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Title: A theory-informed qualitative exploration of social and environmental determinants of physical activity and dietary choices in adolescents with intellectual disabilities in their final year of school.

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1. Introduction

The rate of non-communicable diseases is on the rise, with overweight and obesity identified as key risk factors (World Health Organisation, 2015). As a result, obesity is now recognised as one of the major global public health concerns of the 21st century (Krause et al., 2015). The World Health Organisation (WHO) (2016) defines overweight as having a body mass index (BMI) greater than or equal to 25 and obesity as having a BMI greater than or equal to 30. The consequential impact of obesity on health has been well documented. For example, obesity has been associated with increased incidences of chronic health conditions such as Type 2 diabetes, hypertension, stroke, respiratory problems, arthritis, cardiovascular disease, and some cancers (Haslam & James, 2005; Sohler et al., 2009). Obesity has also been linked to increased all-cause mortality more generally (National Institute for Health and Care Excellence., 2014; Flegal et al., 2013). In addition to increased mortality rates and incidences of physical health problems, obesity has also been associated with poorer psychological functioning such as increased risk of depression (Garcia-Toro et al., 2016; Luppino et al., 2010) and poorer health-related quality of life (Hassan et al., 2003).

Whilst the associated impacts of obesity on health are a concern for all populations, they can be considered to be of particular concern for those with intellectual disabilities (ID) due to the increased prevalence of obesity in this population. The prevalence of obesity is higher in adults with ID than the general population (Rimmer & Yamaki, 2006; Melville et al., 2007; Bhaumik et al., 2008; Hsieh et al., 2014). A recent study by Hsieh et al. (2014) on the prevalence of obesity found that those with ID are more likely to be obese and morbidly obese than the general population. They found 38.3% of adults with ID to be obese, compared to 28% obesity prevalence in the general population; whilst 7.4% of adults with ID were morbidly obese, compared to 4.2% prevalence in the general population. The prevalence of obesity in young adults with ID aged 16-24 is 28.1%, whilst only 10.5% in

young adults aged 16-24 without ID (Melville et al., 2008). These striking statistics highlight the need to investigate factors which contribute to the development of obesity in young people with ID and their lifestyle behaviours more generally.

Although there is a paucity of research concerning young people with ID, there is a growing body of literature concerned with the factors linked to the high rates of obesity in adults with ID. Key risk factors have been categorised as being either non-modifiable or modifiable (Hsieh et al., 2014). Identified non-modifiable risk factors for obesity in the ID population include genetic syndromes, gender, age, and severity of ID (Melville et al., 2007; Stancliffe et al., 2011; de Winter et al., 2012; Hsieh et al., 2014). These risk factors are recognised as non-modifiable since they cannot be changed or altered. Adults with severe-profound ID have been found to have significantly lower rates of obesity than adults with mild-moderate ID (Melville et al., 2007; Hsieh et al., 2014). This places emphasis on the need to investigate the modifiable lifestyle behaviours of those with mild-moderate ID since they are at most risk of developing obesity.

An extensive body of research has explored the modifiable risks for obesity in the general population. However, research augmenting our understanding about the modifiable risks for obesity in the ID population has been limited. Findings suggest that adults with ID have a lower intake of fruit and vegetables than the general population (McGuire et al, 2007) and also drink more sugary drinks (Hsieh et al, 2014; McGuire et al, 2007). Thus, there is consensus that poor diet is a contributory factor to obesity within this population.

Low levels of physical activity (PA) have also been identified as a modifiable lifestyle risk for obesity within the ID population. The health benefits of participating in regular PA are well established. An emerging body of literature suggests that adults with ID lead less physically active and more sedentary lifestyles than the general population (Emerson, 2005; McGuire et al., 2007; Hsieh et al., 2014).

There is limited research which informs us about the lifestyle behaviours of adolescents with ID. The transitional period between adolescence and adulthood in the general population has been identified as a time of increased likelihood of unintentional weight gain, favouring development of overweight and obesity, unhealthy diet and low levels of PA (Nelson et al., 2008). As highlighted in our protocol paper (Mitchell et al., 2016),

transitioning from school to adulthood means that individuals are moving away from a structured supportive environment. Up to 75% of adults with ID have been said to be underemployed or unemployed in the three years after leaving school (Luftig & Muthert, 2005). A lack of purposeful daytime activity may increase the likelihood of leading a sedentary lifestyle and reduce opportunities for PA.

Evidence also suggests that adults with ID have lower levels of health literacy and also experience greater social inequalities, such as economic disadvantage, (e.g. greater material hardship, living in more deprived neighbourhoods, reduced community and social participation) (Emerson, 2011). There is a plethora of research documenting weight stigma (Puhl & Heuer, 2010), therefore adolescents with ID and who are also overweight or obese may experience further social inequalities or stigmatisation. Consequently, the transitional period may pose greater challenges and barriers for overweight/obese individuals with ID.

Investigating the lifestyle behaviours of adolescents is important since 70% of typically developing obese adolescents continue to be obese into adulthood (Tirosh et al., as cited by Krause et al., 2015). Therefore, understanding factors contributing to modifiable lifestyle behaviours is key to supporting change as early as possible to prevent unintentional weight gain. However, no research has explored the factors which influence the lifestyle behaviours of adolescents with ID immediately pre or post transition from school to adulthood.

Self-Determination Theory

Self-Determination Theory (SDT) is a conceptual framework for understanding people's motivations to behave in a particular way. Deci and Ryan's (1985; 2000) theory posits that human beings have three basic psychological needs: 1. the need to be autonomous in their actions. This contrasts heteronomy, whereby actions are controlled externally and are not regulated by the self. 2. The need to feel competent and to gain mastery. 3. The need to experience relatedness through interaction with others (Ryan & Deci, 2006). These needs are thought to be innate and universal. In order to develop competence, individuals must be provided with opportunities to engage in practices to develop their competence in an activity. An individual's social environment can either facilitate or thwart motivation to engage in an activity such as engagement in PA. Ryan and Deci distinguish between intrinsic and extrinsic motivation. Intrinsic motivation refers to participation in an activity "for its own sake, for the

