.

After the Fitness Fun Day, the participating school receives a report comparing their school data with Swansea averages while data of consenting participants is input into the Secure Anonymised Information Linkage (SAIL) databank for linkage to future health records and educational attainment outcomes.

Through Swan-Linx, objective measures of physical competence are collected using the Dragon Challenge V1.0, which is administered during the transition weeks for school children progressing from Primary to Secondary education. The Dragon Challenge is designed as a continuous circuit that enables the efficient assessment of a number of stability, locomotion and manipulative skills that are deemed crucial for successful participation in physical pursuits and sports throughout the life course.

1.2 Field Fitness Test Batteries

There have been many methods to assess the different components of fitness in children over the past few decades. Numerous studies have used a battery of fitness field tests to assess fitness in children in a relatively non-intrusive, cost effective and simple manner (Ekblom et al., 2005). This has allowed fitness testing to evolve from a focus on sporting performance to assessing health-related outcomes (Freedson et al., 2000). There are many fitness testing batteries that have been used; including; AAHPER (American Alliance for Health and Physical Education and Recreation), Youth Fitness Test, YMCA Fitness Trust and FITNESSGRAM in the US (Freedson et al., 2000).

In Europe, possibly the most widely used fitness battery test is EUROFIT (Adam et al., 1988). EUROFIT was developed by the council of Europe and provides data on several components of skill and health-related fitness. It includes simple measures of cardiorespiratory fitness (CRF), agility, hand-eye coordination, BMI, upper body strength, muscular endurance and balance.

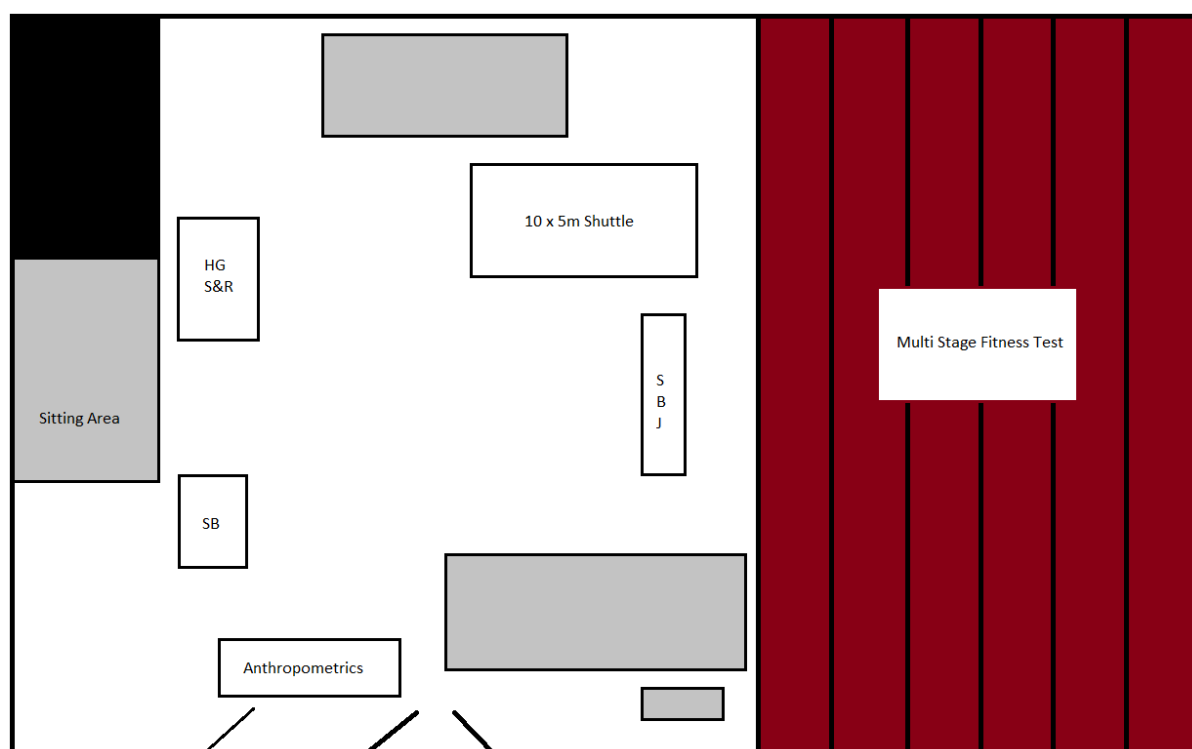
1.3 Swan-Linx Fitness Fun Day Measures

Testing methods used during the Fitness Fun Day (FFD) are based on the same methods used by SportsLinx in Liverpool since 1998. The FFD battery is comprised of 5 circuits stations, 6 measures and the Multi Stage Fitness Test. The measures are designed to capture a range of health-related fitness skills including; agility, speed, flexibility, strength, muscular endurance and cardiorespiratory fitness (CRF). Please see Table 1 for a list of Fitness Fun Day Measurements. Fitness Fun Day activity station sheets and scripts can be found in the Appendices of this manual.

Table 1 – Swan-Linx Fitness Fun Day Measures

Measure	Description	Station Sheet
Anthropometrics	From the children’s measures (height, sitting height and weight), children’s Body Mass Index (BMI) is calculated, and age and gender specific cut-off points are used to provide a percentage of children classed as an unhealthy weight (overweight and obese).	Appendix 1
Speed Bounce	The speed bounce test measures a child’s agility, speed, coordination and stamina. These components of fitness are important in many sports and dance where athletes need to change direction quickly and often.	Appendix 2
Sit and Reach	The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles.	Appendix 3
Handgrip Dynamometer	The handgrip strength test measures the holding strength of the hand and forearm muscles. Generally, people with strong hands tend to be strong elsewhere, so this test is often used as a measure of strength. Each unit is equivalent to lifting 1 bag of sugar.	Appendix 4
5 x 10 Shuttle Run	The objective of this test is to assess the child’s speed and agility by accelerating between marked lines and rapidly changing direction.	Appendix 5
Standing Broad Jump	The standing broad jump is a test that measures the explosive power of the legs. A medium to good standing long jump score is between 115 – 168cm for boys and 105 – 158cm for girls.	Appendix 6
Multi Stage Fitness Test	The 20m multistage shuttle run is a test of running endurance that relies on the heart pumping blood to the large muscles in the legs, as well as breathing increasing to take in oxygen. Research shows that for children of this age, a score of 33 shuttles for boys and 25 shuttles for girls is the threshold for healthy fitness, and children who fail to reach this threshold are at an increased risk of future cardiometabolic diseases.	Appendix 7

1.4 Fitness Fun Day Station Layout



2. Swan-Linx Fitness Fun Day

The Fitness Fun Day is an all-day event that is split into two sessions. In the morning session, a school will bring their Year 5/6 children to the Indoor Training Centre where the first part of the Fitness Fun Day will take place. During the session, the children will engage with a number of different health and fitness measures in small groups (10-14 participants per group). The session will follow a circuit format and the circuit will end when all children have rotated through the stations. Each station will be allocated 15 minutes to measure and record participants, before the next rotation. The circuit will take on average 1 hour and 15 minutes to complete. At the end of the circuit, the children will be invited to take part in the Multistage Fitness Test (also known as Bleep test). When all children have taken part, the school group will then return to their school to complete an online questionnaire in the afternoon session. The Child Health and Activity tool (CHAT) is administered by HAPPEN researchers and asks a number of questions relating to physical activity, wellbeing, nutrition and mental health.

2.1 Diversity, Inclusivity and Respect

Swan-Linx operates under the values set out by Swansea University and works hard to promote and support the participation of all individuals by creating a safe environment that upholds dignity, respect and fairness. Swan-Linx achieves the latter by understanding, respecting, appreciating and recognising difference in individuals and strives to accommodate all participants in their active engagement during the Fitness Fun Day. Swan-Linx expects all researchers, research assistants and partners to operate in line with the above.

2.2 Case Study

Prior to a Fitness Fun Day, Swan-Linx was made aware that an individual who was set to attend the session had severe visual impairment and would be accompanied by a learning assistant. At the beginning of the session, the coordinator worked alongside the participant and learning assistant to assess the level of support the individual would need and how best to modify stations to enable safe participation. The coordinator assigned the participant a research assistant who acted as support and guide through the activities, working closely with the individual and always accompanied by the learning assistant. Throughout the course of the session, the individual was able to confidently take part in the activities and finished the day having taken part in all measures.

3. Swan-Linx Partners

Swan-Linx works in partnership with a number of organisations to deliver the Swan-Linx project. Please see below for partner details and roles within the project.

3.1 HAPPEN – Health and Attainment of Pupils in a Primary Education Network

HAPPEN is a network of health, education and research professionals aimed at improving the health, wellbeing and education outcomes of primary school children in Swansea. In collaboration with the Swan-Linx project, objective and self-reported data is collected on children aged 9-11. This data is fed back to schools through individualised reports comparing the health and wellbeing of their pupils to county averages. Data is presented alongside health guidelines and links to local school-based health initiatives. A novel aspect of HAPPEN is the use of data linkage. This data collected at Fitness Fun Days is linked to anonymous, routinely collected data including GP records, hospital admissions and educational attainment using the SAIL (Secure Anonymised Information Linkage) databank. Finally, this data can be used to evaluate the impact of school-based interventions on outcomes such as fitness, wellbeing and education.

3.1.1 Roles within Swan-Linx

- Delivering afternoon session of Fitness Fun Day
- Handling CHAT data
- Creating and sending out School and Child Fitness Fun Day Reports
- Recruiting potential Swan-Linx schools through HAPPEN network

3.2 Active Young People Team, City and County of Swansea

The Active Young People (AYP) team is funded by Sport Wales and are responsible for providing a variety of exciting sport and physical activity opportunities for young people up to 16 years of age, as part of their school extra-curricular programmes and within their local communities. AYP Swansea would like to see 'every Child Hooked on Sport for Life' and we have several projects to help achieve this across the City, these include; Play to learn, Dragon Multi-skills and Sport, 5x60, physical literacy in the community and Young Ambassadors.

Our aim is to ensure that all children and young people are participating in sport and physical activity, and where appropriate, have the support to excel. AYP is committed to continuing to work with partners to ensure that sporting opportunities are actively encouraged as part of a broader life experience and that the participation gap between those living in poverty and those not is closed.

Having been involved in Swan-Linx since the start of the project in Swansea, AYP Swansea has seen it develop over the years and feel that it provides vital data to help achieve our vision of ‘every child hooked on sport’.

For further information please contact sarah.mccoubrey@swansea.gov.uk - 01792 635414 (Senior Active Young People Sports Development Officer)

3.2.1 Roles within Swan-Linx

- Attending morning session of Fitness Fun Day
- Coordinating and sending Young Ambassadors to morning Fitness Fun Day sessions
- Identifying ‘most wanted’ sport/physical activity session for each Swan-Lin school
- Organising appropriate time for sport/physical activity session with school and Gower College
- Attending sport/physical activity session (quality assurance)

3.3 Gower College

3.3.1 Roles within Swan-Linx

- Providing research assistants for Swan-Linx Fitness Fun Days (morning sessions)
- Liaising with AYP to organise sport/physical activity deliver sessions
- Delivering sport/physical activity session in school

3.4. Swan-Linx Partnership Pathway

Figure 1 below gives a visual pathway detailing the overall Swan-Linx process from Fitness Fun Day to delivery of sport/physical activity sessions and signposting, and what partner(s) are responsible for each step.

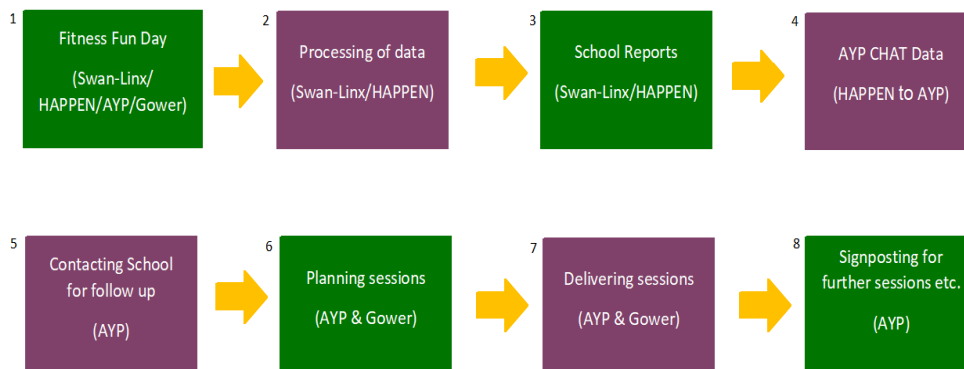


Figure 1: Swan-Linx Partnership Pathway

4. Standing Operating Procedure – Prior to Fitness Fun Day

4.1 Fitness Fun Day Dates

- Agree Fitness Fun Day dates with Fitness Fun Day Group
- Contact Indoor Training Centre and book dates
- Update Fitness Fun Day group of booked testing dates

4.2 School Recruitment

- Draft and send recruitment email to Swan-Linx schools
- Liaise with schools and book into requested testing date – work on first come, first served principle
- Send Fitness Fun Day Information pack to schools
- Request Pre-Fitness Fun Day information from schools (Appendix 8)

4.3 Consent

- Arrange suitable date/time for consent assembly in school
- Liaise with HAPPEN who will attend the assembly to deliver information on CHAT and second part of Fitness Fun Day at school
- Print off consent forms – ensure school code is input into header (e.g. BT20176, CD2018) – (Appendix 9)
- In assembly, cover following areas; introductions, Swan-Linx background information, activities during Fitness Fun Day, doing your best, anonymity, data uses, right to refuse to take part, having fun, consent forms, offering opportunity to ask any questions
- Organise a one week turn around on consent and arrange a suitable time to collect forms from school
- Collect consent and address any issues
- Input and process consent using Consent Template (Appendix 10) sign off all consent forms and store in Swan-Linx locker in ASTEM hub – Bay Campus, Swansea University
- Highlight missing consent and chase up with school

4.4 Equipment

- Book lab equipment with Sport Science Lab at Bay Campus using Excel Booking Form (Appendix 11). Contacts = [REDACTED] – equipment needed - Sitting height stadiometer, SECA digital scales, sit and reach box
- ITC will have other equipment needed for Fitness Fun Day - Other equipment needed will be available to use at the ITC. Inform the ITC staff of what equipment is needed and you will be able to access this from the store cupboards. You will need - Standing Broad Jump mat, 2 x Speed Bounce Mats, Dish/dome markers – 10 x 5m shuttle and station boxes, benches for stations and seating area, Cones for multi stage fitness test. You will have access to the sound system in the ITC which will play audio through an AUX lead (iPod/laptop are ideal)
- Organise remaining Swan-Linx equipment located in A-STEM hub (handgrip dynamometers, standing height stadiometer, 30m measuring tape, pens, stopwatches, blank recording forms, spare participant numbers)
- Transport lab equipment to ITC
- Organise school register and participant numbers (school code and number format e.g. ST1 – ST100)

5. Standard Operating Procedure – On the Fitness Fun Day

- Set up Swan-Linx circuit
- Brief research team
- Send two assistants to collect school from National Pool – leave at 9:20am to meet school at 9:30am
- Welcome school, instruct participants to take coats/jumps off and sit on benches in sitting area
- Introduce yourself to teacher(s) in charge and deliver introduction speech (Appendix 12)
- Register and participant numbers
- Allocate participants into groups (A, B, C, D, E)
- Direct groups to warm up leaders and begin 10-minute warm up
- Stop warm up and direct groups to stations, one group at a time
- Start Swan-Linx circuit, ensuring 15 minutes per station
- In the event that a station finishes before the allotted 15 minutes, request that station researchers play active games with participants to maintain engagement and body temperature
- Track stations and group movements to ensure fluid transitions between stations, keep regular contact with teacher(s) in charge and be on hand for first aid and problem solving
- At the end of station rotations, direct group A, B, C onto sprint track – groups D and E into sitting area to be monitored and controlled by teachers
- Prepare group A, B and C for Multistage fitness test – ensure all participants have shoe laced tied and are aware of the procedure of recording lap achieved with research team. Also make clear that when a participant has finished the MSFT and recorded their lap achieved, the participant is required to engage in a walking cool down that will be running in the middle of the ITC.
- Repeat for groups D and E
- Debrief school in sitting area, inform them of second part of Fitness Fun Day back at school and thank them for their time and participation!
- Allocate 2 research team members to escort school group back to National Pool and wait until school have safely departed.
- Remaining research team members to collect equipment, tidy up ITC and return equipment to secure lockers.
- Debrief entire research team – discuss what went well, what didn't go well and summarise what we can learn from and adapt for the next Fitness Fun Day. Thank research team for attendance

5.1 Risk Assessment



Swan-Linx Risk Assessment

SEVERITY		
Score	Descriptor	Explanation
0	Damage to property	Incident resulting in no injury but causing damage to property or equipment
1	Minor injury/illness	Injury/illness not requiring application of first aid and not involving absence from work/study.
2	Medical attention	Injury/illness requiring medical attention
3	Major injury/illness	Injury/illness resulting in more than 3 days absence from work/study
4	Fatal injury/illness	Injury/illness causing death to an individual
5	Multi-fatalities	Injury/illness causing death to more than one person

Figure 1) Risk Rating system: Severity of the outcome

LIKELIHOOD		
Score	Descriptor	Explanation
0	Inconceivable	Cannot imagine incident will occur. Beyond belief.
1	Remote	Conceivable, but highly unlikely that incident will occur.
2	Unlikely	Doubtful that incident will occur
3	Possible	Feasible chance that incident will occur
4	Probable	Credible chance that incident will occur
5	Certainty	Incident will definitely occur. Sure to happen.