satisfaction inherent in the activity” (2007, p. 2), such as enjoyment. In this sense, intrinsic motivation stems from internal drives and is highly autonomous. Extrinsic motivation, on the other hand, refers to behaviour motivated by external sources and expected outcomes not inherent in the activity, such as rewards or to avoid punishment. Ryan and Deci (2007) outline four types of extrinsic motivation, each with varying degrees of external control, autonomy and internalisation. Internalisation is an important concept within SDT and refers to the “process of transforming external regulations into internal regulations and...integrating those regulations into one’s sense of self” (Deci et al., 1994, p. 120). The types of extrinsic motivation are: external regulation, introjected regulation, identified regulation, and integrated regulation. External regulation is the least autonomous, with low internalisation, whereby behaviour is externally controlled to avoid punishment or gain rewards. Introjected regulation refers to some internalisation, whereby an individual takes on regulations to avoid external disapproval or feelings of guilt but does not incorporate these regulations as part of their sense of self. Identified regulation refers to behaviour that is highly internalised and motivated by personally held values. Finally, integrated regulation refers to the most autonomous type of extrinsic motivation, whereby behaviour is highly internalised and regulations are fully incorporated into part of the self (Ryan & Deci, 2007). Environments meeting the basic needs of an individual are said to facilitate intrinsic motivation, whilst environments which neglect these needs thwart intrinsic motivation.

An international body of literature suggests that individuals with ID have low levels of self-determination (Wehmeyer & Metzler 1995; Stancliffe, 1997; Wehmeyer, Kelchner & Richards, 1996; Wehmeyer, 2001). Consequently, there is a growing emphasis on understanding the social context of the lives of those with ID and how this may affect their self-determination (Jahoda et al., 2006; Walker et al., 2011). Environmental mediators such as the influence of family and peers, school culture, work/college culture, area lived in, community, greenspace, opportunities for PA, autonomy over dietary and PA behaviours are important for understanding health behaviours.

Thus, the aim of the study was to understand the determinants of and factors influencing PA and diet in this population during the transition from school to adulthood, using Self-Determination Theory as a theoretical lens. More research in this area has the potential to influence policy and practice in managing weight in young people with ID, as well as informing future interventions focused on preventing obesity in adolescents with ID.

The current paper presents qualitative findings about factors impacting PA and dietary behaviours during participants' final year of school.

2. Method

2.1 Design

The current study forms part of a wider mixed-method feasibility study investigating the lifestyle behaviours of adolescents with ID during their transition from school, with data collected at three time points: during the final year of school, 6 months post leaving school, and 12 months post leaving school (see Mitchell et al., 2016). Previous authors have noted the importance of qualitative researchers clarifying the theoretical frameworks underpinning their study in order that their methods and aims can be understood by readers (Tong et al., 2007). Therefore, this qualitative component of the research consisted of interviews with adolescents with ID, utilising a phenomenological approach to explore their perceptions of factors influencing their lifestyle behaviours at baseline (during participants' final year at school). Quantitative findings and follow-up qualitative findings will be published separately. Ethical approval for the study was obtained from the University of Glasgow MVLS Ethics Committee.

2.2. Participants

Participants were recruited from four additional support need (ASN) schools in the Greater Glasgow and South Lanarkshire area. The study sought only to recruit participants with a mild-moderate ID, who were independently ambulatory, aged 16 years and over, and in their final year of secondary school. Teachers from the four schools were asked to identify potential participants who met the inclusion criteria for the study. Ultimately, 31 of the suitable individuals expressed an interest in participating in the wider feasibility study (only the qualitative component is reported here). Interviews were then carried out with a sample of the participants who participated in the wider feasibility study to explore their subjective perspectives of PA and dietary behaviours. 10 participants was deemed an appropriate number of participants to take part in an interview since it accounted for almost one third of all participants in the wider feasibility study, providing a somewhat 'representative' pool of the larger sample. To ensure a broad range of experiences of PA and dietary experiences were captured in the interviews, 2-3 participants from each school were selected through purposive sampling by the teacher and researcher. The researcher had previously worked with the pupils

when recruiting for the wider feasibility study, taking consent and collecting baseline quantitative measures, whilst the teachers knew the pupils well from teaching them for a year. Therefore, the teacher and researcher agreed on 2-3 pupils who would provide a range of PA and dietary experiences, and who would be able to understand and respond to straightforward interview questions. Participants who were identified and were willing to participate in an interview were invited to take part in this qualitative component of the wider feasibility study.

Participants were recruited from across the four schools: two participants from school A; two participants from school B; three participants from school C; and, three participants from school D (see Table 1 and Figure 1). Recruiting participants from across the four different schools (thus four different geographical, social and cultural environments) was purposeful to gain access to a range of experiences about the environmental mediators impacting on PA and dietary patterns and choices in this population.

*****please insert Figure 1 here*****

Of the 10 participants, seven were male and three were female. Where possible, a range of girls and boys were invited to participate. However, as there were more boys than girls participating in the wider feasibility study, this resulted in more boys taking part in interviews than girls (i.e. only nine of the 31 participants in the wider feasibility study were female). All participants were aged between 16-18 years old at the time of interview. The majority of participants lived with lived parents. Some lived with a single-parent, whilst one participant lived with his aunt and uncle, and another lived with his grandmother. One participant lived in a local authority residential children's home, which provides long-term care to children in a residential setting outwith the family home (see Table 1). 40% of participants lived in the most deprived quintile on the Scottish Index of Multiple Deprivation (0-20%), 10% in the second most deprived quintile (20-40%), 10% in the middle quintile (40-60%), 20% in the second least deprived (60-80%) and 20% lived in the least deprived areas (80-100%) (Scottish Government, 2012). All interviews were conducted at the participant's school, in a private room. Pseudonyms have been used to protect the identities of participants.

*****Please insert Table 1 here*****

2.3. Procedure and data analysis

Participant information was provided and informed consent obtained prior to interviews taking place. Letters were also sent to participants' parents/guardians to notify them of their son/daughter's participation in the research. Due to the nature of conducting research with individuals with ID, greater care was taken to ensure participants understood the purpose of the research, what would be involved, and that they were free to withdraw at any time without explanation. Interviews were conducted by the last author (FM). FM is a Health Psychologist, holding a PhD in health and exercise. She also has extensive experience conducting interviews with the ID population. Each interview commenced with the use of activity cards (as outlined in Mitchell et al., 2016). The activity cards contained images of different sport/physical activities and a range of foods; participants were asked to sort the activity cards into three piles: things they like, things they were unsure about, and things they did not like doing/eating. The PA cards were adapted from previous work with adults with ID, as were the food cards (Harris et al., 2015), and aided communication and rapport between the researcher and participant (Mitchell et al, 2013; Mitchell et al., 2016).

The interview guide was developed to explore factors which have been identified as facilitators and barriers to lifestyle behaviours in the general population (Mitchell et al, 2013; Ntoumanis and Standage, 2009; Burton et al, 2006). Thus, the semi-structured interview questions explored: school and out-of-school sport and PA participation; activities liked/disliked in school PE and out of school; food eaten in and out of school; food preferences; choices about food and PA; and social and environmental influences on food and PA participation. Interviews were audio recorded and transcribed verbatim.

Transcripts were analysed for recurrent themes relating to PA and diet using a deductive thematic analysis. To ensure no data were ignored and a full understanding of participants' PA and diet was gained, the analysis also took account of other themes that emerged that did not fit within the SDT conceptual framework. Themes were identified based on the explicit meanings of the data, and did not seek to go beyond what had been explicitly said during interviews (Boyatzis, 1998), until the point of saturation (Morris, 1995; 2000). The thematic analysis was carried out in accordance with the guidelines set out by Braun & Clarke (2006): phase 1 – becoming familiarised with the data; phase 2 – generating initial codes; phase 3 – searching for themes; phase 4 – reviewing themes; phase 5 – defining and naming themes; and, phase 6 – producing the report. Thematic analysis is a method for

identifying, analysing and reporting patterns within data, and allows for an in-depth description of themes and patterns within the data to be identified (Braun & Clarke, 2006). Employing a deductive approach allowed for a detailed analysis of participants' perspectives of mediators on self-determination of lifestyle behaviours. A realist theoretical framework was adopted as this could reflect the meaning of participants' reality. Themes were identified at a semantic level; based on the explicit meanings of the data, and did not seek to go beyond what had been said during the interviews.

3. Findings

Three major themes, each with their respective sub-themes, were identified as influencing participants' engagement with PA and dietary choices. These were: situatedness, motivation, and wider environmental influences (see Figure 2).

******Please insert Figure 2 here******

3.1. Theme 1: Situatedness

The first theme is situatedness, and refers to the interplay between agent, context and situation. The culture of the structures within the young people's life impacts on their autonomy, competence, and social relatedness. This theme relates to the ways in which the culture at school and home impact on these aspects of self-determination, both directly and indirectly, to influence PA and dietary choices. The two most influential structures at play, impacting on PA and diet were the structure of the school day and of the family/home culture. The participants in this study reported very distinct patterns of PA engagement and eating habits within the school context compared with their home context.

3.1.1. School culture

Many participants reported that PE at school provided them an opportunity to try a variety of different sports:

I have tried badminton, volleyball and basketball in PE and do a variety of different sports. (Stephanie, aged 17, attends school C, and lives in a residential children's home)

For some participants, the only PA they engage in is through PE at school:

At the moment in PE we are doing tennis just now, and I am enjoying that...I don't do, apart from PE I don't do any other sports... (Kirsty, aged 18, attends school C, and lives with her mother during the week and her father at the weekends)

The school curriculum ensures that participants do some PA as part of their school week. Through participating in a variety of different sporting activities during PE classes, participants develop their interest and disinterest for the activities.

The school week “routine” appears to regulate eating patterns. During the school week, participants reported that they were more likely to have regular eating times i.e. breakfast, lunch and dinner. In addition, participants described their diet as healthier at school compared to their diet at home. One participant described how his school did not put salt on food; however, at home he can help himself to salt:

I think the school is healthier but I know when we eat in the house, you know...if I eat chips in my own house and if I want salt, I just go up and get some for myself but in school they never put salt in the chips or anything. They don't even put salt in the pasta. (Ronald, aged 18, attends school D, and lives with his mother)

Ronald described how the same rules about salt do not apply at home. This demonstrates inconsistencies between two of the largest environments within the participant's life.

Two schools appeared to make some attempt to encourage leadership skills in sport during PE classes. However, the different approaches employed by the schools to inculcate leadership skills in pupils had very different impacts on the participants. Keith described the approach taken by school A:

I am actually doing a course called 'Sports Leader'. On a Thursday I do a girls' football team. I coach them all and my teacher, he doesn't do anything...that was quite good, I really enjoyed that and now I am doing a higher level; it's not actually like a game of tig or anything like that you have to do a game of football and you have to work on an aspect of the game so it would be like either shooting or passing, dribbling, and you have to have three coaching points... (Keith, aged 17, attends school A, and lives with his mother and father).

Keith discussed his enjoyment for the Sports Leader course, and how it has led to him coaching at a more advanced level with increased competence. The Sports Leader course also supports Keith to be autonomous in his coaching role.

Importantly, on considering the girls' football team's performance, Keith provides an insight into how he constructs an understanding of his coaching responsibilities:

I wouldn't say they are really good but they are decent. That is the whole point in me coaching them is to get them better. If they are not getting better, then I am doing something wrong. (Keith)

However, leadership-based PE sessions were not positively experienced by all. Stephanie described the approach taken in school C during PE lessons and the psychological distress it caused her:

Just now the pupils in our class are taking the PE classes, so we don't really know what they are deciding yet so really until that day we don't know what to do...they are responsible to know what they are doing and they have to know what equipment you need for it. I had to do it once or twice, but I got really nervous so I have not to do it again. I got really panicky about it in front of a whole big class. (Stephanie, aged 17, attends school C, and lives in a residential children's home)

Although for many of the participants PE is their only source of PA, not all participants described their enjoyment doing PE. One participant described the frustration he experienced during PE as a result of his relationship with his teacher at school D:

Just now we are playing badminton. It's quite frustrating, because you've to face a certain way when you are trying to fetch the shuttlecock and Miss XXX starts moaning at you. (In) basketball, if you do something that is wrong she stops the game and tells like, "Craig done this wrong and that wrong", and it puts it back. And if someone else does it wrong, she keeps stopping it. It's really annoying. (Craig, aged 17, attends school D, and lives with his mother)

3.1.2. Family/home culture

The current study revealed that the lifestyle behaviours of parents/carers and other family members impact on participants' lifestyle behaviours. The majority of participants reported that they relied on their parents to prepare their meals, which often resulted in a lack of choice about the foods they ate at home. In instances where parents prepared healthy meals, participants' diets were positively influenced:

...I just like homemade soup. It's your homemade mum's soup. I don't know, it's just so good. You don't want to eat anything else apart from that. (Keith, aged 17, attends school A, and lives with his mother and father)

Keith described how his family implicitly encouraged him to eat more healthily through their own eating behaviours:

I would say they (family) have definitely encouraged me but I wouldn't say they have said, "You need to eat more fruit than you are eating just now". It's I want to eat, my brother eats quite a lot of apples and my dad would eat fruit if it was there if nobody else wanted it. My mum and sister have been on a few diets and stuff, so I have seen

them eat fruit as well and that has made me want to eat fruit as well, so they have maybe been a part of it. (Keith)

However, in other instances, parents' choice of food negatively influenced participants' diet. The majority of participants provided an insight into how their parents' unhealthy food choices impact on their diet. For example, Suzanne discussed how her mum chooses to order takeaway food regularly and eats fast food from KFC up to four times per week:

Yes, I like chicken from KFC...mostly three out of five (days)...sometimes three or four (days). (Suzanne, aged 16, attends school B, and lives with her mother and father)

Another participant revealed that his gran cooks his meals; however, on days that she does not cook, he orders food from a fast food takeaway.

On a Thursday I normally have macaroni cheese. A Friday I usually have a pizza. A Saturday my gran doesn't cook, I usually have a takeaway... (Kevin, aged 17, has autism, attends school C, and lives with his grandmother)

Some participants described different eating patterns during the week at school to their eating patterns during the weekend. Within the home context, some participants explained that their family set-up means they eat different foods at different family members' houses. For example, due to Kirsty's parents being separated, she lives at home with her mum during the week and lives with her dad at weekends. As a result, the different home environments have an impact on what she eats during the week and at weekends. During the week, Kirsty explained what her mum makes for her school packed lunch:

I had two cheese and cucumber sandwiches, a biscuit and a yoghurt. (Kirsty, aged 18, attends school C, and lives with her mother during the week and her father at the weekends)

However, Kirsty described an unhealthier lunch during the weekends at her dad's house:

I have been having for quite a wee while now, noodles and toast...my dad makes me it. (Kirsty)

Stephanie also described her different drinking patterns at the weekend compared to during the week:

I drink fizzy juice at the weekends but not at school. (Stephanie, aged 17, attends school C, and lives in a residential children's home)

Some participants described their lack of choice in the activities they participate in. For many participants, home life acted as a barrier to their engagement in PA. Interestingly, many participants expressed their enjoyment of particular activities, but could not remember the last time they had participated in the activity. Instead, participants engaged in other activities that were largely chosen by their parents or carers. Kevin described the lack of support he receives in doing the activities he would like to do, and as a result does not get to go swimming:

See to be honest here, I don't, like, get enough support on people taking me places. If I want to go swimming or if I wanted to even do something that wasn't sport like learn piano, get piano lessons, nobody usually gives me a lot of support for that and my swimming is kind of a long time ago. (Kevin, aged 17, has autism, attends school C, and lives with his grandmother)

Kevin clearly feels a lack of social support in doing the activities he enjoys.

Kevin lives with his grandmother in a rural area, over 16 miles from the school he attends.

This poses a geographical barrier to 'getting out' since his gran does not drive:

I wish my gran would try a lot harder, but my gran doesn't drive and, see, this is the problem. She doesn't like driving and I don't blame her, driving can be scary because there can be accidents that can be caused. It is really hard for me to get out a lot. (Kevin)

Due to living so far from his school, Kevin revealed that travelling to school consists of two long bus journeys and extended periods of time spent sedentary:

Well to calculate it up I am roughly spending about three hours of my day on buses. (Kevin)

In contrast to Kevin's experiences, Keith described a very different culture at home whereby his mum reinforces his sense of competence in PA:

...my mum actually said a month ago, "I was wanting you to help me out do some cardio stuff". I was quite surprised that she asked me and happy she asked me. She can actually come to me and say, "can you help me out?", rather than me going to her all the time saying, "can you help me with this and that?" (Keith, aged 17, attends school A, and lives with his mother and father)

3.2. Theme 2: Motivation

Participants' motivation to participate in PA was influenced by two factors: self-efficacy and social support.

3.2.1 Self-efficacy

Self-efficacy refers to an individual's belief about their capabilities to succeed in a given task (Bandura, 1997). Participants described their intrinsic motivation and increased interest to participate in activities for which they have high self-efficacy and perceive themselves to be good at:

Football...I am good at it, that's probably one of the reasons why I like it. (Keith, aged 17, attends school A, and lives with his mother and father)

One participant described how she now enjoys and feels better playing volleyball having learned the skills involved:

Because ages ago I couldn't, you know, how you hit it (volleyball) like that, so now I am into it I feel good about it and hit the ball and it's really fun to do. (Stephanie, aged 17, attends school C, and lives in a residential children's home)

In a similar vein, participants described their dislike of activities for which they have low self-efficacy, with feelings that they lack the necessary skills required of them for the activity.

One participant described how his low self-efficacy in PA means he has a preference for sedentary tasks:

To be honest, I don't like running because I don't find myself a fast runner. Even though I do enjoy running, I don't like it because of the fact that I have asthma and the lower part of my body is very weak. So I don't enjoy doing it because I am not good at it. I like going on my iPad. I like electronic stuff, they're my most favourite thing in the world. (Kevin, aged 17, has autism, attends school C, and lives with his grandmother)

Kirsty also explained her dislike for basketball due to her low self-efficacy for the activity:

...I think I like tennis, but I don't like other ball games like basketball because I am not good at basketball. I would say that is one of my weaknesses in sport and I think I am better at doing tennis. (Kirsty, aged 18, attends school C, and lives with her mother during the week and her father at the weekends)

Identified regulation also has the potential to foster increased self-efficacy in this population.