Figure 2) Risk Rating system: Likelihood of occurrence

RISK LEVEL ESTIMATOR							
		LIKELIHOOD					
SEVERITY		Certainty	Probable	Possible	Unlikely	Remote	Inconceivable
		5	4	3	2	1	0
Multi-fatalities	5	25	20	15	10	5	0
Fatal injury	4	20	16	12	8	4	0
Major injury	3	15	12	9	6	3	0
Medical attention	2	10	8	6	4	2	0
Minor injury	1	5	4	3	2	1	0
Damage	0	5*	4*	3*	2*	1*	0

Figure 3) Risk Rating system: Risk Level Estimator

** For health & safety purposes to enable the recording of near miss/damage incidents, the multiplication factor is removed and the appropriate likelihood numeric, applied.*

RISK INDEX TABLE (WORK ACTIVITIES)	
Score	Action
12 – 25	Unacceptable intolerable level of risk, not to proceed unless control measures can be implemented to eliminate or reduce risk to an acceptable level.
8 - 10	High level of risk still requiring documented risk reduction strategies
4 - 6	Moderate level of risk, consequences to be fully considered when completing risk assessment
1 - 3	Low level of risk but still requiring periodic monitoring and review.
0	No action required

Figure 4) Risk Rating System: Risk Index Table Work Activities

RISK ASSESSMENT: Swan-Linx

Page 1 – (Hazards)

School / Unit and Area:	A-STEM Research Unit – School of Sport and Exercise Science	
Risk Assessment undertaken by: <small>Recommended to be 2 or more people</small>	Hannah L Spacey	Prof. Gareth Stratton
	██████████	██████████
Description of the work activity being assessed:	Stations include: 20metre multi-stage fitness test (bleep test), standing height, sitting height, mass, speed bounce, handgrip strength test, sit and reach, 10 x 5m shuttle run, standing broad jump.	
Persons Affected:	Staff <input type="checkbox"/>	Students <input type="checkbox"/> Others <input checked="" type="checkbox"/>
Details of Others:	Year 5 & 6 Primary school pupils (9-11 years old)	

HAZARD IDENTIFICATION		RISK RATING - <u>without</u> Controls			
Please provide details of the hazards associated with the area or task. EXAMPLES INCLUDE: Working at height, Manual Handling, Electricity, Fire, Noise, Contact with moving parts of machinery, Dust etc		The Risk Rating (RR) and Degree of Risk are determined by multiplying the Severity (S) of injury by the Likelihood (L) of occurrence.			
		S	L	RR	Degree of Risk
1	The ITC track: Slips and trips. Surface could be slippery if pupils spill drinks.	1	2	2	Low
2	Equipment: Cones – pupils could trip on cones while playing games, athletics or during bleep test.	1	2	2	Low
3	Speed Bounce: Pupils could potentially trip over the speed bounce divider whilst partaking in activity.	1	3	3	Low
4	Handgrip Strength Test: Pupils could potentially strain their hand/arm if activity is not properly conducted.	1	1	1	Low
5	Sit and Reach: Pupils could potentially injure hamstring/lower back by overstretching.	1	2	2	Low
6	10 x 5m shuttle: Pupils could potentially trip while sprinting between the cones.	1	2	2	Low
7	Standing Broad Jump: Pupils could potentially trip/lose balance when jumping.	1	3	3	Low
8	Bleep test: Pupils may fatigue easily.	1	3	3	Low

CONTROLS TO BE APPLIED Examples Include: Elimination, Substitution for something less hazardous, Barriers or fixed guards, standard operating procedures and personnel protective equipment		Date Applied	RISK RATING - with Controls			
			S	L	RR	Degree of Risk
1	The ITC track – slips and trips. Pupils will be encouraged to wipe their trainers before entering ITC if it has been raining. A designated area for drinks will be away from the activity to avoid slips from drink spillages. Children will be advised to secure shoe laces before starting the session.	22/11/17	1	2	2	Low
2	Cones will be placed to demonstrate the 20-metre distance, but pupils will be told to try and avoid the cones by the research assistant.	22/11/17	1	2	2	Low
3	Pupils will see a demonstration of the correct way to jump over speed bounce divider, and advised to be as careful as possible.	22/11/17	1	2	2	Low
4	Pupils see a demonstration of the correct way to perform the test and will be supervised by trained research assistants throughout.	22/11/17	1	2	2	Low
5	A clear instruction of how to correctly perform the sit and reach will be delivered to the pupils before they attempt the station, and all pupils will be allowed one practice run.	22/11/17	1	2	2	Low
6	The track floor will be cleared to ensure nothing can be tripped over and the pupils will be made aware of the dangers of running into the cones. A full demonstration of the activity will be given of running in between the cones.	22/11/17	1	1	1	Low
7	Pupils will be given a full demonstration of how to perform a safe, effective standing broad jump and will be supervised by research assistants at all times.	22/11/17	1	1	1	Low
8	On the bleep test, pupils are asked to try their very best, however, pupils will be asked to tell an adult if they feel faint / dizzy. They will be asked to take a break and drink plenty of water.	22/11/17	1	2	2	Low
1.	Examples of possible controls: All appliances are to be PAT tested. Any new items are to be reported to estates. Users to undertake visual checks prior to use. Damaged equipment to be removed from use.	07/06/07	4	1	4	Moderate
Date of first assessment:		22/11/2017				
Assessment review dates:	10/08/2018					

6. Fitness Fun Day Data

- Download data from RedCap app and merge with pre-fitness fun day data (linked by participant number)
- Delete any records that do not have full consent
- Clean data set
- Calculate mean scores etc. that are required for the school report mail merge form (Appendix 13)
- Input data into mail merge document and send to HAPPEN
- Send HAPPEN school data set for merging with CHAT data
- Input fully merged data set (Swan-Linx and CHAT) into data sheet for Swan-Linx 5 testing period (2017/2018)

6.1 Calculating Maturity Offset – Excel Formulas

To calculate maturity offsets, split the datasheet by gender (0 = female, 1 = male) in Excel, and input the following formulas, substituting with participant data.

Males

$$=-9.236+(0.0002708*(\text{Leg Length}*\text{Sitting Height}))-(0.001663*(\text{Age}*\text{Leg Length}))+0.007216*(\text{Age}*\text{Sitting Height})+(0.02292*((\text{Weight}/\text{Height})*100))$$

Females

$$=-9.376+(0.0001882*(\text{Leg Length}*\text{Sitting Height}))+0.0022*(\text{Age}*\text{Leg Length}))+0.005841*(\text{Age}*\text{Sitting Height}))-0.002658*(\text{Age}*\text{Weight}))+0.07693*((\text{Weight}/\text{Height})*100))$$

6.2 BMI: IOFT and British Centiles

How to download the Growth Add-in for calculating BMI centiles/cut-offs (excel 2010)

Go to the following website to explain the different options for measuring and interpreting BMI in children:

https://www.noo.org.uk/NOO_about_obesity/measurement/children

Calculating BMI centiles for child populations:

In order to calculate BMI centiles for large numbers of children, the simplest and most accurate method is to use the 'LMS Growth' Microsoft Excel add-in software. Published at:

<http://www.healthforallchildren.com/?product=lmsgrowth>

This software can also be used to calculate centiles and z/SD scores for BMI and other child measurements such as height, weight, and waist circumference, and is available at no charge from Harlow

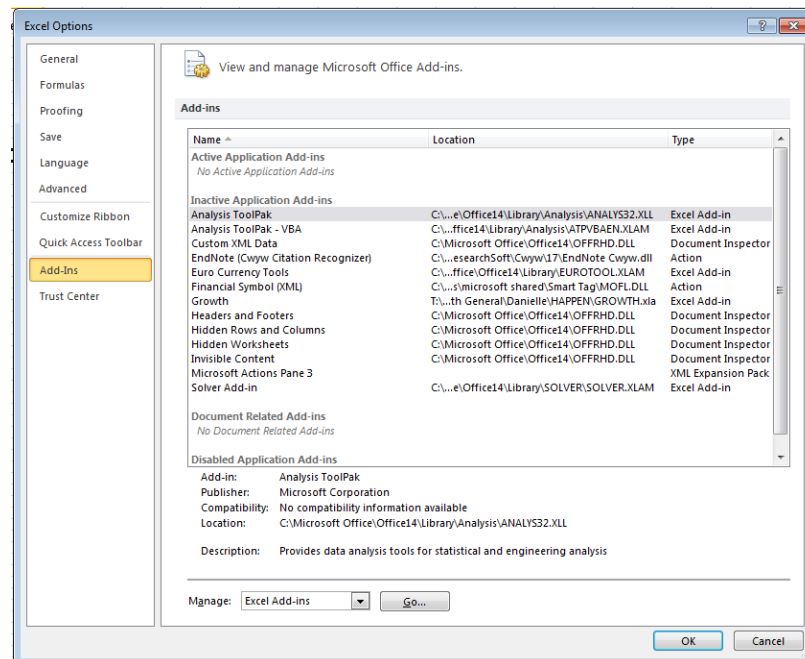
- Download the LMS Growth add-in (should be free to download), and a zip file will appear in your downloads folder
- There are always the README.TXT and GUIDE.PDF to give further instructions for installation.

- First, copy the file BRITISH1990.XLS (in the zip file) and paste in the Excel start up subdirectory or folder named XLSTART. This will be found under C:\Microsoft Office\Office14\XLSTART.

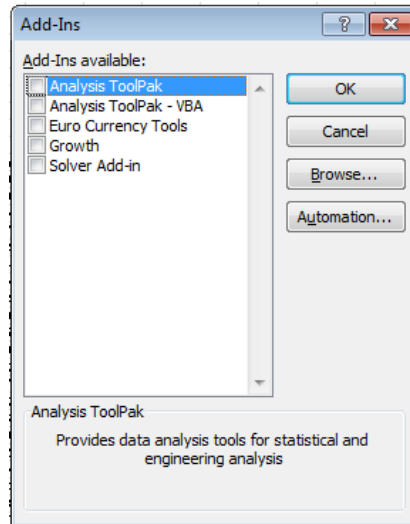
**** © A copy of the 1990 British growth data is included with the software which is subject to copyright and may not be extracted from or utilized in any other software. The copyright includes reproduction in any format. Prior to the software being supplied a copyright license must be agreed.

How to link the Add-in to your current Excel File

- Secondly you need to link the Add-in to the excel file you are using. This can be done by clicking File->Options->Add-ins (on the left-hand side). This will bring up a table...



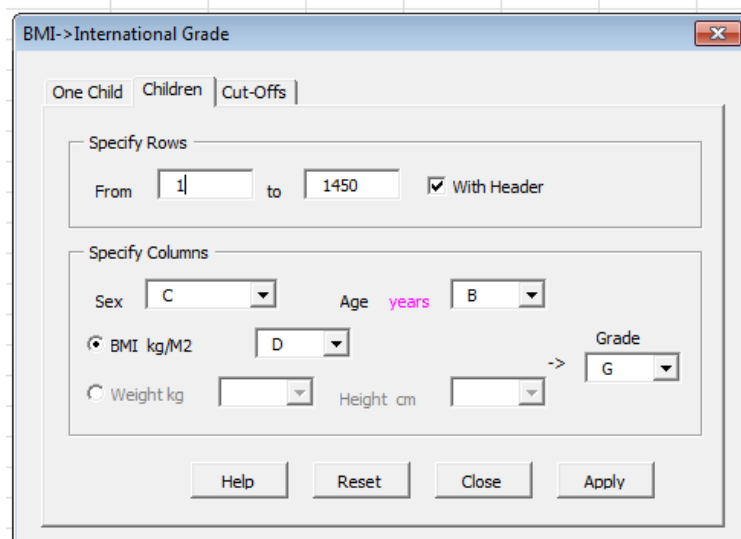
- at the bottom of the table there will be a drop down menu with the heading Manage and the default setting will read Excel Add-ins (see above)
- Provided the drop down menu says Excel add-ins, click GO (not OK), and this will bring up the following pop-up:



- Click in the growth tick box to link the BRITISH 1990 growth reference file to the current file you have open
- This should bring up an additional tab in the toolbar entitle 'Add-ins' and when clicking on this tab the wording LMSgrowth should appear in the top left hand corner with a drop down arrow next to it
- The Add-in is now installed, for further details regarding how to use the Add-in, please see below.

How to use the LMS Growth Add-in to calculate IOTF cut-offs

- Open your database within excel
- In order to calculate the IOTF, the minimum data requirements include age, gender and BMI. If the files are mixed gender needs to be in the following format: 1 or m=male / 2 or f=female
- Click the 'Add-ins' tab on the tool bar, and then the drop-down arrow next to the wording 'LMSgrowth'. Within this drop-down menu select 'BMI to International Grade' to pop-up the following



- Use the one child option if you are just calculating the BMI for an individual
- For a population use the children tab and ensure all the data is included in the 'specify rows' sections and use the 'with header' tick box as appropriate
- Use the drop down menus under 'specify columns' in order to select where the data is, e.g. click column C if the gender information is in column C and follow this through for the rest. The Grade option determines where the new data will be placed.
- Click 'apply'.
- The data will appear as -3, -2, -1, 0, 1, 2 and corresponds as follows:

Grade	BMI range at 18y	Code
Thinness grade 3	<16	-3
Thinness grade 2	16 to <17	-2
Thinness grade 1	17 to <18.5	-1
Normal weight	18.5 to <25	0
Overweight	25 to <30	1
Obesity	30+	2

How to use the LMS Growth Add-in to calculate British cut-offs

- Open your database within excel
- In order to calculate the British cut-offs , the minimum data requirements include age, gender and BMI. If the files are mixed gender needs to be in the following format: 1 or m=male / 2 or f=female
- Click the 'Add-ins' tab on the tool bar, and then the drop-down arrow next to the wording 'LMSgrowth'. Within this drop-down menu select 'Measurement to/from SDS' to pop-up the following

Measurement -> SDS with British1990

Sex: Male | Gestation (weeks): Ignore

Specify Rows
From: 1 to 1450 | With Header:

Specify Age Columns
 Dates
 Age years: []

Specify Measurement Columns

	Measurement	Centile
Height	cm	[]
Weight	kg	[]
BMI	kglm2	[]
Head	cm	[]
Sitht	cm	[]
Legln	cm	[]

Buttons: Help, Reset, Close, Apply

- Under Sex, select either male or female or if the data is mixed, select the corresponding column letter e.g. C
- Ensure all the data is included in the 'specify rows' sections and use the 'with header' tick box as appropriate
- Again, with age, ensure this is selected to the corresponding column letter.
- Where Centile appears in purple, this will originally read as SDS – therefore if you click directly on the purple SDS wording, this will change through various options, so select through until the wording reads Centile.
- Select the corresponding column for the BMI drop down menu and under the Centile Column (for BMI), select the column you would like the new data to appear in
- Click 'Apply'
- Scores for Centiles read as follows:

Underweight: \leq 2nd centile
Healthy weight: >2 - <85 th centile
Overweight: \geq 85th centile
Obese: ≥ 95 th centile

Anthropometrics Script

Explaining the anthropometric measures to children:

	Assessment Item		
	Height	Weight	Sitting Height
What will you do?	You will have to stand as straight as possible with your shoes off then breathe in to best your best height	Stand on the scales without shoes and wear a t-shirt and shorts/gym wear	Sit on the special table and have your height measured from the bottom of your bottom to the top of your head
Why?	We want to record how much you are growing and compare some of your other results to your height	We want to record how much you are growing and compare some of your other results to your weight	We can use this to work out how long your legs are and how you are maturing physically
What will it tell you?	This will tell you how tall you are in centimetres (cm). If you measure your height every 3 months it will tell you how fast you are growing	How heavy you are	How long your legs are. How long your upper body is
Is it competitive?	Not at all, it's your measure and you can't change it	Not at all. But you can have a healthy weight by eating healthy foods and being physically active for at least 60 minutes per day	Not at all, it's your measure and you can't change it
How will you feel after it?	Hopefully you will feel good knowing how tall you are	Some people are worried about their weight and what they weigh. Nobody should be scared about their weight	Hopefully you will feel good knowing how your height is split between your upper and lower body
How can you help others?	Make sure that you help other people by respecting them so they can keep their results to themselves	Make sure that you help other people by respecting them so they can keep their results to themselves	Make sure that you help other people by respecting them so they can keep their results to themselves
Hints for Instructors	Make sure that children know that they can't change their height. Tell them to breathe in, keep their head level and make themselves as tall as possible	It is really important to make sure that you reinforce that you are what you weigh – this is your weight	Make sure that children know that they can't change their height. Tell them to breathe in and make themselves as tall as possible

Speed Bounce Station Sheet

Speed Bounce events are part of the Sporthall series designed for the indoor use of school age competitors. This event is an exciting test of an athlete's speed, rhythm and coordination, involving double footed jumps over a foam wedge.

Equipment

- Stopwatch
- Foam Wedge
- Recording sheets/iPad

Personnel

- 2-3 people

Procedure

Participants must wear suitable footwear – this station is NOT to be completed in bare feet!

- Speed Bounce is a two-footed jump in which the participant must take off on two-feet and land on two-feet. The participants' feet should leave the mat simultaneously leave the mat and simultaneously land on the mat for one jump to be counted.
- The participant should cross the foam wedge as many times as possible within 30 seconds.
- If an incorrect technique is used, the participant should be stopped, offered an explanation and then allowed a fresh trial.
- An official should inform the participant when 10 seconds are remaining.
- The number of CORRECT bounces are counted toward the final score. It is not an offence to brush or clip the foam wedge during the activity.
- A practical trial is allowed – about 5 to 10 bounces provide an ideal opportunity to spot potential problems with technique.
- Participants must complete TWO trials.

Scoring

Two officials should count the 'correct' bounces. To promote participant engagement, researchers should invite the remaining participants to motivate the individuals taking part in the Speed Bounce and take part in the counting of correct bounces.



Speed Bounce Scripts

	Assessment Item – Speed Bounce
What will you do?	A two-footed jump back and forth as many times in 30 seconds.
Why?	This tells us how well coordinated you are and how you can keep this going when you're tired.
What will it tell you?	How fit you are when doing something that requires you to jump quickly in a long burst.
Is it competitive?	Yes, it is. Motivate yourself to keep going when you're tired. Tell yourself to do your best.
How will you feel after it?	You should feel very warm and tired in your legs. If you don't you will not have done your best.
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	This is related to sport and dance performance and related to how well coordinated a child is. It is important to ask children to coordinate their arms and legs and keep their head as central over the barrier as possible. Motivate them by using the group to cheer them on but only if the participant wants them to.

Sit and Reach Station Sheet

The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles. The test is important as tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain. The basic outline of the sit and reach test is described below.