One participant in the study who participates in regular PA explained how watching YouTube videos about exercise and diet informed him about exercises he should do and diet he should follow to achieve his goal of building muscle. This self-directed learning demonstrates his extrinsic motivation to increase his self-efficacy in practices valued in gym settings:

See when I was going to the gym every day for maybe two hours, I would look at stuff on YouTube and a guy he was saying if you are going to the gym and want to put on

muscle you need to eat more than you are eating. So instead of eating three meals a day you need to eat about seven meals a day. So I would say I eat seven meals a day but they are quite small meals...but they are portioned good...they are all high in protein. (Keith, aged 17, attends school A, and lives with his mother and father)

The same participant provided an insight into his own perspective on PA by considering the achievements of a physically disabled family member, which may be responsible for his high levels of self-efficacy:

See like people with disabilities, like people with wheelchairs like my wee cousin, he has only got an arm to there (points to the middle of his arm) and he started a football team and he enjoys it, so I wouldn't say that people that only have one leg or maybe have no legs are confined to a wheelchair they can still do exercise. When you think of people who do the Paralympics or the Special Olympics just think about all they achieve. (Keith)

3.2.2. Social connectedness

Many participants discussed their enjoyment for teamwork and competition in sporting activities. Brian described his “love” for dodgeball and the competition he has with his friend:

Handball and I love dodgeball, sometimes I am goal keeper and try and catch Kenneth out. (Brian, aged 17, attends school B, and lives with his mother)

Suzanne also described how she enjoys the competition when playing other teams in basketball:

It's kind of fun because you verse other teams. (Suzanne, aged 16, attends school B, and lives with her mother and father)

The social connectedness that resulted from Keith playing football as part of a team led to him building friendships and establishing a sense of belonging:

I would say the only thing I find different is with my last two teams it wasn't, you felt as if you weren't noticed. With this team everybody gets on and they talk to each other, so it's a bit more...and they have asked me to come down to where they are and hang about which I thought was quite good. (Keith, aged 17, attends school A, and lives with his mother and father)

Craig also cites social connectedness as a reason why he likes playing football:

Because it is good to get exercise and meeting new people. (Craig, aged 17, attends school D, and lives with his mother)

Interestingly, when asked about activities enjoyed, participants often cited activities they do with others and the fun involved. Ronald describes the fun he has when dancing with friends:

I like to dance with my friends at my youth club or the sky bar with my friends from the youth club on a Friday sometimes, and we usually dance to some songs there. Just moving round and having a great time and it's fun. (Ronald, aged 18, attends school D, and lives with his mother)

George also discussed the fun and humour involved in doing aerobics classes with his friend:

I have done that (aerobics) at one point as well, it was funny because me and my pal went to this class and we didn't know what it was going to be, and we done press ups and we were running. It was so funny. I was like, "what are we doing?" (George, aged 17, attends school A, and lives with his mother and father)

George also reported that if he needs help at the gym, he feels he can approach another gym member for support. This demonstrates a sense of relatedness which influences his sense of belonging:

Nobody really bothers you that much (at the gym). You can even ask somebody if you don't get an exercise, you can ask them, "How do you do that?" They will give you a hand. It's a friendly place as long as you are not bugging them (other gym members). (George)

One participant described his lack of social connectedness, and expressed a desire to do activities with others. Kevin revealed that he does not like to be alone and finds it "sad":

This is the problem, I am independent and I can go out myself but, see, I don't really like being alone from people because I just find it a bit sad, because I like talking to people, like all I would ask is for somebody to come with me and if they did I would be really happy. (Kevin, aged 17, has autism, attends school C, and lives with his grandmother)

3.3. Theme 3: Wider environmental influences

This theme describes the environmental factors outwith the school and home culture which influence participants' PA and dietary choices.

3.3.1. Weather

Poor weather prevents participants engaging in outdoor activity. Stephanie described how the weather impacts on the activities she participates in with her family:

I would play volleyball or mainly badminton, we would do that or sometimes go up to the swimming... Like we do that in the summer and stuff, but because it is really cold

we just run about. (Stephanie, aged 17, attends school C, and lives in a residential children's home)

Discussing his interest in playing golf, Brian described how he had not played since the summer and would not play again until the weather improved. As a result, Brian would not have contact with his golf friends during adverse weather:

It must be last July. I met all my new friends, I met them there...when the weather gets changed a bit I will go up (to golf course) with my dad and cousin. (Brian, aged 17, attends school B, and lives with his mother)

3.3.2. Availability and price

Participants described how availability and price impact their activity and eating decisions. One participant discussed how the increased difficulty to get healthier foods in shops means he has less healthy options:

Yes I still eat white rice because I know it's much easier to find white rice than brown rice. I have been eating that mostly with my dinners. (Keith, aged 17, attends school A, and lives with his mother and father)

George described how he chooses to eat all the chocolate he buys because he does not want to waste money:

I've had three chocolate bars. I felt nice towards one of my pals so I gave him a chocolate bar so I ate the three, that's a waste of money if I don't eat them. (George, aged 17, attends school A, and lives with his mother and father)

Interestingly, Keith speculates about how finances may impact families' food choices:

I would say that because people do work and if they have kids and maybe the money they are earning they can only buy certain foods. (Keith, aged 17, attends school A, and lives with his mother and father)

Keith also explained how having to pay public transport fares to the gym means he chooses to attend a closer gym that he can walk to.

I didn't want to go to a Glasgow gym as I'd have to pay bus fare to get there, it's a bit more money rather than just go down the road. (Keith)

4. Discussion

To the authors' knowledge, the current study is the first to have explored factors influencing the lifestyle behaviours of adolescents with ID immediately pre-transition from school, from

the adolescents' perspective. These findings suggest that influences on the young people in this population's PA and dietary patterns are multifaceted and complex in nature. Overall, the school and home environments were found to have the strongest influence on participants' lifestyle behaviours, but in very distinct and often conflicting ways. In Bronfenbrenner's terms, the school and home/family structures form the microsystem – the environmental system which is closest to the individual, and represents the structures that the individual has direct contact with (Bronfenbrenner, 1979). The microsystem structures within the young adults' day-to-day life play a crucial role in their engagement with PA and their dietary choices and patterns.

Generally, the school environment appeared to exert a positive influence on participants' PA and diet, whilst the home environment presented as a barrier to engagement in PA and a healthy diet. Findings highlight the importance of school PE since the majority of participants reported this is their main or sole source of PA. This finding gives credence to previous research which identifies poor PA levels in the ID population (Emerson, 2005; McGuire et al., 2007; Hsieh et al., 2014). However, the school environment was not entirely unproblematic in terms of PA experiences. Interestingly, two of the participating ASN schools were found to be utilising different approaches to inculcate sport leadership skills in their pupils, with very different outcomes.

The approach taken by school A resulted in Keith's increased perceived competence. Locus of control refers to individuals' beliefs about to the extent to which life outcomes are determined by one's own behaviour or external factors. Keith demonstrated an internal locus of control as a result of the Sports Leader course, whereby he holds that the performance of the girls' football team is his responsibility and is the result of his actions. Research has found that, in the non-ID population, individuals with an internal locus of control are more likely to engage in regular PA (Cobb-Clark et al., 2014). Inculcating such values in adolescents with ID could be pivotal to PA in later life. However, the approach taken by school C resulted in feelings of anxiety for Stephanie. It remains unclear from the current findings whether these different outcomes were in fact due to the different approaches taken by the schools or the result of participant individual differences. The authors acknowledge that Stephanie may not consider developing sport leadership skills as being important or meaningful to her, contributing to the different outcome. In any case, this finding demonstrates that these types of leadership-based classes may not be positively received by all, and should be tailored to the individual. Furthermore, the current findings suggest that a lack of social relatedness with teachers during PE classes can lead to negative PA experiences

and feelings of frustration, negatively impacting perceived competence. This supports findings which suggest the wider psycho-social environmental influences are as important as the PE activity being delivered, in terms of pupils' participation and engagement (Mitchell et al., 2013). Therefore, PE-based interventions which aim to increase PA levels in this population should ensure that a social-ecological approach targeting psychological, social and environmental levels of behaviour change are adopted (Mitchell et al., 2015).

The relatedness component of SDT suggests that individuals must experience a sense of belongingness within a given environment or a social connection with others to fulfil emotional satisfaction. Participants lacking such a connection with their teacher experienced negative PA experiences. This finding highlights the need for teachers and sport coaches working with the ID population to be aware that their interactions with adolescents with ID can influence their motivation to engage in PA.

Generally, participants who reported their parents as being physically active with healthy diets had better diets and were also more physically active than participants with inactive parents with poorer diets. In this sense, participants' PA and dietary choices are influenced by the cultural norms at home.

A lack of social support at home meant that participants were unable to do the PA they enjoy, resulting in inactivity. This finding parallels Zecevic et al.'s (2010) suggestion that, in the non-ID population, those with greater parental support for PA are 6.3 times more likely to be active. Molloy et al. (2010) suggest that those who experience low levels of social support also have lower levels of PA, whilst higher levels of social support is associated with regular PA in the general population. Therefore, future PA interventions for this population should consider the significant influence of parental support.

Findings also suggest that participants have healthier eating patterns at school compared to at home. The school environments make attempts to control participants' diet through limiting the salt in school foods. However, often these principles are not upheld in the participants' home environment. Participants' eating patterns at home were largely found to be negatively influenced by parents' cooking choices and home food availability. This demonstrates that the individual's home life environment has a strong influence on their dietary patterns. Although this can be a positive influence for few, the majority of participants in this study reported the negative influences at home. A previous study has demonstrated that, in a non-ID context, young people's diet is influenced by home food availability.

Campbell et al. (2013) investigated the impact of maternal nutrition knowledge on their child's diet, and found the association to be mediated by home food availability. In other words, children of mothers with increased levels of nutrition knowledge consumed more fruit and vegetables, whilst children with mothers with poor nutrition knowledge consumed more foods associated with overweight and obesity. The current findings highlights that home food availability also influences eating habits of adolescents with ID. The current finding also presents the weekend as the least healthy days in terms of diet. The school week encourages a more structured and healthier eating pattern.

For one participant in particular, the geographical barrier of living several miles from school friends and being unable to travel alone draws links with the autonomy component of SDT. For Kevin, the lack of autonomy in 'getting out' due to the location of where he lives means that he does not consider how he spends his time as being self-endorsed (Ryan & Deci, 2006), highlighting the heteronomy he experiences in his home environment. Being unable to get out of the house has the potential to lead to social isolation which has been shown to result in more sedentary lifestyles and reduced levels of PA (Sanders et al., 2000; Sinkkonen et al., 2014). This contrasts with Keith's home context which can be considered an autonomy supportive environment in that he is influenced by his family's healthy eating, but ultimately feels like the choices he makes are his own and that his actions are self-determined. This finding is consistent with that of Wehmeyer and Bolding (2001) who suggest that an environment which provides adequate support and opportunities to practice self-determination facilitate the development of self-determination in those with ID.

The cultural norms at home present a number of previously identified risks associated with the development of obesity (Hsieh et al., 2014; McGuire et al., 2007) which raises concerns about the impact that making the transition from the structured supportive environment of school will have on these participants' lifestyle behaviours. This finding highlights the importance of educating parents about nutrition and the impact of their food choices on their child's health, as well as the importance of providing autonomy supportive environments.

The school's efforts to support a healthier diet among pupils, such as limiting salt intake, can be linked to the autonomy component of SDT. This component suggests that an individual must be autonomous in their actions to be self-determined (Ryan & Deci, 2006). Autonomy plays an important role in facilitating intrinsic motivation and for internalisation

of extrinsic motivation to engage in a behaviour/activity. SDT would suggest that a lack of autonomy in PA and diet could have a negative impact on participants' motivation longer term. Although the school environment was found to be a positive influence on participants' PA and diet in the current study, the longer term impact of their heteronomous approach to encourage PA and a healthier diet remain unknown. According to Deci (2004), learning environments should promote autonomy in people with ID to support greater well-being. Therefore, future research would benefit from investigating ASN schools' understanding of their role in influencing pupils' lifestyle behaviours. More specifically, research could explore whether schools consider their role in influencing pupils' lifestyle behaviours to be short-term, terminating once the young person makes the transition from school, or whether their role is more about educating pupils longer term, resulting in lifelong learning.

Participants' motivation to participate in PA was found to be influenced by self-efficacy and social connectedness. Participants were more intrinsically motivated to engage in activities for which they have a high self-efficacy, whilst low self-efficacy in an activity thwarted intrinsic motivation, highlighting the importance of considering participants' self-efficacy in activities when attempting to encourage PA in adolescents with ID. This finding parallels Ryan and Deci's (2007) suggestion that an individual's competence can facilitate intrinsic motivation, whilst diminished feelings of competence serve to restrict it. If the goal is to increase PA levels in those with ID, then this finding presents the importance of considering self-efficacy levels for PA in this population. Parents, carers, teachers and researchers should be aware that promoting just any activity would be insufficient. Instead, the activity must be tailored to the individual in relation to their self-efficacy to maintain interest and enjoyment.