Equipment

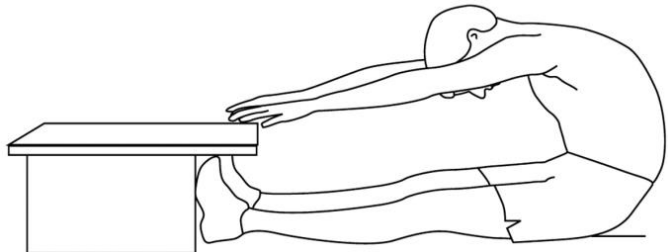
- Sit and reach box
- Recording sheets/iPad

Personnel

- 1-2 people

Procedure

This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed and the soles of the feet are placed flat against the box, shoulder-width apart. Both knees should be locked and pressed flat to the floor – the researcher may assist by holding legs down, just above the knee joint. With the palms facing downwards, and the hands on top of each other or side by side, the participant reaches forward along the measuring line as far as possible and holds for 2 seconds. Ensure that hands stay side by side, not one hand reaching further forward than the other.



Scoring

The score is recorded to the nearest centimetre (cm) as the distance reached by the hand.

Sit and Reach Script

	Assessment Item – Sit and Reach
What will you do?	You will be asked to sit on the floor with your feet pressing against the sit and reach box, before stretching forward. You will have to stretch the muscles at the back of your legs and in your lower back.
Why?	This will tell how far you can stretch and how bendy and flexible you are. The muscles that stretch well are healthier. As you get older you will be less likely to have back pain or get injured playing sport if you have good flexibility.
What will it tell you?	This tells you if you can touch your toes and how bendy your muscles are.
Is it competitive?	No, this is not competitive. In fact, you should stretch forward slowly. You should make sure that you are warm when you do it.
How will you feel after it?	You might feel a little discomfort on the back of the legs but this is because you are making the muscles in the legs and back stretch as far as they can go, safely!
How can you help others?	By following proper instruction and stretching as far as you can go.
Hints for Instructors	Make sure that you inform the participants that muscles become more flexible when they are warm. Also mention some activities that require a lot of flexibility, such as; dance, gymnastics, swimming and remember to state that all activities need a certain amount of flexibility to protect joints.

Handgrip Dynamometer Station Sheet

The purpose of the handgrip strength test is to measure the maximum isometric strength of the hand and forearm muscles. Handgrip strength is important for any sport in which the hands are used for catching, throwing or lifting. Also, as a general rule, people with strong hands tend to be strong elsewhere, so this test is often used as a general test of strength.

Equipment

- Handgrip Dynamometer
- Recording sheets/iPad

Personnel

- 1-2 people

Procedure

- The handle of the dynamometer should be adjusted if required – the base should rest on the first metacarpal (heel of palm), while the handle should rest on the middle of the four fingers.
- The participant holds the dynamometer in the hand to be tested with the arm extended above their head.
- When ready, the subject squeezes the dynamometer with maximum effort (maintained for 305 seconds), they bring their arm down to the side in a smooth motion.
- No other body movement is allowed.
- Make sure both hands are measured!



Scoring

Record the reading for each hand (kg).

Handgrip Dynamometer Script

	Assessment Item – Handgrip Dynamometer
What will you do?	You will adjust the instrument to suit your hand size and then grip it as hard as you can.
Why?	You will do this to give a result for your basic strength.
What will it tell you?	It tells you how hard you can grip things and how strong you are.
Is it competitive?	Yes, you can be competitive against yourself, try as hard as you can – breathing out and shouting ‘AHHHH’ while you squeeze will help you to get a higher score!
How will you feel after it?	You will feel that you have exercised the muscles in your lower arms.
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	Each kg recorded is about the same as a bag of sugar. Tell the children how many bags of sugar they can lift with their fingertips. Another tip is to tell the children what percentage of their body weight they can lift...amazing!

10 x 5m Shuttle Run Station Sheet

The 10 x 5m shuttle run test is a test of speed and agility.

Equipment

- A flat, non-slip surface
- Stopwatch
- Measuring tape
- Marker cones
- Recording sheets/iPad

Personnel

- 2 people

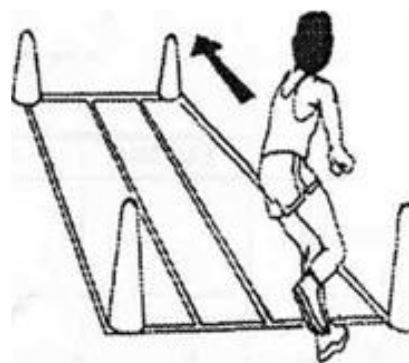
Procedure

- Marker cones and/or lines are placed 5m apart.
- Start with a foot at one marker.
- When instructed by the timer, the participant runs to the opposite marker, turns and returns to the starting line.
- This is repeated until the participant has completed 5 times (covering 50 meters in total).
- At each marker, both feet must fully cross the line!

Scoring

Record the total time taken to complete the 50m course.

Record time to two decimal places e.g. 17.45s



10 x 5m Shuttle Run Script

	Assessment Item – 10 x 5m Shuttle Run
What will you do?	You will sprint back and forth over a 5m distance, ten times.
Why?	This tells us how agile you are and how quickly you can change direction when running at speed.
What will it tell you?	Whether you are fast and agile and how you may use this in sport or dance.
Is it competitive?	Yes, compete against yourself and try to turn as quickly as possible to achieve your best time!
How will you feel after it?	You will feel a little tired but also great after running as fast as you can.
How can you help others?	Help motivate them if they want you to. You could even run with a friend to help motivate them.
Hints for Instructors	This is a measure of speed and agility and crucial for successful performance is sport and dance. The key is to show children how to turn quickly by turning the head to look back in the direction they want to go when they get to the line.

Standing Broad Jump Station Sheet

The standing broad jump, also called the Standing Long Jump, is a common and easy to administer test to measure the explosive power of the participant's legs.

Equipment

- Standing Broad Jump mat
- Recording sheets/iPad

Personnel

- 1-2 people

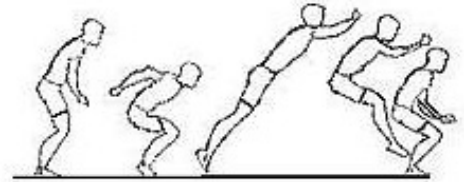
Procedure

- The participant stands behind the line marked on the standing broad jump mat with feet slightly apart.
- A two-foot take-off and landing is used, with the swinging of the arms and bending of the knees to provide forward drive.
- The participant attempts to jump as far as possible, landing on both feet without falling backwards.
- The participant has 3 attempts.

Scoring

The measurement is taken from the take off line to the nearest point of contact on the landing mat (back of heels).

Record the results for each attempt.



Standing Broad Jump Script

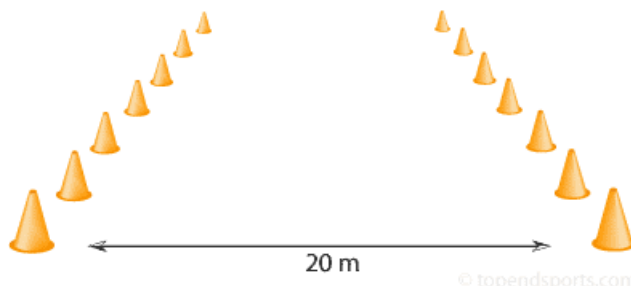
	Assessment Item – Standing Broad Jump
What will you do?	You will jump two-footed as far as you can.
Why?	We want to measure your leg power.
What will it tell you?	How far you can jump and how springy you are. This is good for sports and dance that require leg power.
Is it competitive?	Yes, it is. Make as big an effort as you can. Can you jump your own height?
How will you feel after it?	You should feel good and springy!
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	Being powerful is important for all sports and dance. Tell participants to use their arms as well. What % of their height can they jump?

Multistage Fitness Test Station Sheet

The 20m multistage fitness test (MSFT) is a commonly used maximal running aerobic fitness test. It is also known as the 20m shuttle test, beep or bleep test.

Equipment

- 20m measuring tape
- Marking cones
- Bleep test CD/audio file
- CD player/sound system/laptop or iPod (AUX)
- Recording sheets/iPad
- Flat, non-slip surface



Personnel

- 2 people per bleep test group (max. of 3 groups at any one time) = 6
- 2 people for cool down group
- 3 people for pacing
- Total = 11 people

Procedure

This test involves continuous running between two lines, 20m apart in time to recorded beeps. The subjects stand behind one of the lines facing the second line and begin running when instructed by the CD recording. The subject continues running between the two lines as prompted by the CD recording. After one minute, the beeps will gradually increase in speed, and this will continue for every proceeding minute. If the line is reached before the bleep sound, the participant must stay at the line and wait for the next bleep before making way to next line. If the line is not reached before the bleep sound, the participant is warned and must continue to run to the line, before attempting to catch up with the next bleep. The participant is asked to finish the test if they fail to make the line (within 2 metres) on two consecutive beeps.

Scoring

The participants' score is the number of shuttles reached before they were unable to keep up with the recording. Record the last lap completed (not necessarily the lap stopped at).

Multistage Fitness Test Script

	Assessment Item – Multistage fitness test
What will you do?	You will be asked to run back and forth over a 20m distance in time with a bleep.
Why?	We want to know what your fitness level is. This type of activity puts more demands on your heart, lungs, legs and your ability to keep going. We know that this measure is related to your health.
What will it tell you?	You will run as far as you can and you will know how many 20m shuttles you can complete! If you do 20 shuttles, that means you have completed 400m. A healthy score for girls is 25, and a healthy score for boys is 33.
Is it competitive?	The most important thing about this task is that you do your best and work as hard as you can. We know how hard you are working. This is not a race!!!
How will you feel after it?	You should feel very tired initially and your heart rate and breathing will be much faster than usual, but you will recover quickly during your cool down period. If you want to join back in for fun or to help motivate a friend, you are very welcome to do that.
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	This test has been criticised for not recording accurate results. This is due to low motivation levels of children and not setting the test up in a positive, cooperative atmosphere. When participants stop and get their breath back, they should join back in and help a friend. At the end of the MSFT, the person with the highest score should not be running alone.

Fitness Fun Day Information for Schools

Fitness Fun Day: Information for Schools

Morning Session

Location – Indoor Training Centre, Swansea University

Time – 9.30am – 12.30pm

Activities – Children will take part in anthropometric measurements, standing long jump, 5 x 10m shuttle run, sit and reach, speed bounce, hand grip strength, multi-stage fitness test

Please arrive at the National Pool for 9:30am where a researcher will meet you and escort you to the Indoor Training Centre. We would encourage all children to arrive wearing their gym kits/suitable sporting attire with their own water bottles. We have access to a water machine but are unable to supply bottles or cups for the children to use.

Afternoon Session

Location – Your school

Time – 1:00pm – 3:00pm

Activities – Children will fill in an online health and activity questionnaire.

Please ensure that there are adequate numbers of computers, laptops and tablets for the children to use. The questionnaire can take 30-40 minutes to complete and children are asked to complete the questionnaire independently and in relative silence.

Checklist for Schools

1. Email researcher the total number of children in Year 5 and Year 6 along with a record of participant postcodes, date of birth, school year and gender
2. Distribute consent forms
3. Collect consent forms, ensuring any incomplete forms are filled in before handing back to researcher – INCOMPLETE CONSENT FORMS WILL RESULT IN THE CHILD NOT BEING ABLE TO PARTICIPATE IN THE FITNESS FUN DAY REPORT
4. Arrange transport to and from the Indoor Training Centre (arriving at 9:30am and leaving at 12:30pm)
5. Book appropriate IT facilities and class rooms for the afternoon session

Thank you for your support and we look forward to welcoming you to your fitness fun day soon!

Fitness Fun Day: Information for Schools

Why do we need participant information before the Fitness Fun Day?

Names - we need the names of the children who are expected to attend in order to assign each participant a research number before the fitness fun day. As all of the data we collect in Swan-Linx is anonymous, we use these research numbers to identify the children within the study when we are collecting measurements on the day.

D.O.B - We need the participants D.O.B to calculate decimal age and to calculate accurate BMI/IOFT scores.

School Year - We need to know what school year the children are part of for data sorting (e.g. Year 5, Year 6).

Gender - We need to know the gender of the children as there are variations between measurement norms and formulas. As we don't have the children's names, we need to identify this variable before the fitness fun day and analysis of data.

Postcodes - Swan-Linx needs to have a record of the postcodes for every child in order to work out deprivation codes. The postcodes are also needed for the second part of the day, where the children fill out the online questionnaire. On the first page of the questionnaire, it asks the children to give their postcode but due to the age of the children taking part, some of them may not know this information, hence why we ask for a list. For us to have an idea about where the children reside without knowing who they are, we use postcodes to map the area of residence of each participant. We also use postcodes for data linkage where the parent has consented.

All data is kept on password protected files, on a password protected hard drive which is locked in a secure locker in the A-STEM Research Hub at Swansea University's Bay Campus. After the data has been input and the fitness fun day is completed, any registers etc. are shredded/destroyed.

If you have any questions about the Fitness Fun Day or anything related to the information above, please feel free to contact –

[Redacted contact information]

[Redacted contact information]



PARTICIPANT INFORMATION SHEET
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:



You have been invited to take part in a Swansea University study. You have been chosen because you are between the ages of 8-13 years old and go to a school in Wales.

In this study you have the chance to take part in a fitness fun day, and complete a questionnaire about your health and lifestyle and about how physically active you are.

Physical activity is any movement that requires your body to work harder than it does whilst sitting, or resting. The fitness fun day will involve lots of fun physical activities that you may not have tried before which should be really enjoyable. These activities will include a 20m shuttle run to see how long you can run for, a shuttle sprint to see how quick you can run back and forth, gripping with your hands to find out your strength, sit and reach to find out how flexible you are, standing long jump to see how far you can jump, and speed bounce to see how many times you can jump in 30 seconds. You may also be invited to take part in another fitness fun day over the next year. You will be told when this will happen and are free to withdraw at any point.

You may also get asked to wear our BRAND NEW devices, and use the NEWEST technology to measure how fast you move forwards and backwards, side to side and up and down. This will be worn on your wrist and ankle during some of the physical activities. You may also be video recorded during some of the physical activities. This will help us see how well you have done.

You will not be forced to do any of the activities and can stop at any time without fear of penalty or having to worry about being in trouble.

If you have any questions, please ask.

THANK YOU!











PARTICIPANT ASSENT FORM
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:



<i>Please look at the following statements and put your initials if you agree. Example Sarah Jones: SJ</i>		
	I have read the Participant Information Sheet	<input type="checkbox"/>
	I understand what I will be doing if I take part	<input type="checkbox"/>
	I have had a chance to think about taking part	<input type="checkbox"/>
	I have had a chance to ask any questions	<input type="checkbox"/>
	I agree that my data can be used in a research report and that I will not be named so no-one will know it was my information	<input type="checkbox"/>
	I understand that all of the information will be kept private and only shared with the research team	<input type="checkbox"/>
	I am happy to try to do the activities that the Swan-Linx Team want me to do during the fitness fun day, and complete the questionnaire at both times	<input type="checkbox"/>
	I am happy to take part in this study	<input type="checkbox"/>

Name of Participant

Date

Signature

Researcher

Date

Signature



HEADTEACHER INFORMATION SHEET

(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of Swansea School Children

Contact Details:



1. Invitation Paragraph

The children in your school have been invited to take part in a new study that will look at the relationships between lifestyle behaviours, such as, sitting time, computer game play, fitness, sleep time, type of foods eaten and so forth. Other schools are also taking part in the study. They will be asked to take part in a Fitness Fun Day, where they will complete a series of physical activities and a questionnaire. The data we collect will help us assess different aspects of children's motor skills (physical competency), fitness and lifestyle. Please consider whether you are able to commit to the requirements stated below before signing the consent form.

2. What is the purpose of the study?

The purpose of this study is to investigate the health, motor skills (physical competence), fitness, lifestyle of children from selected schools. The study will also test an accelerometer which measures body movement. The data collected will be used in a postgraduate student's thesis and will assist in tracking children's health, physical activity and physical competency, to decide how best to help children become healthier and more involved in sport and physical activity in the future. The data collected will also be used to map results across Wales. This will help us to further analyse levels of health and fitness in children in terms of demographics.

3. Why have I been chosen?

The children in your school have been invited take part in the Fitness Fun Day as they attend school in Wales. During the day if any of the children do not feel happy about anything they are asked to do, they can stop at any time, without fear of penalty. If you need any more information about the study then please contact any member of the team on the details above.

4. What will happen to the children if they take part?

Your pupils will attend a Fitness Fun Day; this will involve a half day of fun physical activities which will measure the children's strength, speed, agility, endurance and flexibility. These activities include; 20m Multi Stage shuttle runs (measures endurance), 10x5m sprint (measures speed and agility), handgrip (measures strength), sit and reach (measures flexibility), standing long jump (measures leg explosive power), and speed bounce (measures leg speed, agility and endurance).

During these physical activities, some of the children may be asked to wear a sensor called a SlamTracker accelerometer. This device will measure how fast the child moves forwards and backwards, side to side and up and down, and will only be worn during some activities. The activities will be no harder than what a child would do during school PE lessons. The children will also have weight, height and sitting height measurements recorded, take by a member of the research team listed. Measures of body weight are taken privately in a separate room or behind a screen, there will always be other children in the room or next to the screen but they will not be party to the results or be able to view the measures and no results are shared with the rest of the class. Children can choose not to have their anthropometric measurements taken if they do not want to be measured. We have followed this approach with around 70000 children in Liverpool since 1996. Finally, during the Fitness Fun Day session, the children will also be asked complete a questionnaire, about their health, physical activity and lifestyle, which will take about 30 minutes. There will be members of the research team and teachers present to assist the children in filling them in. All the activities during the Fitness Fun Day are aimed for the children's enjoyment and not as a competition. With your permission, a video camera will also be used to capture some of the activities the children are performing.

Your school may also be invited to participate in a further Fitness Fun Day within 12 months of your initial Fitness Fun Day. This helps to evaluate school-based interventions and track changes in children's fitness and health. You are free to withdraw your school at any point.

5. What are the possible disadvantages of taking part?

Taking part in the Fitness Fun Day activities poses no greater risk than a child would face during physical education lessons in school. However, in the unlikely event that a child feels unwell, there will be people monitoring the children during all parts of the fitness fun day, and the children's teachers will remain present at all times. A qualified first aider will always be present during the fitness fun day.

6. What are the possible benefits of taking part?

The Fitness Fun Day will be an active and very enjoyable day for the children and they will get to take part in a variety of different activities that they might not have taken part in before. They will be able to find out about their skills and fitness in relation to health and well-being. Further we want children to engage with their results. Therefore school data will be anonymised and made available to the school for educational purposes.

7. Will my taking part in the study be kept confidential?

All the data we collect from the children will be kept private and confidential; the children's names will be changed to numbers. Any hard copies of the questionnaires and fun day data will be kept in a secure office and computer files with any personal information will be password protected. The data obtained will only be looked at by responsible individuals of the research team from Swansea University and the City & County of Swansea, and the PLPS team (Sport Wales), or from regulatory authorities where it is relevant to the children's participation in the research. To enable us to track changes in health over time we will also keep the secure data available for future linkage with other sets of data collected in the future such as GP visits or educational results for example.

8. What if I have any questions?

If you have any questions about what I have written above or anything to do with the study please don't hesitate to contact me or anyone from the research team as detailed above. If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee, [REDACTED]

HEADTEACHER CONSENT FORM

(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:

[Redacted]
 [Redacted]
 [Redacted]

Please INITIAL each box below

1. I confirm that I have read and understood the information sheet dated 01/06/2017 (Version number 2.0) for the above study and have had the opportunity to ask questions.
2. I understand that the children's participation is voluntary and that I am free to withdraw my pupils at any time, without giving any reason, without their medical care or legal rights being affected.
3. I understand that sections of the data obtained may be looked at by responsible individuals from the Swansea University or from regulatory authorities where it is relevant to the children's taking part in research.
4. I am happy for any data collected in this study to be used in future health related studies where data collected will be linked to health outcomes and educational records
5. I am happy for the activities to be video recorded for academic use ONLY.

I agree to allow the pupils in my school to take part in the above study.

Name of School	Date	Signature
Name of Head Teacher	Date	Signature
Researcher	Date	Signature



PARENT INFORMATION SHEET

(Version 1.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

Contact Details:



Please read the information below carefully before deciding whether to consent for your child's participation.

1. Invitation Paragraph

The children in your child's class have been invited to take part in a new study that will look at the relationships between lifestyle behaviours, such as, sitting time, computer game play, fitness, sleep time, type of foods eaten and so forth. The data we collect from all of the children taking part in the study will help us assess different aspects of children's motor skills (physical competency), fitness and lifestyle.

2. What is the purpose of the study?

The purpose of this study is to investigate motor skills (physical competency), fitness and lifestyle in children. The study will also test an accelerometer which measures body movement. The data collected will be used in a postgraduate student's thesis and will assist in tracking children's health, physical activity and physical competency, to decide how best to help children become healthier and more involved in sport and physical activity in the future. The data collected will also be used to map results across Wales. This will help us to further analyse levels of health and fitness in children in terms of demographics.

3. Why has my child been chosen?

All of the children in your child's class, including your child, have been invited to take part in the Fitness Fun Day. During the day, if your child does not feel happy about anything that they are asked to do, they can stop at any time, without fear of penalty. If you need any more information about the study then please contact any member of the team on the details above.

4. What will happen to your child if they take part?

Your child will attend a Fitness Fun Day with the rest of their class. This will involve a half day of fun physical activities which will measure children's strength, speed, agility,

endurance and flexibility. These activities include; 20m shuttle run (measures endurance), 10x5m sprint (measures speed and agility), handgrip (measures strength), sit and reach (measures flexibility), standing long jump (measures leg explosive power), and speed bounce (measures leg speed, agility and endurance).

During the physical activities, some of the children may be asked to wear the SlamTracker accelerometer. This device will measure how fast your child moves forwards and backwards, side to side and up and down.

Your child will also have weight, height and sitting height measurements recorded, taken by a member of the research team listed. Measures of body weight are taken privately in a separate room or behind a screen, there will always be other children in the room or next to the screen but they will not be party to the results or be able to view the measures and no results are shared with the rest of the class, however, your child will not have to have them taken if they do not want to. All activities will be no harder than your child would do during school PE lessons. Finally, during the Fitness Fun Day session or at your child's school, your child will also be asked complete a questionnaire, about their health, physical activity and lifestyle, which will take about 30 minutes. There will be members of the research team and teachers present to assist your child in filling them in. All the activities during the Fitness Fun Day are aimed for the children's enjoyment and not as a competition. With your permission, a video camera will also be used to capture some of the activities the children are performing.

Your child may also be invited to take part in a further Fitness Fun Day within 12 months of their initial Fitness Fun Day. This can help evaluate school-based interventions and track changes in children's fitness and health. You and your child will be notified when this second Fitness Fun Day will take place, and are free to withdraw at any point.

5. What are the possible disadvantages of taking part?

Taking part in the Fitness Fun Day activities poses no greater risk than a child participating in school physical education lessons. However, in the unlikely event that a child feels unwell, there will be people monitoring the children during all parts of the fitness fun day, and the children's teachers will remain present at all times. A qualified first aider will always be present during the Fitness Fun Day.

6. What are the possible benefits of taking part?

The Fitness Fun Day will be an active and very enjoyable day for the children and they will get to take part in a variety of different activities that they might not have taken part in before. They will be able to find out about their skills and fitness in relation to health and well-being. Further we want children to engage with their results. Therefore school data will be anonymised and made available to the school for educational purposes.

7. Will my child taking part in the study be kept confidential?

All the data we collect from your child will be kept private and confidential; the children's names will be changed to numbers. Any hard copies of the questionnaires and fitness fun day data will be kept in a secure office and computer files with any personal information will be password protected. The data obtained will only be looked at by responsible individuals of the research team from Swansea University, City & County of Swansea, and the PLPS team (Sport Wales), or from regulatory authorities where it is relevant to your child's participation in the research. To enable us to track changes in health over time we will also keep the secure data available for future linkage with other sets of data collected in the future such as GP visits or educational results for example.

8. What if I have any questions?

If you have any questions about what is written above or anything to do with the study,

please don't hesitate to contact me or anyone from the research team (see contact details above). If after the study you are concerned about how any aspect of the research was conducted please contact the Chair of the College Ethics Committee, [REDACTED]

PARENT CONSENT FORM
(Version 2.0, Date: 01/06/2017)

Project Title:

Health, motor skills (physical competency), fitness and lifestyle of School Children in Wales

PLEASE RETURN THIS FORM TO SCHOOL TO CONSENT FOR YOUR CHILD TO TAKE PART IN THE PROJECT.

Contact Details:

████████████████████
████████████████████
████████████████████

Please INITIAL each box below

1. I confirm that I have read and understood the information sheet dated 01/06/2017 (Version number 2.0) for the above study and have had the opportunity to ask questions.
2. I am happy for my child to participate in this Fitness Fun Days and a second Fitness Fun Day within 12 months, and wear the SlamTracker accelerometer.
3. I understand that my child's participation is voluntary and that I am free to withdraw my child at any time, without giving any reason, without their medical care or legal rights being affected.
4. I understand that sections of the data obtained may be looked at by responsible individuals from the Swansea University or from regulatory authorities where it is relevant to the children's taking part in research
5. I am happy for any data collected in this study to be used in future health related studies where data collected will be linked to health outcomes and educational records.
6. I am happy for the activities to be video recorded for academic use ONLY.

I agree to allow my child to take part in the above study.

Name of Participant (child)	Date	Signature
Name of Parent/Guardian	Date	Signature
Researcher	Date	Signature

Lab booking form

Swansea University, Sports Science		Study Info: Equipment and Lab Requirements	
Form A1: Study Information Sheet			
1. Project / Study Title:	Swan-Linx: Fitness Fun Day		
2. Study Type: <small>(Place * next to relevant box)</small>	Dissertation	<input type="checkbox"/>	Other *
	Masters Project	<input type="checkbox"/>	(If other, please explain)
	PhD Project	<input type="checkbox"/>	
	Consultancy	<input type="checkbox"/>	
Give a brief description of study/assessments:			
Swan-Linx aims to measure physical literacy and fitness in children aged 9-11 in Swansea			
3. Dissertation/Study Supervisor:	OFFICE USE ONLY:		
Prof Gareth Stratton	Ethical Approval (EA) obtained?	<small>(Delete as required)</small>	Yes / No
4. Names of all students in study: Hannah Louise Spacey	Risk Assessment (RA) completed?	<small>(Delete as required)</small>	Yes / No
	Copy of EA & RA handed in?	<small>(Delete as required)</small>	Yes / No
	Initial Consultation with Lab Tech	<small>(Delete as required)</small>	Yes / No
	Lab Training Completed?	<small>(Delete as required)</small>	Yes / No
5. Estimated Testing Dates:	From: 7th October 201	To: 30th April 2018	
6. How often are you likely to be testing in lab each week? <small>(e.g. Approx. how many test sessions per week?)</small>	N/A		
7. Equipment required: List all equipment and state how often it is to be used <small>(i.e. How many subjects / tests per subject)</small>			
<small>Equipment (list)</small>	<small>How Often?</small>	<small>Equipment (list)</small>	<small>How Often?</small>
Sitting Height Stadiometer	100 subjects/1 test		14 testing days
Digital Weighing Scales	100 subjects/1 test		14 testing days
Sit and Reach Box	100 subjects/1 test		14 testing days
8. Consumables required: <small>(E.g. lancets, alcohol swabs, EIA electrodes) - be specific</small> <small>(N.B. Post Grad & Research Studies must supply their own consumables)</small>			
<small>Product:</small>	<small>No. required:</small>	<small>Product:</small>	<small>No. required:</small>
9. Supervision: Who will be supervising during your testing in the lab? <small>(This person must be an approved supervisor who is first aid trained)</small>			
10. Has this supervision been arranged and agreed? <small>(delete as required)</small> Yes / No			
10. Student contact details <small>(to liaise re bookings):</small>			
Name: Hannah L Spacey	Email:	Tel. No:	
Name:	Email:	Tel. No:	
Name:	Email:	Tel. No:	
11. Test Information			
Please list the protocols to be used in your test battery and how many times each test			

Study Code:

18/03/2017

Introduction Speech

Thank you for coming to the Indoor Training Centre today! First of all, I need to go over the safety for this morning. In the case of a fire, please head to the nearest exit and make your way to the fire assembly point in the car park. If you injure yourself or feel ill at any time during the morning, please notify myself, your teacher or one of the research team. If you need to use the toilet, please notify myself, your teacher or one of the research team and the same goes for getting drinks, jumpers etc.

Okay, so can anyone tell me what we are doing here today? [children respond with answers].

Wow, great - they are all brilliant answers! So today we would like you to take part in a few different physical activities, some of them you will have tried before, some you won't have. We'd would like you to give everything a go and try your best! It is important to remember that today is all about having fun and so I will ask you to be positive and supportive to your peers and help motivate those who are trying the activities for the first time today.

So, a little background about the Swan-Linx project. The study is looking at the health and fitness of 9-11-year-old children in Swansea. To date, over 3,500 children have been measured and we hope to continue to add to this number until all the primary schools in Swansea have taken part. Does anyone have any questions?

In a moment, your teacher will call out your name and a number. Please come up and collect your number, stick it onto your t-shirt and sit back down as quickly and quietly as possible. Your number will be your new identity during the day and you will need to give your number to the researchers at every station during the morning session. Your number will mean that we won't know your name and so all your data today will remain anonymous. Please make sure you take a mental note of your number as you will need this to complete the online questionnaire this afternoon.

Swan-Linx Fitness Fun Day Training Manual



Research Assistants
2017/2018

1. Statement of Purpose

This manual is designed for members of the Swan-Linx research team as a tool to aid training and to ensure consistency between research groups. The manual should be read and understood by all research assistants before partaking in any Swan-Linx Fitness Fun Day. It is the responsibility of the research assistant to ensure that they fulfil the latter clause.

1.1 Diversity, Inclusivity and Respect

Swan-Linx operates under the values set out by Swansea University and works hard to promote and support the participation of all individuals by creating a safe environment that upholds dignity, respect and fairness. Swan-Linx achieves the latter by understanding, respecting, appreciating and recognising difference in individuals and strives to accommodate all participants in their active engagement during the Fitness Fun Day. Swan-Linx expects all researchers, research assistants and partners to operate in line with the above.

1.2 Case Study

Prior to a Fitness Fun Day, Swan-Linx was made aware that an individual who was set to attend the session had severe visual impairment and would be accompanied by a learning assistant. At the beginning of the session, the coordinator worked alongside the participant and learning assistant to assess the level of support the individual would need and how best to modify stations to enable safe participation. The coordinator assigned the participant a research assistant who acted as support and guide through the activities, working closely with the individual and always accompanied by the learning assistant. Throughout the course of the session, the individual was able to confidently take part in the activities and finished the day having taken part in all measures.

2. Swan-Linx Overview

Swan-Linx is a longitudinal project run by A-STEM researchers at Swansea University that collects data on the health, fitness and physical competence of primary age children in Swansea. Schools are invited to attend a Fitness Fun Day where the children take part in a range of health and skill related fitness measures before going back to school to complete the Child Health and Activity Tool (CHAT) with HAPPEN researchers. The CHAT is an online questionnaire that collects data on a wide spectrum of health and lifestyle-related behaviours including; sleep, diet, physical activity, mental health, active travel and environment.

After the Fitness Fun Day, the participating school receives a report comparing their school data with Swansea averages while data of consenting participants is input into the Secure Anonymised Information Linkage (SAIL) databank for linkage to future health records and educational attainment outcomes.

Through Swan-Linx, objective measures of physical competence are collected using the Dragon Challenge V1.0, which is administered during the transition weeks for school children progressing from Primary to Secondary education. The Dragon Challenge is designed as a continuous circuit that enables the efficient assessment of a number of

stability, locomotion and manipulative skills that are deemed crucial for successful participation in physical pursuits and sports throughout the life course.

3. Swan-Linx Fitness Fun Day

The Fitness Fun Day is an all-day event that is split into two sessions. In the morning session, a school will bring their Year 5/6 children to the Indoor Training Centre where the first part of the Fitness Fun Day will take place. During the session, the children will engage with a number of different health and fitness measures in small groups (10-14 participants per group). The session will follow a circuit format and the circuit will end when all children have rotated through the stations. Each station will be allocated 15 minutes to measure and record participants, before the next rotation. The circuit will take on average 1 hour and 15 minutes to complete. At the end of the circuit, the children will be invited to take part in the Multistage Fitness Test (also known as Bleep test). When all children have taken part, the school group will then return to their school to complete an online questionnaire in the afternoon session. The Child Health and Activity tool (CHAT) is administered by HAPPEN researchers and asks a number of questions relating to physical activity, wellbeing, nutrition and mental health. Please see Table 1 for a list of Fitness Fun Day Measurements. Fitness Fun Day activity station sheets and scripts can be found in the Appendices of this manual.

Table 1: Fitness Fun Day measurements

Morning Session	Afternoon Session
Battery of fitness measures – <ul style="list-style-type: none"> • Anthropometric Measures • Speed Bounce - agility, speed, coordination and stamina • Handgrip – strength • Sit and Reach - flexibility • 10 x 5m Shuttle – speed, agility • Standing Broad Jump – explosive power • Multistage Fitness Test – cardiorespiratory fitness 	Online Questionnaire – CHAT <ul style="list-style-type: none"> • Lifestyle • Wellbeing • Physical Activity • Diet • Sleep • Mental Health

4. Swan-Linx Partners

Swan-Linx works in partnership with a number of organisations to deliver the Swan-Linx project. Please see below for partner details and roles within the project.

4.1 HAPPEN – Health and Attainment of Pupils in a Primary Education Network

HAPPEN is a network of health, education and research professionals aimed at improving the health, wellbeing and education outcomes of primary school children in Swansea. In collaboration with the Swan-Linx project, objective and self-reported data is collected on children aged 9-11. This data is fed back to schools through individualised reports comparing the health and wellbeing of their pupils to county averages. Data is presented alongside health guidelines and links to local school-based health initiatives. A novel aspect of HAPPEN is the use of data linkage. This data collected at Fitness Fun Days is linked to anonymous, routinely collected data including GP records, hospital admissions and educational attainment using the SAIL (Secure Anonymised Information Linkage) databank.

Finally, this data can be used to evaluate the impact of school-based interventions on outcomes such as fitness, wellbeing and education.

4.1.1 Roles within Swan-Linx

- Delivering afternoon session of Fitness Fun Day
- Handling CHAT data
- Creating and sending out School and Child Fitness Fun Day Reports
- Recruiting potential Swan-Linx schools through HAPPEN network

3.2 Active Young People Team, City and County of Swansea

The **Active Young People** (AYP) team is funded by Sport Wales and are responsible for providing a variety of exciting sport and physical activity opportunities for young people up to 16 years of age, as part of their school extra-curricular programmes and within their local communities. AYP Swansea would like to see 'every Child Hooked on Sport for Life' and we have several projects to help achieve this across the City, these include; Play to learn, Dragon Multi-skills and Sport, 5x60, physical literacy in the community and Young Ambassadors.

Our aim is to ensure that all children and young people are participating in sport and physical activity, and where appropriate, have the support to excel. AYP is committed to continuing to work with partners to ensure that sporting opportunities are actively encouraged as part of a broader life experience and that the participation gap between those living in poverty and those not is closed.

Having been involved in Swan-Linx since the start of the project in Swansea, AYP Swansea has seen it develop over the years and feel that it provides vital data to help achieve our vision of 'every child hooked on sport'.

4.2.1 Roles within Swan-Linx

- Attending morning session of Fitness Fun Day
- Coordinating and sending Young Ambassadors to morning Fitness Fun Day sessions
- Identifying 'most wanted' sport/physical activity session for each Swan-Lin school
- Organising appropriate time for sport/physical activity session with school and Gower College
- Attending sport/physical activity session (quality assurance)

4.3. Roles within Swan-Linx

- Providing research assistants for Swan-Linx Fitness Fun Days (morning sessions)
- Liaising with AYP to organise sport/physical activity deliver sessions
- Delivering sport/physical activity session in school

5. Swan-Linx Partnership Pathway

Figure 1 below gives a visual pathway detailing the overall Swan-Linx process from Fitness Fun Day to delivery of sport/physical activity sessions and signposting, and what partner(s) are responsible for each step.