Furthermore, participants are more likely to be intrinsically and extrinsically motivated in activities they experience a sense of social connectedness and belonging. The current findings identify the need for adolescents with ID to establish social relationships, from which friendships can be borne. Social connectedness and competition with friends facilitated intrinsic motivation to participate in PA in this population, whilst a lack of social connectedness leads to feelings of alienation. This finding supports Ryan and Deci's (2007) suggestion that intrinsic motivation is most likely to develop in contexts where the need for relatedness is supported. According to Deci & Ryan (1985), competition can either increase or decrease intrinsic motivation depending on the individual's perception of the competitive situation. However, for many participants in the current study, competition with friends served to facilitate intrinsic motivation. Participants discussed their enjoyment for activities

that involve some competition, demonstrating that high intrinsic and extrinsic motivation to be physically active need not be mutually exclusive in this population.

Ryan and Deci (2007) suggest that the need for relatedness is not as proximal as the need for competence and autonomy, although essential for intrinsic motivation to grow. However, during discussions about their enjoyment for activities, participants often immediately linked the activities they participate in to their social relationships, even before discussing their competence for the activity. In this sense, for some young people with ID, social relatedness takes precedence over competence in PA, meaning that establishing a sense of connectedness with others during PA is more important than their levels of competence.

Perhaps it is not too surprising that Kevin experiences a lack of social connectedness since he lives so far from school friends and does not belong to any out-of-school clubs. Deci and Ryan (2000) state that when people feel alienated, they become more inhibited which negatively impacts their likelihood to experience interest or enjoyment in their activities. In this sense, feeling rejected or unsupported undermines intrinsic motivation.

In addition to the immediate environmental influences such as family and school on adolescents' PA and diet, findings also highlighted that wider environmental factors have an indirect impact. Poor weather conditions prevented PA engagement. For some participants, being unable to participate in sport-based clubs during poor weather resulted in them being unable to have contact with their friends. Therefore, poor weather not only results in a decrease in PA, it also has the potential to lead to social isolation.

Finally, other factors which are external to the individual, such as shop stock, pricing of foods and transport impact on the diet and PA of young people with ID. This finding can be understood in terms of Bronfenbrenner's (1979) Bioecological Systems Theory, with availability and pricing representing the macrosystem; the outer layer of the individual's environment which includes the political system, society, economics, and culture. Therefore, these findings reveal any intervention focused on preventing obesity in this population ought to be multipronged.

Overall, these findings provide a unique insight into the influence of social environments and motivation on PA levels and diet of adolescents with ID and pre-transition from school, which have been neglected in the literature to date. These findings make an important contribution to understanding PA and diet in this population. Further, this study

will be useful for informing interventions which aim to reduce and prevent rising levels of obesity in adolescents with ID.

Limitations

Whilst the current study provides a crucial insight into the social and environmental influences of the lifestyle behaviours of those with ID disabilities, there are some limitations which should be considered. Firstly, the sample size was relatively small, with 10 participants. However, this accounted for almost one third of all participants in the wider feasibility study. Furthermore, participants were recruited across a range of four ASN schools, providing a breadth of experiences. Secondly, the majority of participants in the current study were male. While it is recognised that females with ID are at an increased risk of developing obesity (Hsieh et al., 2014; Melville et al., 2007), the current study provides an important initial insight into participants' perspectives of factors contributing to their lifestyle behaviours. Furthermore, in childhood and adolescence, boys experience increased prevalence of ID than girls (Maulik & Harbour, 2010); therefore the participating ASN schools were largely dominated by males, impacting on the recruitment of participants. Therefore, it is acknowledged that the experiences presented within this research may represent the experiences of males with ID, and may not reflect the experiences of females with ID. A paired ratio approach may have increased the representativeness of the sample, however, this was not possible with just four schools, and went beyond the scope of this study. Further research consisting of a larger sample and an increased number of female participants is warranted.

Selecting participants is something which needs careful consideration when working with vulnerable groups. One of the shortcomings of many studies with young people in schools is that often only the teachers select the pupils for the research (Flintoff and Scratton, 2001). We recognised that this can result in including only 'well represented' pupils, therefore the researcher had a discussion with the teachers prior to selection, to ensure a range of students (e.g. gender, PA and dietary behaviours) were selected for interview.

In conclusion, a number of factors contribute to the lifestyle behaviours of adolescents with ID in their final year of school. Any attempt to address the increased prevalence of obesity in this population must recognise the complexity of the factors at play which influence lifestyle behaviours. Overall, educating parents, addressing issues relating to competence, and supporting participants to establish social connectedness may be the route to

supporting participants to engage in regular PA and to make healthier dietary choices. Specifically, the information presented provides much needed context on young people with ID's PA and dietary behaviours, and this knowledge will be instrumental for future policy and practice. These findings will be particularly useful for developing and designing weight gain intervention studies in this population, over this transition period, ultimately contributing to tackling the rising rates of obesity in the ID population.

Lastly, findings suggest that SDT may be a useful conceptual framework for understanding PA and diet in this population. The current findings augment current understandings of the PA and diet of those with ID, and make an important contribution to the scant literature in this field.

References

- Bhaumik S, Watson JM., Thorp C. F, Tyrer F & McGrother CW. (2008) Body mass index in adults with intellectual disability: distribution, associations and service implications: a population-based prevalence study. *Journal of Intellectual Disability Research* 52, 287-298.
- Boyatzis RE. (1998) *Transforming Qualitative Information: Thematic analysis and code development*. Sage, Thousand Oaks, CA.
- Braun V & Clarke V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology* 3, 77-101.
- Bronfenbrenner U. (1989) Ecological systems theory. In: *Annals of Child Development: Vol. 6 Six Theories of Child Development: Revised Formulations and Current Issues* (Ed. R. Vasta), pp. 187-249. JAI Press, Greenwich, CT.
- Burton KD, Lydon JE D, D'Alessandro DU and Koestner R. (2006) The differential effects of intrinsic and identified motivation on well-being and performance: prospective, experimental, and implicit approaches to self-determination theory. *Journal of Personality and Social Psychology* 91(4), 750–762.
- Campbell KJ, Abbott G, Spence AC, Crawford A, McNaughton SA & Ball K. (2013) Home food availability mediates associations between mothers' nutrition knowledge and child diet. *Appetite* 71, 1-6.