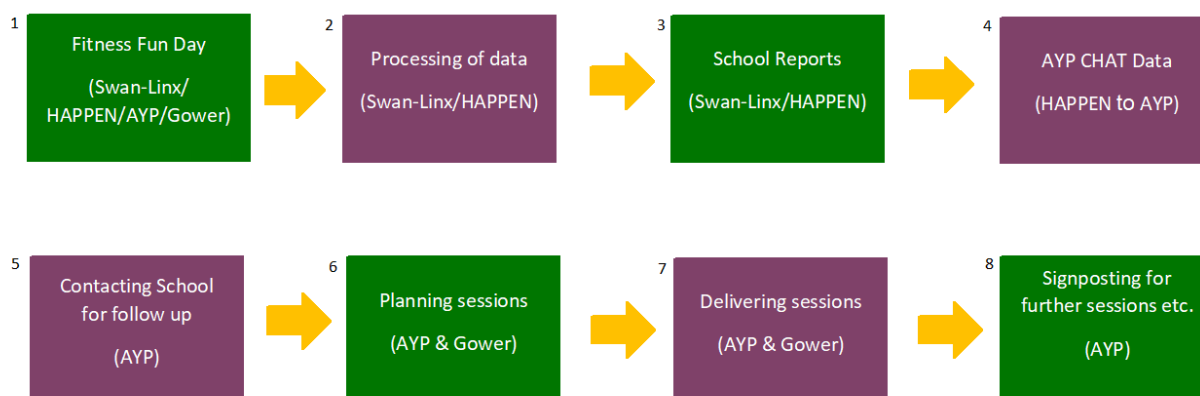


Figure 1: Swan-Linx Partnership Pathway

6. Research Assistant Roles and Responsibilities

During the Fitness Fun Day (morning) session, research assistants will have a number of roles and responsibilities that cover a range of skills such as; accurate measurement, precise data collection, organisation, problem solving and interpersonal communication. Research assistants are expected to approach these tasks with efficiency and professionalism at all times.

6.1 Research Assistant Operational Procedures – Fitness Fun Day (AM) session

1. Research assistants arrive at Indoor Training Centre by 8:30am
2. Research assistants to set up stations, organise sitting area and partake in a team briefing led by Swan-Linx coordinator (discussion topics: school information, expected number of participants, station timings, station allocations, warm up leader allocation, Q&A, any other business)
3. Two research team members will leave ITC at 9:15am to collect school from National Pool
4. School arrives at ITC – welcome!
5. Introduction and Fitness Fun Day briefing – Swan-Linx Coordinator
6. Swan-Linx coordinator to read register, allocate participant numbers and assign participants into groups
7. Research assistants to collect participant group and escort to warm up area
8. Research assistants to deliver appropriate warm up session for 10 minutes
9. At end of warm up, research assistants to lead participant group to Fitness Fun Day circuit station and when all groups are at correct stations, the session will begin
10. Research assistants are expected to conduct the station as follows;
 - a. **Greet your participants** – ‘Hello, Group A! How are you today?’.
 - b. **Introduce yourself** – ‘My name is Ben and I am a member of the Swan-Linx Research team’.

- c. **Demonstrate activity** – ‘Okay so can anyone tell me what they think we will be doing on this station today? [children answer]. Yes, they are all great answers! So, this station is called the Standing Broad Jump and it’s designed to test the explosive power in your legs. I am going to talk you through what I would like you to do and I will then demonstrate how I would like to do it’.
- d. **Organise group** – ‘Okay, so now that I have explained the station to you and demonstrated how to do the activity, I am going to organise you into numerical order and this will be the order that you will have your go at the activity’.
- e. **Measure outputs** – please ensure accurate measurement of activity output for all participants and stations.
- f. **Record outputs** – please ensure accurate recording of activity output, paying special attention to the preferred metric unit
- g. **Engage group** – Each group will be given 15 minutes at each station; however, some stations will be finished before others. Research assistants are expected to keep participants engaged and moving during the waiting period. No participants should be sitting down during this time. A good use of this time is to communicate with the group about sports and physical activities by creating a quick game.
 - 1. ‘Who likes’ Game example –
 - a. Get group to line up in a line
 - b. Instruct participants to run to another line and back if the statement applies to them
 - c. Statements can include –
 - i. Who likes football?
 - ii. Who likes hockey?
 - iii. Who likes running?
 - iv. Who likes swimming?
 - v. Who likes the colour blue?
 - vi. Who likes the colour green?
 - vii. Who has a dog?
 - viii. Who has a cat?
 - d. Please ensure that the ‘Who likes’ questions are inclusive, age appropriate and not likely to cause any negative feelings, feelings of exclusion or discrimination.
- h. **Rotation** – One research assistant are expected to escort their group to their next station while the other research assistant is expected to welcome and greet the new station group
- i. **Multistage Fitness Test** – The multistage fitness test is the last measure that the participants will be invited to take part in in the Fitness Fun Day. Research assistants are expected to follow the guidance of the Swan-Linx coordinator who will be overseeing the organisation and running order of the MSFT. During the MSFT, research assistants will be responsible for;
 - a. Guiding their participant group to relevant area (on 80m sprint track if group is running MSFT or into sitting area if group is waiting to take part)

- b. Delivering a quick recap of the relevant information needed by participants to successfully run the MSFT (
 - i. What bleep to go on
 - ii. Which line to run to
 - iii. Number of shuttles missed to be disqualified,
 - iv. Participant needs to keep track of laps while running in order to report lap achieved to research assistant for data collection
 - v. Start slow, run at same pace as pacer
 - vi. When participant drops out they need to give their participant number and lap achieved to research assistant
 - vii. Participant to engage in cool down after exiting the MSFT
 - viii. Participant can jump back into the MSFT for motivation/support of remaining runners
- c. There will be 3 research assistants assigned to each MSFT track (3 tests will run at the same time)
 - i. Research assistant 1 = recording data
 - ii. Research assistant 2 = monitoring
 - iii. Research assistant 3 = pacing
- d. Cool down – 2 research assistants will be allocated to organise and run the cool down section
 - i. Instruct participants to walk up and down ITC (from high jump mat to pole vault mat) five times
- e. Rotate and repeat for last groups
- j. **End of session roles** – while Swan-Linx coordinator is debriefing school, research assistants are expected to QUIETLY pack up stations and organise equipment ready for storage. Research assistants are expected to say Goodbye to the school group as they leave, see below for examples of things to say
 - a. 'Thank you for a great day'
 - b. 'Have a safe journey'
 - c. 'Great job everyone!'
 - d. 'Goodbye!'
 - e. 'Well done!!!'
- k. **Escorting school** - Two research assistants will escort school back to National pool and wait until group has safely boarded the bus, before returning to the Indoor Training Centre
- l. **Session Debrief** – The Swan-Linx coordinator will run a debriefing session with the research team to summaries session (discussion topics: what went well, what didn't go so well, future risk management, feedback, reminder

of date of next session, any other business). Research assistants will be dismissed and can leave the Indoor Training Centre.

- m. **Sport/physical activity session at school** – research assistants will be delivering a session of the ‘most wanted’ sport/physical activity at the Swan-Linx school. This will be organised and overseen by the Active Young People team and Gower College lecturers.

Swan-Linx Coordinator – [REDACTED]

Swan-Linx Principle Investigator – [REDACTED]

Anthropometrics Script

Explaining the anthropometric measures to children:

	Assessment Item		
	Height	Weight	Sitting Height
What will you do?	You will have to stand as straight as possible with your shoes off then breathe in to best your best height	Stand on the scales without shoes and wear a t-shirt and shorts/gym wear	Sit on the special table and have your height measured from the bottom of your bottom to the top of your head
Why?	We want to record how much you are growing and compare some of your other results to your height	We want to record how much you are growing and compare some of your other results to your weight	We can use this to work out how long your legs are and how you are maturing physically
What will it tell you?	This will tell you how tall you are in centimetres (cm). If you measure your height every 3 months it will tell you how fast you are growing	How heavy you are	How long your legs are. How long your upper body is
Is it competitive?	Not at all, it's your measure and you can't change it	Not at all. But you can have a healthy weight by eating healthy foods and being physically active for at least 60 minutes per day	Not at all, it's your measure and you can't change it
How will you feel after it?	Hopefully you will feel good knowing how tall you are	Some people are worried about their weight and what they weigh. Nobody should be scared about their weight	Hopefully you will feel good knowing how your height is split between your upper and lower body
How can you help others?	Make sure that you help other people by respecting them so they can keep their results to themselves	Make sure that you help other people by respecting them so they can keep their results to themselves	Make sure that you help other people by respecting them so they can keep their results to themselves
Hints for Instructors	Make sure that children know that they can't change their height. Tell them to breathe in, keep their head level and make themselves as tall as possible	It is really important to make sure that you reinforce that you are what you weigh – this is your weight	Make sure that children know that they can't change their height. Tell them to breathe in and make themselves as tall as possible

Speed Bounce Station Sheet

Speed Bounce events are part of the Sporthall series designed for the indoor use of school age competitors. This event is an exciting test of an athlete's speed, rhythm and coordination, involving double footed jumps over a foam wedge.

Equipment

- Stopwatch
- Foam Wedge
- Recording sheets/iPad

Personnel

- 2-3 people

Procedure

Participants must wear suitable footwear – this station is NOT to be completed in bare feet!

- Speed Bounce is a two-footed jump in which the participant must take off on two-feet and land on two-feet. The participants' feet should leave the mat simultaneously leave the mat and simultaneously land on the mat for one jump to be counted.
- The participant should cross the foam wedge as many times as possible within 30 seconds.
- If an incorrect technique is used, the participant should be stopped, offered an explanation and then allowed a fresh trial.
- An official should inform the participant when 10 seconds are remaining.
- The number of CORRECT bounces are counted toward the final score. It is not an offence to brush or clip the foam wedge during the activity.
- A practical trial is allowed – about 5 to 10 bounces provide an ideal opportunity to spot potential problems with technique.
- Participants must complete TWO trials.

Scoring

Two officials should count the 'correct' bounces. To promote participant engagement, researchers should invite the remaining participants to motivate the individuals taking part in the Speed Bounce and take part in the counting of correct bounces.



Speed Bounce Scripts

	Assessment Item – Speed Bounce
What will you do?	A two-footed jump back and forth as many times in 30 seconds.
Why?	This tells us how well coordinated you are and how you can keep this going when you're tired.
What will it tell you?	How fit you are when doing something that requires you to jump quickly in a long burst.
Is it competitive?	Yes, it is. Motivate yourself to keep going when you're tired. Tell yourself to do your best.
How will you feel after it?	You should feel very warm and tired in your legs. If you don't you will not have done your best.
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	This is related to sport and dance performance and related to how well coordinated a child is. It is important to ask children to coordinate their arms and legs and keep their head as central over the barrier as possible. Motivate them by using the group to cheer them on but only if the participant wants them to.

Sit and Reach Station Sheet

The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles. The test is important as tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain. The basic outline of the sit and reach test is described below.

Equipment

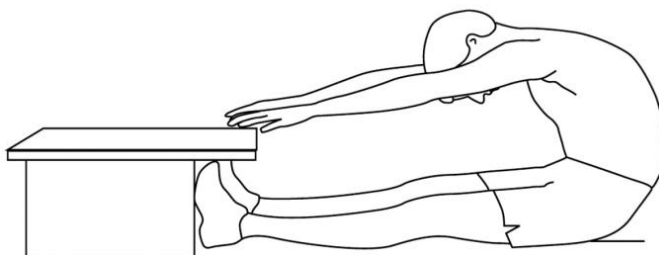
- Sit and reach box
- Recording sheets/iPad

Personnel

- 1-2 people

Procedure

This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed and the soles of the feet are placed flat against the box, shoulder-width apart. Both knees should be locked and pressed flat to the floor – the researcher may assist by holding legs down, just above the knee joint. With the palms facing downwards, and the hands on top of each other or side by side, the participant reaches forward along the measuring line as far as possible and holds for 2 seconds. Ensure that hands stay side by side, not one hand reaching further forward than the other.



Scoring

The score is recorded to the nearest centimetre (cm) as the distance reached by the hand.

Sit and Reach Script

	Assessment Item – Sit and Reach
What will you do?	You will be asked to sit on the floor with your feet pressing against the sit and reach box, before stretching forward. You will have to stretch the muscles at the back of your legs and in your lower back.
Why?	This will tell how far you can stretch and how bendy and flexible you are. The muscles that stretch well are healthier. As you get older you will be less likely to have back pain or get injured playing sport if you have good flexibility.
What will it tell you?	This tells you if you can touch your toes and how bendy your muscles are.
Is it competitive?	No, this is not competitive. In fact, you should stretch forward slowly. You should make sure that you are warm when you do it.
How will you feel after it?	You might feel a little discomfort on the back of the legs but this is because you are making the muscles in the legs and back stretch as far as they can go, safely!
How can you help others?	By following proper instruction and stretching as far as you can go.
Hints for Instructors	Make sure that you inform the participants that muscles become more flexible when they are warm. Also mention some activities that require a lot of flexibility, such as; dance, gymnastics, swimming and remember to state that all activities need a certain amount of flexibility to protect joints.

Handgrip Dynamometer Station Sheet

The purpose of the handgrip strength test is to measure the maximum isometric strength of the hand and forearm muscles. Handgrip strength is important for any sport in which the hands are used for catching, throwing or lifting. Also, as a general rule, people with strong hands tend to be strong elsewhere, so this test is often used as a general test of strength.

Equipment

- Handgrip Dynamometer
- Recording sheets/iPad

Personnel

- 1-2 people

Procedure

- The handle of the dynamometer should be adjusted if required – the base should rest on the first metacarpal (heel of palm), while the handle should rest on the middle of the four fingers.
- The participant holds the dynamometer in the hand to be tested with the arm extended above their head.
- When ready, the subject squeezes the dynamometer with maximum effort (maintained for 305 seconds), they bring their arm down to the side in a smooth motion.
- No other body movement is allowed.
- Make sure both hands are measured!



Scoring

Record the reading for each hand (kg).

Handgrip Dynamometer Script

	Assessment Item – Handgrip Dynamometer
What will you do?	You will adjust the instrument to suit your hand size and then grip it as hard as you can.
Why?	You will do this to give a result for your basic strength.
What will it tell you?	It tells you how hard you can grip things and how strong you are.
Is it competitive?	Yes, you can be competitive against yourself, try as hard as you can – breathing out and shouting ‘AHHHH’ while you squeeze will help you to get a higher score!
How will you feel after it?	You will feel that you have exercised the muscles in your lower arms.
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	Each kg recorded is about the same as a bag of sugar. Tell the children how many bags of sugar they can lift with their fingertips. Another tip is to tell the children what percentage of their body weight they can lift...amazing!

10 x 5m Shuttle Run Station Sheet

The 10 x 5m shuttle run test is a test of speed and agility.

Equipment

- A flat, non-slip surface
- Stopwatch
- Measuring tape
- Marker cones
- Recording sheets/iPad

Personnel

- 2 people

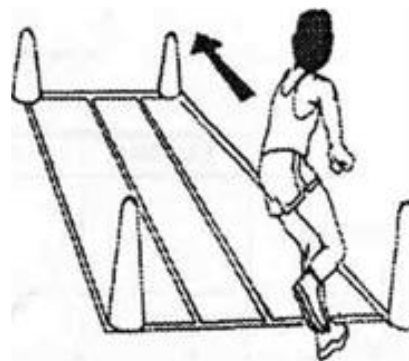
Procedure

- Marker cones and/or lines are placed 5m apart.
- Start with a foot at one marker.
- When instructed by the timer, the participant runs to the opposite marker, turns and returns to the starting line.
- This is repeated until the participant has completed 5 times (covering 50 meters in total).
- At each marker, both feet must fully cross the line!

Scoring

Record the total time taken to complete the 50m course.

Record time to two decimal places e.g. 17.45s



Standing Broad Jump Station Sheet

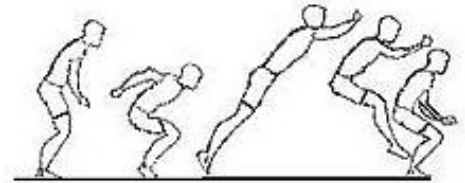
The standing broad jump, also called the Standing Long Jump, is a common and easy to administer test to measure the explosive power of the participant's legs.

Equipment

- Standing Broad Jump mat
- Recording sheets/iPad

Personnel

- 1-2 people



Procedure

- The participant stands behind the line marked on the standing broad jump mat with feet slightly apart.
- A two-foot take-off and landing is used, with the swinging of the arms and bending of the knees to provide forward drive.
- The participant attempts to jump as far as possible, landing on both feet without falling backwards.
- The participant has 3 attempts.

Scoring

The measurement is taken from the take off line to the nearest point of contact on the landing mat (back of heels).

Record the results for each attempt.

Standing Broad Jump Script

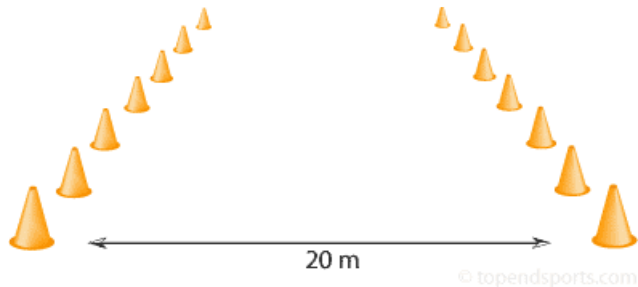
	Assessment Item – Standing Broad Jump
What will you do?	You will jump two-footed as far as you can.
Why?	We want to measure your leg power.
What will it tell you?	How far you can jump and how springy you are. This is good for sports and dance that require leg power.
Is it competitive?	Yes, it is. Make as big an effort as you can. Can you jump your own height?
How will you feel after it?	You should feel good and springy!
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	Being powerful is important for all sports and dance. Tell participants to use their arms as well. What % of their height can they jump?

Multistage Fitness Test Station Sheet

The 20m multistage fitness test (MSFT) is a commonly used maximal running aerobic fitness test. It is also known as the 20m shuttle test, beep or bleep test.

Equipment

- 20m measuring tape
- Marking cones
- Bleep test CD/audio file
- CD player/sound system/laptop or iPod (AUX)
- Recording sheets/iPad
- Flat, non-slip surface



Personnel

- 2 people per bleep test group (max. of 3 groups at any one time) = 6
- 2 people for cool down group
- 3 people for pacing
- Total = 11 people

Procedure

This test involves continuous running between two lines, 20m apart in time to recorded beeps. The subjects stand behind one of the lines facing the second line and begin running when instructed by the CD recording. The subject continues running between the two lines as prompted by the CD recording. After one minute, the beeps will gradually increase in speed, and this will continue for every proceeding minute. If the line is reached before the bleep sound, the participant must stay at the line and wait for the next bleep before making way to next line. If the line is not reached before the bleep sound, the participant is warned and must continue to run to the line, before attempting to catch up with the next bleep. The participant is asked to finish the test if they fail to make the line (within 2 metres) on two consecutive beeps.

Scoring

The participants' score is the number of shuttles reached before they were unable to keep up with the recording. Record the last lap completed (not necessarily the lap stopped at).

Multistage Fitness Test Script

	Assessment Item – Multistage fitness test
What will you do?	You will be asked to run back and forth over a 20m distance in time with a bleep.
Why?	We want to know what your fitness level is. This type of activity puts more demands on your heart, lungs, legs and your ability to keep going. We know that this measure is related to your health.
What will it tell you?	You will run as far as you can and you will know how many 20m shuttles you can complete! If you do 20 shuttles, that means you have completed 400m. A healthy score for girls is 25, and a healthy score for boys is 33.
Is it competitive?	The most important thing about this task is that you do your best and work as hard as you can. We know how hard you are working. This is not a race!!!
How will you feel after it?	You should feel very tired initially and your heart rate and breathing will be much faster than usual, but you will recover quickly during your cool down period. If you want to join back in for fun or to help motivate a friend, you are very welcome to do that.
How can you help others?	Help motivate them if they want you to.
Hints for Instructors	This test has been criticised for not recording accurate results. This is due to low motivation levels of children and not setting the test up in a positive, cooperative atmosphere. When participants stop and get their breath back, they should join back in and help a friend. At the end of the MSFT, the person with the highest score should not be running alone.

Appendix III: Child Health and Activity Tool (CHAT): Online Questionnaire

CHAT
* Required



About You



1. ID number (from fitness fun day) *

2. School Name *


3. What year are you in? *

Mark only one oval.

- Year 5
 Year 6
 Year 7

4. Gender *

Mark only one oval.

	
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Boy

Girl

Date of Birth

5. Year *

Mark only one oval.

- 2005
 2006
 2007
 2008
 2009
 2010

6. Month *

Mark only one oval.

- January
 February
 March
 April
 May
 June
 July
 August
 September
 October
 November
 December

7. Day *

Mark only one oval.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31

8. Postcode *

9. Do you consider yourself to have a disability or health problem? *

Check all that apply.

- No
- Yes - Wheelchair user
- Yes - Physical disability
- Yes - Blind or have low vision
- Yes - Deaf or poor hearing
- Yes - Learning difficulty
- Yes - Mental health difficulty e.g. Anxiety, Depression
- Yes - Health condition e.g. Asthma, Diabetes, Epilepsy
- Other: _____

YESTERDAY



Firstly, think carefully about what you did YESTERDAY
and then answer the following questions....

10. 1a. What did you eat for breakfast YESTERDAY? *
Check all that apply.

 Nothing


Nothing

 Cereal

Sugary cereal e.g. coco pops, frosties, sugar puffs, chocolate cereals

 Cereal

Healthy cereal e.g. porridge, weetabix, readybrek, muesli, branflakes, cornflakes

 Snacks

Snacks

 Fruit

Fruit

 Toast

Toast

 Cooked Breakfast


Cooked breakfast

 Yoghurt

Yoghurt

Other: _____

11. 1b. What did you have to drink for breakfast YESTERDAY? *
Check all that apply.

 Nothing	 Water
<input type="checkbox"/> Nothing	<input type="checkbox"/> Water
 Milk	 Fruit Juice
<input type="checkbox"/> Milk	<input type="checkbox"/> Fruit juice e.g. orange juice, apple juice
 Squash	 Energy Drink
<input type="checkbox"/> Squash	<input type="checkbox"/> Energy drink e.g. lucozade, red bull, monster
 Fizzy Drink	 Diet Fizzy Drink
<input type="checkbox"/> Fizzy drink e.g. coke, sprite <input type="checkbox"/> Other: _____	<input type="checkbox"/> Diet fizzy drink e.g. diet coke, diet fanta

12. 2. BEFORE LESSONS STARTED YESTERDAY, how much time did you spend being active? *





This includes doing any activities where your heart beat faster, you breathed faster & you felt warmer

- Mark only one oval.
- Less than 10 minutes
 - 10 to 30 minutes
 - More than 30 minutes to 1 hour
 - More than 1 hour



13. 3. How did you get to school YESTERDAY morning? *

(Mark only one oval.)

 On the bus	 On bike
--	---

On the bus

On bike

 In the car/taxi	 Walked
---	--

In the car/taxi

Walked

 Ran/jogged	 Scooter
--	---

Ran/jogged

Scooter

 Skateboarded/Rollerbladed

Skateboarded/Rollerbladed



14. 4a. What did you have to eat for lunch YESTERDAY? *

(Mark only one oval.)

- School dinner
- Packed lunch
- Nothing

15. 4b. What did you have to drink for lunch YESTERDAY? *
Check all that apply.

 Water	 Fruit Juice
--	--

Water Fruit Juice

 Fizzy Drink	 Diet Fizzy Drink
--	---

Fizzy drink Diet fizzy drink

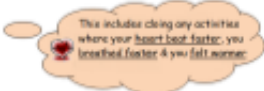
 Squash	 Energy Drink
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Squash Energy drink

 Milk	 Nothing
---	--

Milk Nothing

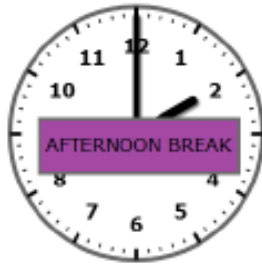
16. 5. What did you do for MOST of your break-times YESTERDAY? (This includes lunchtime) *
Mark only one oval.

	
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Sat around inside or outside Ran around

	
---	---

Stood around Walked around



17. 6. Do you have an afternoon break at school? *



Mark only one oval.

YES

NO


18. 7. How did you get home YESTERDAY? *

Mark only one oval.

 On the bus	 On bike
--	---

On the bus

On bike

 In the car/taxi	 Walked
---	--

In the car/taxi

Walked

 Ran/jogged	 Scooter
--	---

Ran/jogged

Scooter

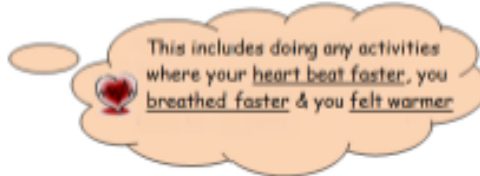
 Skateboarded/Rollerbladed

Skateboarded/Rollerbladed

AFTER SCHOOL



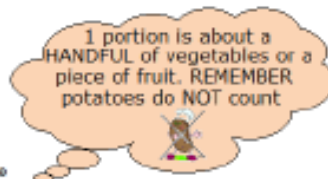
19. 8. AFTER SCHOOL YESTERDAY, how long did you spend being active? *



Mark only one oval.

- Less than 10 minutes
- 10 to 30 minutes
- More than 30 minutes to 1 hour
- More than 1 hour to 2 hours
- More than 2 hours

20. 9. How many portions of fruit and vegetables did you eat YESTERDAY? *



Mark only one oval.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8+

21. 10. How many times did you brush your teeth YESTERDAY? *

Mark only one oval.

	
---	---

0

1

	
---	--

2

More than 2

22. 11. What time did you fall asleep YESTERDAY (to the nearest half hour)? *



Mark only one oval.

- 7:00pm
 - 7:30pm
 - 8:00pm
 - 8:30pm
 - 9:00pm
 - 9:30pm
 - 10:00pm
 - 10:30pm
 - 11:00pm
 - 11:30pm
 - 12:00am
 - 12:30am
 - 1:00am
 - 1:30am
 - 2:00am
 - 3:00am
 - 3:30am
 - 4:00am
-

23. 12. What time did you wake up TODAY (to the nearest half hour)? *



Mark only one oval.

- 5.00am
- 5.30am
- 6.00am
- 6.30am
- 7.00am
- 7.30am
- 8.00am
- 8.30am
- 9.00am
- Other: _____

THE LAST WEEK

NOW think about what you did in the last 7 days...



24. 13. In the last 7 days, how many days did you... *

Mark only one oval per row.

	0 days	1-2 days	3-4 days	5-6 days	7 days
Do sports or exercise for at least 1 hour in total? (This includes doing any activities or playing sports where your heart beat faster, you breathed faster and you felt warmer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Watch TV/play on consoles/use iPad/use the INTERNET etc. for 2 or more hours a day (in total)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel tired?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feel like you could concentrate/pay attention well in class?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drink at least one fizzy drink e.g. coke, fanta, sprite?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drink at least one DIET fizzy drink e.g. Diet coke, Diet fanta?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eat at least one sugary snack e.g. chocolate bar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eat take away foods e.g. McDonalds, KFC, chinese?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sport and Activity



25. 14. These questions are going to ask you how you feel about physical activity (This includes any activity where your heart beats faster, you breathe faster and you feel warmer) *

Strongly agree Agree Disagree Strongly disagree
 ✓ ✓ ✗ ✗

Mark only one oval per row.

	Strongly agree	Agree	Disagree	Strongly disagree
I want to take part in physical activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident to take part in lots of different physical activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at lots of different physical activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand why taking part in physical activity is good for me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. 16a. How many times do you take part in a sports club OUTSIDE OF SCHOOL each week?
 Mark only one oval.

0 1 2 3 4 5 6 7 8 9 10

27. 16b. If you take part in a sports club OUTSIDE of school, what is the name of the sports club?
 (For example Swancea Rugby Club Under 11's)

28. 18. Are you a member of cubs, brownies, scouts or guides? *

Mark only one oval.

 Yes	 No
---	--

Yes

No

29. 17. Who do you mostly take part in physical activity or sport with? *



Mark only one oval.

- On your own
- With friends
- With my mum
- With my dad
- With my guardian
- With my brother/sister

30. 18. Which of these sports or physical activities would you like to try? (That you haven't tried before) *
Check all that apply:



Athletics

Basketball



Cricket

Dance



Gymnastics

Hockey



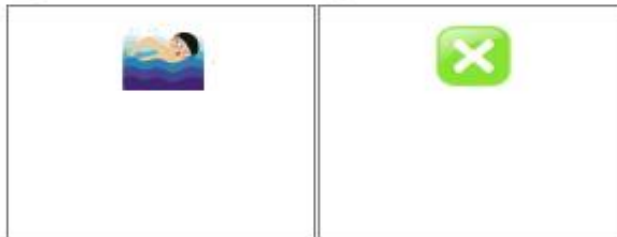
Multi Skills

Netball



Rugby


Tennis



Swimming
 Other:

None of these

31. 18. Can you ride a bike WITHOUT STABILISERS? *
Mark only one oval.

 Yes	 No
--	---

Yes No

32. 20. Can you swim 25 metres WITHOUT A FLOAT OR ARMBANDS? (This is 1 length of a standard swimming pool) *
Mark only one oval.

 Yes	 No
--	---

Yes No

You and your feelings



This part of the survey is going to ask you how you feel. There are no right or wrong answers. You should just pick the answer which is best for you.

33. 21. Tell us if you agree or disagree with the following: *

Strongly agree Agree Don't agree or disagree Disagree Strongly disagree
✓ ✓ x x

Mark only one oval per row

	Strongly agree	Agree	Don't agree or disagree	Disagree	Strongly disagree
I am doing well at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have lots of choice over things that are important to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are lots of things I'm good at	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. On a scale of 0 to 10 (0 being very unhappy and 10 being very happy, how do you feel about:

34. Your Health *



Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Very unhappy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very happy

35. Your School *



Mark only one oval.

0 1 2 3 4 5 6 7 8 9 10

Very unhappy Very happy

36. Your Family *



Mark only one oval.

0 1 2 3 4 5 6 7 8 9 10

Very unhappy Very happy

37. Your Friends *



Mark only one oval.

0 1 2 3 4 5 6 7 8 9 10

Very unhappy Very happy

38. Your Appearance (how you look) *



Mark only one oval.

0 1 2 3 4 5 6 7 8 9 10

Very unhappy Very happy

39. Your Life *



Mark only one oval.

0 1 2 3 4 5 6 7 8 9 10

Very unhappy Very happy



40. 23. Remember, there are no right or wrong answers, just pick which is right for you. *



Mark only one oval per row.

	Never	Sometimes	Always
I feel lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I cry a lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am unhappy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel nobody likes me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worry a lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have problems sleeping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wake up in the night	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am shy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel scared	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worry when I am at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get very angry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lose my temper	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I hit out when I am angry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do things to hurt people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am calm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I break things on purpose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The Environment



41. 24. On a scale of 0 to 10 (0 being not very safe and 10 being very safe), how safe do you feel playing in your area? *



Mark only one oval.

	0	1	2	3	4	5	6	7	8	9	10	
Not very safe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very safe

42. 25. What do you think could be done near where you live to improve the health and wellbeing of you, your friends and family?

Well done, you've completed the questionnaire.

Thank you!



Don't forget to press submit below!

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 Google Forms

Child Health and Activity Tool – Coding Dictionary

Stata Variable	Description	Code
timestamp	Date and time CHAT completed	
FFDID	Fitness Fun Day ID Number	
SchoolCode	School Code	(see list of school identifiers spreadsheet)
gendercode	Gender Code	1 = Male 2 = Female
DOBYear	Date of Birth Year	
DOBDay	Date of Birth Day	
DOBmonth	Date of Birth Month	
Postcode	Postcode	
disabilityhealthproblem	Disability/health problem	0 = No 1 = Yes
breakfastcode breakfastcode2	Type of breakfast	0 = nothing 1 = cereal 2 = toast 3 = snacks 4 = fruit 5 = yogurt 6 = fry up 7 = other
breakfastfruit	Consumed fruit at breakfast	0 = no fruit consumed at breakfast 1 = fruit consumed at breakfast
beforeschoolpacode	Before school PA	1 = Less than 10 minutes 2 = 10 – 30 minutes 3 = More than 30 minutes to 1 hour 4 = More than 1 hour
transporttoschool	Active travel to school	0 = No 1 = Yes
lunchcode	Lunchtime food code	0 = Nothing 1 = Packed Lunch 2 = School Dinner
lunchdrinkcode	Lunchtime drink code	0 = Nothing 1 = Milk 2 = Squash 3 = Water 4 = Fruit juice 5 = Energy Drink 6 = Fizzy Drink 7 = Diet Fizzy Drink 8 = Other 9 = Combination
breaktimeactivitycode	Break time activity code	0 = Sat around inside or outside

		1 = Stood around 2 = Walked around 3 = Ran around
afternoonbreakcode	Do they have an afternoon break	0 = No 1 = Yes
transportfromschool	Active travel from school	0 = No 1 = Yes
afterschoolpacode	After school PA code	1 = Less than 10 minutes 2 = 10 to 30 minutes 3 = More than 30 minutes to 1 hour 4 = More than 1 hour to 2 hours 5 = More than 2 hours
fruitandveg1	Number of fruit and veg portions consumed	
nooftoothbrushday1	Number of times brushed teeth	1 = 1 2 = 2 3 = More than 2
bedtimecode	Time went to bed yesterday	19 = 7:00pm 19.5 = 7:30pm 20 = 8:00pm 20.5 = 8:30pm 21 = 9:00pm 21.5 = 9:30pm 22 = 10:00pm 22.5 = 10:30pm 23 = 11:00pm 23.5 = 11:30pm 'Other bedtime time' not coded
wakeuptoday1	Time woke up today	5 = 5:00am 5.5 = 5:30am 6 = 6:00am 6.5 = 6:30am 7 = 7:00am 7.5 = 7:30am 8 = 8:00am 8.5 = 8:30am 9 = 9:00am 'Other wakeup time' not coded
daysactive60mins	Number of days active 60+ mins	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days

dayssed2hrs	Number of days sedentary 2+ hours	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
daystired	Number of days felt tired	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
daysconcentrate	Number of days concentrate in class	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
daysfizzydrink	Number of days consumed fizzy drink	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
daysdietfizzydrink	Number of days consumed diet fizzy drink	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
daysugarysnack	Number of days consumed sugary snack	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
daystakeaway	Number of days consumed takeaway	0 = 0 days 1 = 1-2 days 2 = 3-4 days 3 = 5-6 days 4 = 7 days
physlittakepart	Physical Literacy - I want to take part in physical activity	1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree
physlitfeelconfident	Physical Literacy - I feel confident to take part in lots of different physical activities	1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree
physlitgood	Physical Literacy - I am good at lots of different physical activities	1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree
physlitunderstand	Physical Literacy - I understand why taking part in physical activity is good for me	1 = Strongly disagree 2 = Disagree 3 = Agree 4 = Strongly agree

sportcluboutsideschool1	Number of sport clubs outside of school	
sportclubname1	Name of sport club they participate in	
scoutclubmember	Member of cubs/scouts/guides/brownies	0 = No 1 = Yes
sportpawith1	Who they participate in sport/PA with	0 = On your own 1 = With friends 2 = With my mum 3 = With my dad 4 = With my guardian 5 = With my brother/sister
sportpaliketotry	Sport or PA they would like to try	
abletorideabike1	Able to ride a bike	0 = No 1 = Yes
abletoswim25m	Able to swim 25m	0 = No 1 = Yes
schoolcompetence1	'I am doing well at school'	1 = Strongly disagree 2 = Disagree 3 = Don't agree or disagree 4 = Agree 5 = Strongly agree
autonomy1	'I have lots of choice over things that are important to me'	1 = Strongly disagree 2 = Disagree 3 = Don't agree or disagree 4 = Agree 5 = Strongly agree
gencomp1	'There are lots of things I'm good at'	1 = Strongly disagree 2 = Disagree 3 = Don't agree or disagree 4 = Agree 5 = Strongly agree
wellbeinghealth1	'How do you feel about your health'	1 = Really unhappy 2 = Unhappy 3 = Not happy or unhappy 4 = Happy 5 = Really happy
wellbeingfitness1	'How do you feel about your fitness'	1 = Really unhappy 2 = Unhappy 3 = Not happy or unhappy 4 = Happy 5 = Really happy

wellbeingschool1	'How do you feel about your school'	1 = Really unhappy 2 = Unhappy 3 = Not happy or unhappy 4 = Happy 5 = Really happy
wellbeingfamily1	'How do you feel about your family'	1 = Really unhappy 2 = Unhappy 3 = Not happy or unhappy 4 = Happy 5 = Really happy
wellbeingfriends1	'How do you feel about your friends'	1 = Really unhappy 2 = Unhappy 3 = Not happy or unhappy 4 = Happy 5 = Really happy
wellbeinglife1	'How do you feel about your life as a whole'	1 = Really unhappy 2 = Unhappy 3 = Not happy or unhappy 4 = Happy 5 = Really happy
MHfeellonely1	Me and My Feelings – I feel lonely	0 = Never 1 = Sometimes 2 = Always
MHcrylot1	Me and My Feelings – I cry a lot	0 = Never 1 = Sometimes 2 = Always
MHunhappy1	Me and My Feelings – I am unhappy	0 = Never 1 = Sometimes 2 = Always
MHnobodylikesme1	Me and My Feelings – Nobody likes me	0 = Never 1 = Sometimes 2 = Always
MHworrylot1	Me and My Feelings – I worry a lot	0 = Never 1 = Sometimes 2 = Always
MHproblemssleeping1	Me and My Feelings – I have problems sleeping	0 = Never 1 = Sometimes 2 = Always
MHwakeupinnight1	Me and My Feelings – I wake up in the night	0 = Never 1 = Sometimes 2 = Always
MHshy1	Me and My Feelings – I am shy	0 = Never 1 = Sometimes 2 = Always
MHfeelscared	Me and My Feelings – I feel scared	0 = Never 1 = Sometimes 2 = Always

MHworryatschool1	Me and My Feelings – I worry when I am at school	0 = Never 1 = Sometimes 2 = Always
MHgetveryangry1	Me and My Feelings – I get very angry	0 = Never 1 = Sometimes 2 = Always
MHlosetemper1	Me and My Feelings – I lose my temper	0 = Never 1 = Sometimes 2 = Always
MHhitoutwhenangry1	Me and My Feelings – I hit out when I am angry	0 = Never 1 = Sometimes 2 = Always
MHdothingstohurtpeople1	Me and My Feelings – I do things to hurt people	0 = Never 1 = Sometimes 2 = Always
MHcalm1	Me and My Feelings - I am calm	2 = Never 1 = Sometimes 0 = Always
MHbreakthingsonpurpose1	Me and My Feelings – I break things on purpose	0 = Never 1 = Sometimes 2 = Always
emotionaldifficulty	Me and My Feelings – Emotional difficulty score	
behaviouraldifficulty	Me and My Feelings – Behavioural difficulty score	
safeplayinginarea	How safe they feel playing nearby	1 = Not very safe 2 = Quite Safe 3 = Very Safe
improvehealthwblocalarea	What they would like improved nearby to make children healthier	

Appendix V Example TNSB Themes and Coding

Theme: Opinions and Awareness

- “cause you might be unhealthy because you’re not doing any physical activity...then you can become diabetic and stuff” [Code: HEALTH].
- “I think it’s important to be healthy but I’m far from it to be honest” [Code: HEALTH].
- “because they are taking control of their image” [Code: IMAGE].

Theme: Descriptive Norms

- “I find mostly that they are male” [Code: MALE ACTIVE].
- “Yeah, its older people that go walking round our area...so like, old people riding their bikes and that” [Code: OLDER PEOPLE ACTIVE].
- “Cause they’re self-conscious” [Code: GIRLS SELF-CONSCIOUS].

Theme: Injunctive Norms

- “cause if you exercise a lot then you might think you have to look a certain way and if you start putting on weight, then you might think of other ways of losing weight and it can just escalate to something bad” – [Code: BODY MAINTAINENCE].
- “There might be pressure to maintain your physical look” – [Code: BODY MAINTENANCE].
- “Like trampolining and stuff like that is indoors” [Code: INDOOR ACTIVIES].

Theme: Outcome Expectation

- “Cause it’s like less people” [Code: POSITIVE INDOOR PA].
- “There’s less chance of falling over a curb” [Code: POSITIVE INDOOR PA].
- “You don’t care what faces you pull so you’ll do like, your best job” [Code: POSITIVE INDOOR PA].
- “Cause everyone is just watching you and people video you” [Code: PEER JUDGEMENT/SOCIAL MEDIA].
- “[people] take the mick out of you” [Code: PEER JUDGEMENT].

Theme: Group Identity

- “...because most boys do like, say that you pick rugby now to do rugby as a sport, you go into rugby but then there’s so many boys doing it, you’re like ‘Oh I feel self-conscious now’ and don’t wanna do it” [Code: SELF CONSCIOUS].
- “...cause, like, our bodies are developing” [Code: SELF CONSCIOUS].
- “It’s weird as well if you did that, like if you played rugby with the boys, if you’re on the opposite team, they wouldn’t tackle you...If you had the ball, they’ll just run next to you that’s as far as it’d go... Like they wouldn’t actually full on tackle you” [Code: BOYS HESITANT TO PLAY WITH GIRLS].
- “Yeah, I’ve done that like I was running outside before and I tripped over like a rock or something, or it could have been nothing, I have no idea, and then a boy was there and he goes, ‘Oh only a girl could manage to fall over nothing’...and it was really annoying...” [Code: GIRLS COMPETENCE].
- “They just think that we’re like, we’re too weak and stuff” [Code: GIRLS COMPETENCE].
- “A load of girls do [think girls can’t do sport or physical activity] because it’s like, stuck in a stereotypical mind set or because the boys say that they can’t do it they believe they can’t do it” [Code: STEREOTYPES].

- “It’s just a glance, like if you’re doing exercise and a group of girls walk past you...and they just, they only have to look at you or they have to laugh or even if they look at their friends and start to giggle, you get the feeling they are talking about you, they’re looking at you, maybe that’s being paranoid” [Code: PEER OBSERVATION].

Appendix VI – Focus Group Scripts

Focus Group Scripts

Participant Focus Group 1

The [REDACTED] Project

1. How have you found the [REDACTED] project?
2. What do you think the project has done for you so far?
3. Do you think other people would benefit from a project like this?
4. If you could improve parts of the project, what would they be and why?

Physical Activity

5. Have you covered PA in your sessions?
6. What do you think about the current PA recommendations for your age group?
7. Is meeting the PA guidelines a priority for you?
8. Are other girls in your area physically active?
9. Is being physically active important for you?

Aspirations

10. What aspects of aspirations have you covered?
11. Are these sessions useful for you?
12. What do you think are the aspirations of girls in your area?
13. Do you feel like you are expected to have the same aspirations/follow the same path as other girls/women in your area?

Participant Focus Group 2

1. How have you found the [REDACTED] project so far?
2. What topic areas have you covered since the last FG?
3. Has the project had a positive effect on you?
4. Do you think other people would benefit from a project like this/focusing on these topics?
5. Do you enjoy the delivery of the sessions?
6. Do you leave the sessions feeling like you have learned something? Do you think the project is effective in this way?
7. If you could improve parts of the project, what would they be and why?

Participant Focus Group 3

1. How have you found the [REDACTED] project so far?
2. What topic areas have you covered since the last FG?
3. Has the project had a positive effect on you?
4. Do you think other people would benefit from a project like this/focusing on these topics?
5. Do you enjoy the delivery of the sessions?
6. Do you leave the sessions feeling like you have learned something? Do you think the project is effective in this way?
7. If you could improve parts of the project, what would they be and why?

Participant Follow Up Focus Group

1. What has been life been like since the [REDACTED] project?
2. What are your suggestions for making [REDACTED] better?

3. What would you like to happen after the [redacted] project?

Wellbeing Department and Deliverer Joint Interview Script

1. What events led up to [wellbeing department] needing to provide a targeted programme for adolescent girls?
2. What were the main areas of concern that [wellbeing department] wanted to target? How were these identified?
3. How long did the programme design take?
4. How are key [wellbeing department] elements promoted through the programme?
5. How were schools recruited for the project and who took responsibility for school recruitment?
6. How did you come up with appropriate session content that targeted the [wellbeing department] areas?
7. What are the shared aims for the current project?
8. Are there any potential risks?

Wellbeing Department Endpoint Interview

1. How do you feel the project went?
2. Did you have any school feedback?
3. Selection criteria – reflections on this, ways to improve?
4. What were your experiences of managing the project/school contact? – Any changes over the year?
5. What were the main challenges?
6. Project endings – reflections on celebration event
7. How do you feel now that the project has ended?
8. Is the project suitable to roll out?
9. Recommendations

Deliverer Endpoint Interview Script

Cover all points raised in reflective journals – expansion and member checking

1. How do you feel now that the project has ended?
2. Do you have further reflections?
3. Is this project suitable to roll out in other areas?
4. What are the main challenges?
5. Recommendations

Physical Activity Focus Group – True/False Statements

TNSB Domain	Focus Group True/False Statements
Awareness	<ul style="list-style-type: none"> Physical activity is good for health and fitness, to lose weight and to control anger – <i>school A</i> Physical activity is good because it builds confidence and improves health and fitness – <i>school B</i> Physical activity is good for health and fitness, losing weight and getting a good figure – <i>school C</i>
Opinion	<ul style="list-style-type: none"> Physical activity is a good thing to do but can be tiring. Physical activity has mixed importance. Girls being physically active is a positive thing and family members are physically active – <i>school A</i> Some participants think other girls being physically active is a good thing because it shows how healthy they are and that they know what they want their bodies to look like – <i>school B</i> Physical activity can be important for health and fitness and losing weight but other things take priority. Family members are physically active. Some participants think girls being active is a good thing, others don't care – <i>school C</i>
Descriptive Norms	<ul style="list-style-type: none"> It's not common to see girls being physically active, some people are confused at why girls want to be physically active, other people don't notice but boys tend to stare – <i>school A</i> Participants report that it's common to see people being physically active in area but not many of group family members are physically active – <i>school B</i> It's not common to see people being physically active in area – if so, they are older people and men. Mixed responses on whether girls are seen being physically active in area. Boys stare at girls being physically active – <i>school C</i>
Injunctive Norms	<ul style="list-style-type: none"> Majority of participants don't feel other people expect them to be physically active. It is considered acceptable for girls to be physically active in area – <i>school A</i> Group members feel other people expect them to be physically active as they spend too much time in the house. When a girl is seen being physically active, this is seen as acceptable as they are doing it for health and fitness – <i>school B</i> Group members feel that other people expect them to be physically active – to get out of the house, meet other people/new friends. Participants think that other people think it's acceptable for girls to be physically active – <i>school C</i>
Outcome Expectation	<ul style="list-style-type: none"> Girls in area take part in a number of activities in public and private places. Physical activity type depends on how fit a girl wants to be and if she wants to be seen – <i>school A</i> Girls take part in a number of activities in private spaces because they don't want people to see them – <i>school B</i> Mixed responses on whether girls are physically active in the area and where they take part in physical activity
Group Identity	<ul style="list-style-type: none"> Mixed opinions on whether being physically active is more difficult for girls – <i>school A</i> It is more difficult for girls to be physically active in the area because girls think boys will make fun of them, girls don't know what to do and because they are young – <i>school B</i> Participants felt it was more difficult for girls to be physically active because of smoking, mobile phones and self-consciousness – <i>school C</i>

Appendix VII – Photo Novella Protocol

Photo Novella Task – Purposed timeline and session plans

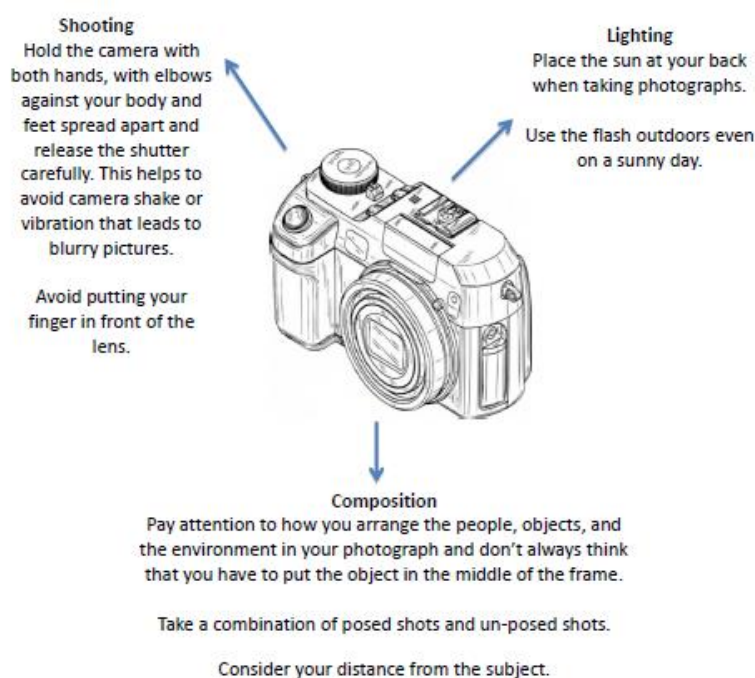
Week	Session	Purpose	Overview
1	Introductory	To introduce the research task to participants and provide an opportunity for those interested to ask questions.	<ol style="list-style-type: none"> 1. Participants will be invited to take part in the photo novella task and will be briefed on the necessary procedures, guidelines and timelines for the task. 2. The participants will then be offered the opportunity to ask questions and have any queries addressed by the researcher. 3. When all questions/queries have been addressed, the participants will then be asked to sign a task consent form.
2	Hand-out	To hand-out disposable cameras to consenting participants and to brief the group on appropriate conduct while engaging with the task – covering what participants CAN and CANNOT include in their photography, along with what will happen if these prohibited subjects are included in their photography.	<ol style="list-style-type: none"> 1. Consenting participants will be given a disposable camera for the task and will be briefed on how to use. 2. A printed task guideline document will be given to the participants for the task and participants will be able to ask any questions.
3	Collection	To collect disposable cameras and run task debriefing with participants.	<ol style="list-style-type: none"> 1. The researcher will collect the disposable cameras in from the participants and will lead a debriefing session. The researcher will get each film developed in time for the next session.
4	FILM DEVELOPMENT AND PHOTO ORGANISATION		
5	Familiarization & Focus Group	To reunite participants with their still images which will then form the basis of the focus group.	<ol style="list-style-type: none"> 1. The photographs will be handed back to the participants for viewing 2. The researcher will ask the participants to identify the photographs that best fit the task topic areas. 3. The participants will be asked to write a title, brief description or caption for each picture and these will then be shared in a focus group to aid discussion. 4. Participants will share their photographs to the other members of the group and conversation will be developed from the points raised the oral description/overview of photographs.

Photo Novella Task – Resource Pack for Participants

Introduction

You have agreed to take part in a photo novella task as part of the [REDACTED] research project. In this task, the researcher will ask you to take pictures using a disposable camera and then discuss your photographs in a focus group setting. Depending on the timeline of the project delivery, you may be asked to take part in more than one task.

Photography Basics



How to use your disposable camera

1. Pick up your camera and test the shot through the viewing lens.
2. When you are happy with the look of your shot, you will need to decide whether you need to use the flash.
3. You can turn on the flash function by pressing a button or flipping a switch on the front of the disposable camera.
4. The flash indication light will turn on and the flash is then ready to use.
5. Use the flash feature for all indoor and nighttime outdoor pictures and remember to stand 4 – 10 feet away from the thing you are taking a photograph of (the subject).
6. Hold the camera steady with both hands and remember to keep your fingers away from the lens and flash (if using).

7. Click the large button and your photograph has been taken!
8. When you have taken your photograph, you will need to wind the cog until you hear a 'click' sound. The camera is now ready for the next time you would like to take a photograph.
9. Every time you take a photograph, you will see the number of photographs left reduce until you will reach 0. This means that there are no photographs left to be taken on the film and you should return the camera to the project researcher.

Safety

Your safety is very important, and although you are invited to be as creative as you like with your photographs, please use your judgement and stay safe. Do not venture out of your usual areas or venture away from your usual travel routes in search of the 'perfect shot'. Please don't go anywhere you would usually go and don't take photographs while doing another activity (like while riding your bike etc.). If you do travel to a different area, please ensure you take a friend or family member with you. If you find yourself confronted by an aggressive person, stay calm, do not resist and give up the camera. You will not be in trouble if someone steals your camera.

Privacy and Respect

When taking part in this task, you must make sure that you are always considerate to other peoples' privacy in and around your community and within the areas that you are photographing.

What can I take pictures of?

In this task, you are invited to take pictures of anything that relates to the topic areas that you feel best describes how you feel, think or see elements related to a project topic area. Please see list below for examples.

Physical Activity – mountain, bike, sunny day, trainers, local places to take part in physical activity

Nutrition – food items, kitchen, emotions, breakfast, lunch, dinner, fruit, places to eat

Aspirations – job advertisements, posters, TV adverts, uniforms, places of work, emotions

Self-Esteem – emotions, environments, places, clothes

Body Image – clothes, places, moods/emotions

.....
THERE ARE NO RIGHT OR WRONG ANSWERS IN THIS TASK – PLEASE DOCUMENT WHAT IS IMPORTANT TO YOU 😊

Taking pictures of people

If you would like to take a picture of someone (friend, family member etc.), you will need to get signed permission form the person before taking the picture (Appendix 17). The researcher will provide you with a number of permission slips for you to have for the duration of the task. You will need to keep the signed permission slip and return it to the researcher along with your camera at the end of the task.

Taking pictures of places (homes/shops)

If you would like to take a picture of a local business, leisure center or private property, you will need to get signed permission from the person who owns the property or who works there (Appendix 18). The researcher will provide you with a number of permission slips for you to have for the duration of the task. You will need to keep the signed permission slip and return it to the researcher along with your camera at the end of the task.

What happens if I take a picture of something that I don't have permission for?

Don't panic! If you happen to take a picture of something that you shouldn't, the researcher will decide whether the image can be blurred/cropped, but if this is not applicable, the image will have to be destroyed.

How long will I have to take my photographs?

For each task you will have one week to take your photographs. You will be required to hand your camera back into the researcher in your next [REDACTED] project session.

When will I get my photographs back?

The researcher will aim to get the photographs back to you within 1-2 weeks. In the hand back session, you will be asked to sort through your photographs and select the 2-3 that best fit the topic areas that will be discussed in the focus group.

Permission slip for people

I, _____, give permission for _____, acting on behalf of the Swansea University [REDACTED] research project, to take my photograph. By signing my name below, I understand and agree that unless otherwise stated in writing, Swansea University assumes that permission is granted to use my photograph for project related reports, exhibits, presentations and scientific publications that are likely to result from this project. I understand that researchers, policy makers, students and possibly people from my community will see my photograph.

Signature: _____

Date: _____

Parental consent – if subject is a minor

Signature: _____ Date: _____

Permission slip for private premises

I, _____, give permission for _____, acting on behalf of the Swansea University [REDACTED] research project, to take photographs on my property. By signing my name below, I understand that this photograph may be used in project related reports, exhibits, presentations and scientific publications that are likely to result from this project. I understand that researchers, policy makers, students and possibly people from my community may see the photograph taken of/on my property.

Name of property/business/company:

Signature: _____ Date: _____

Appendix VIII – Physical Activity Questionnaire for Older Children (PAQ-C)

Physical Activity Questionnaire for Older Children (PAQ-C)

Name: _____ Age: _____

Sex: M _____ F _____ Grade: _____

Teacher: _____

We are trying to find out about your level of physical activity from the last 7 days (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember: 1. There are no right and wrong answers — this is not a test. 2. Please answer all the questions as honestly and accurately as you can — this is very important.

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

7 times No 1-2 3-4 5-6 or more

Skipping	Rowing/canoeing	In-line skating
.....	Tag	Walking for exercise
.....	Bicycling	Jogging or running
Aerobics	Swimming	Baseball, softball
.....	Dance	Football
Badminton	Skateboarding	Soccer
.....	Street hockey	Volleyball
.....	Floor hockey	Basketball
.....	Ice skating	Cross-country skiing
.....	Ice hockey/ringette	Other:
.....

9

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

I don't do PE Hardly ever
 Sometimes Quite often
 Always

3. In the last 7 days, what did you do most of the time at recess? (Check one only.)

Sat down (talking, reading, doing schoolwork)..... Stood around or walked around
 Ran or played a little bit Ran around and played quite a bit
 Ran and played hard most of the time

4. In the last 7 days, what did you normally do at lunch (besides eating lunch)? (Check one only.)

Sat down (talking, reading, doing schoolwork)..... Stood around or walked around
 Ran or played a little bit Ran around and played quite a bit
 Ran and played hard most of the time

5. In the last 7 days, on how many days right after school, did you do sports, dance, or play games in which you were very active? (Check one only.)

None 1 time last week
2 or 3 times last week 4 times last week
..... 5 times last week

6. In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active? (Check one only.)

None 1 time last week
..... 2 or 3 times last week 4 or 5 last week
..... 6 or 7 times last week

10

7. On the last weekend, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

None 1 time
..... 2 — 3 times 4 —
5 times 6 or more times

8. Which one of the following describes you best for the last 7 days? Read all five statements before deciding on the one answer that describes you.

A. All or most of my free time was spent doing things that involve little physical effort

B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics)

C. I often (3 — 4 times last week) did physical things in my free time

D. I quite often (5 — 6 times last week) did physical things in my free time

E. I very often (7 or more times last week) did physical things in my free time

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week. Little bit Medium Often often

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

10. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes No

If Yes, what prevented you? _____

Appendix IX: Self-perception Profile for Adults

Self-perception Profile for Adolescents

What I Am Like

Name _____ Age _____ Birthday _____ Boy Girl
Month Day (check one)

	Really True for me	Sort of True for me		Sort of True for me	Really True for me	
			Sample Sentence			
a.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers like to go to movies in their spare time	BUT	Other teenagers would rather go to sports events	<input type="checkbox"/> <input type="checkbox"/>
1.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are just as smart as others their age	BUT	Other teenagers aren't so sure and wonder if they are as smart	<input type="checkbox"/> <input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers find it hard to make friends	BUT	Other teenagers find it pretty easy to make friends	<input type="checkbox"/> <input type="checkbox"/>
3.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do very well at all kinds of sports	BUT	Other teenagers <i>don't</i> feel that they are very good when it comes to sports	<input type="checkbox"/> <input type="checkbox"/>
4.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are <i>not</i> happy with the way they look	BUT	Other teenagers <i>are</i> happy with the way they look	<input type="checkbox"/> <input type="checkbox"/>
5.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are ready to do well at a part-time job	BUT	Other teenagers feel that they are not quite ready to handle a part-time job	<input type="checkbox"/> <input type="checkbox"/>
6.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that if they are romantically interested in someone, that person will like them back	BUT	Other teenagers worry that when they like someone romantically, that person <i>won't</i> like them back	<input type="checkbox"/> <input type="checkbox"/>
7.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers usually do the right thing	BUT	Other teenagers often don't do what they know is right	<input type="checkbox"/> <input type="checkbox"/>
8.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are able to make really close friends	BUT	Other teenagers find it hard to make really close friends	<input type="checkbox"/> <input type="checkbox"/>
9.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are often disappointed with themselves	BUT	Other teenagers are pretty pleased with themselves	<input type="checkbox"/> <input type="checkbox"/>

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
10.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are pretty slow in finishing their school work	BUT	Other teenagers can do their school work quickly	<input type="checkbox"/>	<input type="checkbox"/>
11.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers know how to make classmates like them	BUT	Other teenagers don't know how to make classmates like them	<input type="checkbox"/>	<input type="checkbox"/>
12.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think they could do well at just about any new athletic activity	BUT	Other teenagers are afraid they might not do well at a new athletic activity	<input type="checkbox"/>	<input type="checkbox"/>
13.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers wish their body was different	BUT	Other teenagers like their body the way it is	<input type="checkbox"/>	<input type="checkbox"/>
14.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they <i>don't</i> have enough skills to do well at a job	BUT	Other teenagers feel that they <i>do</i> have enough skills to do a job well	<input type="checkbox"/>	<input type="checkbox"/>
15.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are <i>not</i> dating the people they are really attracted to	BUT	Other teenagers <i>are</i> dating those people they are attracted to	<input type="checkbox"/>	<input type="checkbox"/>
16.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers often get in trouble because of things they do	BUT	Other teenagers usually <i>don't</i> do things that get them in trouble	<input type="checkbox"/>	<input type="checkbox"/>
17.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> know how to find a close friend with whom they can share secrets	BUT	Other teenagers <i>do</i> know how to find a close friend with whom they can share secrets	<input type="checkbox"/>	<input type="checkbox"/>
18.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers don't like the way they are leading their life	BUT	Other teenagers <i>do</i> like the way they are leading their life	<input type="checkbox"/>	<input type="checkbox"/>
19.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do very well at their classwork	BUT	Other teenagers <i>don't</i> do very well at their classwork	<input type="checkbox"/>	<input type="checkbox"/>
20.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers don't have the social skills to make friends	BUT	Other teenagers <i>do</i> have the social skills to make friends	<input type="checkbox"/>	<input type="checkbox"/>
21.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are better than others their age at sports	BUT	Other teenagers don't feel they can play as well	<input type="checkbox"/>	<input type="checkbox"/>
22.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers wish their physical appearance was different	BUT	Other teenagers like their physical appearance the way it is	<input type="checkbox"/>	<input type="checkbox"/>

	Really True for me	Sort of True for me			Sort of True for me	Really True for me	
23.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel they are old enough to get and keep a paying job	BUT	Other teenagers do not feel that they are old enough, yet, to really handle a job well	<input type="checkbox"/>	<input type="checkbox"/>
24.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that people their age will be romantically attracted to them	BUT	Other teenagers worry about whether people their age will be attracted to them	<input type="checkbox"/>	<input type="checkbox"/>
25.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel really good about the way they act	BUT	Other teenagers <i>don't</i> feel that good about the way they often act	<input type="checkbox"/>	<input type="checkbox"/>
26.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>do</i> know what it takes to develop a close friendship with a peer	BUT	Other teenagers <i>don't</i> know what to do to form a close friendship with a peer	<input type="checkbox"/>	<input type="checkbox"/>
27.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are happy with themselves most of the time	BUT	Other teenagers are often not happy with themselves	<input type="checkbox"/>	<input type="checkbox"/>
28.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers have trouble figuring out the answers in school	BUT	Other teenagers almost always can figure out the answers	<input type="checkbox"/>	<input type="checkbox"/>
29.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers understand how to get peers to accept them	BUT	Other teenagers <i>don't</i> understand how to get peers to accept them	<input type="checkbox"/>	<input type="checkbox"/>
30.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> do well at new outdoor games	BUT	Other teenagers are good at new games right away	<input type="checkbox"/>	<input type="checkbox"/>
31.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think that they are good looking	BUT	Other teenagers think that they are not very good looking	<input type="checkbox"/>	<input type="checkbox"/>
32.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel like they could do better at work they do for pay	BUT	Other teenagers feel that they are doing really well at work they do for pay	<input type="checkbox"/>	<input type="checkbox"/>
33.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are fun and interesting on a date	BUT	Other teenagers wonder about how fun and interesting they are on a date	<input type="checkbox"/>	<input type="checkbox"/>
34.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do things they know they shouldn't do	BUT	Other teenagers hardly ever do things they know they shouldn't do	<input type="checkbox"/>	<input type="checkbox"/>

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
35.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers find it hard to make friends they can really trust	BUT	Other teenagers <i>are</i> able to make close friends they can really trust	<input type="checkbox"/>	<input type="checkbox"/>
36.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers like the kind of person they are	BUT	Other teenagers often wish they were someone else	<input type="checkbox"/>	<input type="checkbox"/>
37.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are pretty intelligent	BUT	Other teenagers question whether they are intelligent	<input type="checkbox"/>	<input type="checkbox"/>
38.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers know how to become popular	BUT	Other teenagers do not know how to become popular	<input type="checkbox"/>	<input type="checkbox"/>
39.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers do not feel that they are very athletic	BUT	Other teenagers feel that they <i>are</i> very athletic	<input type="checkbox"/>	<input type="checkbox"/>
40.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers really like their looks	BUT	Other teenagers wish they looked different	<input type="checkbox"/>	<input type="checkbox"/>
41.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers feel that they are really able to handle the work on a paying job	BUT	Other teenagers wonder if they are really doing as good a job at work as they should be doing	<input type="checkbox"/>	<input type="checkbox"/>
42.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers usually <i>don't</i> go out with people they would really like to date	BUT	Other teenagers <i>do</i> go out with people they really want to date	<input type="checkbox"/>	<input type="checkbox"/>
43.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers usually act the way they know they are supposed to	BUT	Other teenagers often don't act the way they are supposed to	<input type="checkbox"/>	<input type="checkbox"/>
44.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> understand what they should do to have a friend close enough to share personal thoughts with	BUT	Other teenagers <i>do</i> understand what to do to have a close friend with whom they can share personal thoughts.	<input type="checkbox"/>	<input type="checkbox"/>
45.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers are very happy being the way they are	BUT	Other teenagers often wish they were different	<input type="checkbox"/>	<input type="checkbox"/>

Susan Harter, Ph.D., University of Denver, 2012

Name or ID _____ Age _____ Grade _____

How Important Are These Things to How You Feel about Yourself as a Person?

	Really True for me	Sort of True for me		BUT		Sort of True for me	Really True for me
1.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it is important to be intelligent		Other teenagers <i>don't</i> think it is important to be intelligent	<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> think it's all that important to have a lot of friends		Other teenagers think that having a lot of friends is important	<input type="checkbox"/>	<input type="checkbox"/>
3.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it's important to be good at sports		Other teenagers <i>don't</i> care much about being good at sports	<input type="checkbox"/>	<input type="checkbox"/>
4.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> really think that their physical appearance is all that important		Other teenagers think that their physical appearance is important	<input type="checkbox"/>	<input type="checkbox"/>
5.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> care that much about how well they do on a paying job		Other teenagers feel it's important that they do well on a paying job	<input type="checkbox"/>	<input type="checkbox"/>
6.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it's important that the people they are romantically interested in like them back		Other teenagers <i>don't</i> really care that much whether someone they are interested in likes them that much	<input type="checkbox"/>	<input type="checkbox"/>
7.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> think it's that important to do the right thing		Other teenagers think that doing the right thing is important	<input type="checkbox"/>	<input type="checkbox"/>
8.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it's important to be able to make really close friends		Other teenagers <i>don't</i> think making close friends is all that important	<input type="checkbox"/>	<input type="checkbox"/>
9.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> think that doing well in school is really that important		Other teenagers think that doing well in school is important	<input type="checkbox"/>	<input type="checkbox"/>
10.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it's important to be popular		Other teenagers <i>don't</i> care that much about whether they are popular	<input type="checkbox"/>	<input type="checkbox"/>
11.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> think that being athletic is that important		Other teenagers think that being athletic is important	<input type="checkbox"/>	<input type="checkbox"/>
12.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think that how they look is important		Other teenagers <i>don't</i> care that much about how they look	<input type="checkbox"/>	<input type="checkbox"/>
13.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it's important to do their best on a paying job		Other teenagers <i>don't</i> think that doing their best on a job is all that important	<input type="checkbox"/>	<input type="checkbox"/>
14.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> care that much whether they are dating someone they are romantically interested in		Other teenagers think it's important to be dating someone they are interested in	<input type="checkbox"/>	<input type="checkbox"/>
15.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers think it's important to act the way they are supposed to		Other teenagers <i>don't</i> care that much whether they are acting the way they are supposed to	<input type="checkbox"/>	<input type="checkbox"/>
16.	<input type="checkbox"/>	<input type="checkbox"/>	Some teenagers <i>don't</i> care that much about developing close friendships		Other teenagers think it's important to develop close friendships	<input type="checkbox"/>	<input type="checkbox"/>

Appendix X - Adolescent Femininity Ideology Scale

Adolescent Femininity Ideology Scale

Inauthentic Self in Relationships Subscale

I would tell a friend I think she looks nice, even if I think she shouldn't go out of the house dressed like that.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I worry that I make others feel bad if I am successful.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I would not change the way I do things in order to please someone else (R)

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I tell my friends what I honestly think even when it is an unpopular idea (R)

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

Often I look happy on the outside in order to please others, even if I don't feel happy on the inside

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I wish I could say what I feel more often than I do

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I feel like it's my fault when I have disagreements with my friends.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

When my friends ignore my feelings, I think that my feelings weren't very important anyway.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I usually tell my friends when they hurt my feelings (R)

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

Objectified Relationship with Body Subscale

The way I can tell that I am at a good weight is when I fit into a small size

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I often wish my body were different

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I think that a girl has to be thin to feel beautiful.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I think a girl has to have a light complexion and delicate features to be thought of as beautiful.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I am more concerned about how my body looks than how my body feels.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

I often feel uncomfortable in my body.

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

There are times when I have really good feelings in my body (R)

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

The way I decide I am at a good weight is when I feel healthy (R)

Stongly DISAGREE						Strongly AGREE
1	2	3	4	5	6	

Appendix XI: Body Parts Dissatisfaction Scale

Body Parts Dissatisfaction Scale

Is there anything you would like to change about your body? If so, please put a checkmark (✓) to indicate the part(s) of your body you would like to change, whether you wish they were bigger or smaller, and why you think you might like this change.

Body Part	Bigger	Smaller	Why?
Hips			
Buttocks			
Chest			
Legs			
Thighs			
Stomach			
Waist			
Other (please state)			

Appendix XII: The Adolescent Food Habits Checklist

The Adolescent Food Habits Checklist

1. If I am having lunch away from home, I often choose a low-fat option. (True/False/I never have lunch away from home)
2. I usually avoid eating fried foods. (True/False)
3. I usually eat a dessert or pudding if there is one available. (True/False)
4. I make sure I eat at least one serving of fruit a day. (True/False)
5. I try to keep my overall fat intake down. (True/False)
6. If I am buying crisps, I often choose a low-fat brand. (True/False/I never buy crisps)
7. I avoid eating lots of sausages and burgers. (True/False/I never eat sausages or burgers)
8. I often buy pastries or cakes. (True/False)
9. I try to keep my overall sugar intake down. (True/False)
10. I make sure I eat at least one serving of vegetables or salad a day. (True/False)
11. If I am having a dessert at home, I try to have something low in fat. (True/False/I don't eat desserts)
12. I rarely eat takeaway meals. (True/False)
13. I try to ensure I eat plenty of fruit and vegetables. (True/False)
14. I often eat sweet snacks between meals. (True/False)
15. I usually eat at least one serving of vegetables (excluding potatoes) or salad with my evening meal. (True/False)
16. When I am buying a soft drink, I usually choose a diet drink. (True/False/I never buy soft drinks)
17. When I put butter or margarine on bread, I usually spread it thinly. (True/False/I never have butter or margarine on bread)
18. If I have a packed lunch, I usually include some chocolate and/or biscuits. (True/False/I never have a packed lunch)
19. When I have a snack between meals, I often choose fruit. (True/False/I never eat snacks between meals)
20. If I am having a dessert or pudding in a restaurant, I usually choose the healthiest one. (True/False/I never have desserts in restaurants)
21. I often have cream on desserts. (True/False/I don't eat desserts)
22. I eat at least three servings of fruit most days. (True/False)
23. I generally try to have a healthy diet. (True/False)