- Cobb-Clark DA, Kassenboehmer SC & Schurer S. (2014) Healthy habits: The connection between diet, exercise, and locus of control. *Journal of Economic Behavior & Organization* 98, 1-28.
- Deci EL. (2004) Promoting intrinsic motivation and self-determination in people with mental retardation. In: *Personality and motivational systems in mental retardation, Vol. 28* (Ed. H. N. Switzky), pp. 1-29. Elsevier Academic Press, San Diego.
- Deci EL, Eghrari, H, Patrick, BC & Leone, DR. (1994) Facilitating Internalization: The Self-Determination Theory Perspective. *Journal of Personality* 62(1), 119-142.
- Deci EL & Ryan RM. (1985) *Intrinsic motivation and self-determination in human behaviour*. Plenum, New York.
- Emerson E. (2005) Underweight, obesity and exercise among adults with intellectual disabilities in supported accommodation in northern England. *Journal of Intellectual Disability Research* 49, 134-143.
- Emerson E. (2011) Health status and health risks of the hidden majority of adults with intellectual disabilities. *Intellectual and Developmental Disabilities* 49, 155-65.
- Festinger L. (1954) A theory of social comparison processes. *Human Relations* 7(2), 117-140.
- Flegal KM, Kit BK, Orpana H & Graubard BI. (2013) Association of all-cause mortality with overweight and obesity using standard body mass index categories: a systematic review and meta-analysis. *The Journal of American Medical Association* 309(1), 71-82.
- Flintoff A Scraton S. (2001) Stepping into active leisure? Young Women's Perceptions of Active Lifestyles and their experiences of School Physical Education. *Sport, Education and Society* 6(1), 5-21.
- Garcia-Toro M, Vicens-Pons E, Gili M, Roca M., Serrano-Ripoll MJ, Vives M... & Oliván-Blazquez B. (2016) Obesity, metabolic syndrome and Mediterranean diet: Impact on depression outcome. *Journal of Affective Disorders* 194, 105-108.
- Harris H, Melville C, Jones N, Pert C, Boyle S, Murray H...Hankey C. (2015) A single-blind, pilot randomised trial of a weight management intervention for adults with intellectual disabilities and obesity: study protocol. *Pilot and Feasibility Studies* 1: 5

- Hassan MK, Joshi AV, Madhavan SS & Amonkar MM. (2003) Obesity and health-related quality of life: a cross-sectional analysis of the US population. *International Journal of Obesity* 27, 1227-1232.
- Hsieh K, Rimmer JH & Heller T. (2014) Obesity and associated factors in adults with intellectual disability. (2014). *Journal of Intellectual Disability Research* 58(9), 851-863.
- Jahoda A, Dagnan D, Jarvie P & Kerr W. (2006) Depression, Social Context and Cognitive Behavioural Therapy for People who have Intellectual Disabilities. *Journal of Applied Research in Intellectual Disabilities* 19(1), 81-9.
- Krause S, Ware R, McPherson L, Lennox N & O'Callaghan M. (2015) Obesity in adolescents with intellectual disability: Prevalence and associated characteristics. *Obesity Research & Clinical Practice*, 1-11.
- Lincoln YS & Guba EG. (1985) *Naturalistic inquiry*. Sage, Beverly Hills, CA.
- Lincoln YS & Guba EG. (2000) Paradigmatic controversies, contradictions, and emerging confluences. In: *Handbook of qualitative research* (2nd ed) (Eds N. K. Denzin & Y. S. Lincoln), pp. 163-188. Sage, Thousand Oaks, CA.
- Luftig R & Muthert D. (2005) Patterns of employment and independent living of adult graduates with learning disabilities and mental retardation of an inclusionary high school vocational program. *Research in Developmental Disabilities* 26, 317-325.
- Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW & Zitman FG. (2010) Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of general psychiatry* 67(3), 220-229.
- Maulik PK, & Harbour CK. (2010) Epidemiology of Intellectual Disability. In: JH Stone, M Blouin, editors. *International Encyclopedia of Rehabilitation*.
- McGuire BE, Daly P & Smyth F. (2007) Lifestyle and health behaviours of adults with an intellectual disability. *Journal of Intellectual Disability Research* 51(7), 497-510.
- Melville CA, Cooper SA, Morrison J, Allan L, Smiley E & Williamson A. (2008) The prevalence and determinants of obesity in adults with intellectual disabilities. *Journal of Applied Research in Intellectual Disabilities* 21, 425-437.

- Melville CA, Hamilton S, Hankey CR, Miller S & Boyle S. (2007) The prevalence and determinants of obesity in adults with intellectual disabilities. *Obesity Review* 8, 223-230.
- Mitchell F, Stalker K, Mutrie N, Matthews L, McConnachie A, Murray H, Walker A & Melville C. (2016) A qualitative exploration of participants' experiences of taking part in a walking programme: perceived benefits, barriers, choices and use of intervention resources. *Journal of Applied Research in Intellectual Disabilities*, 1-12.
- Mitchell F, Jahoda A, Hankey C, Matthews L, Murray H & Melville C. (2016) Moving on feeling good: a feasibility study to explore the lifestyle behaviours of young adults with intellectual disabilities as they transition from school to adulthood – a study protocol. *Pilot and Feasibility Studies* 2 (8), 1-10
- Mitchell, F., Inchley, J., Kirby, J., Currie, C. (2015) A socio-ecological approach to understanding adolescent girls' engagement and experiences in the PE environment: A case study design. *Graduate Journal of Sport, Exercise & Physical Education Research*, 3, 44-62.
- 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*, 1-19
- Mitchell F, Melville C, Stalker K, Matthews L, McConnachie A, Murray H, Walker A, Mutrie N. (2013) Walk Well: A randomised controlled trial of a walking intervention for adults with learning disabilities: Study protocol. *BMC public health* 13, 620.
- Molloy GJ, Dixon D, Hammer M & Sniehotta FF. (2010) Social support and regular physical activity: does planning mediate this link? *British Journal of Health Psychology* 15(4), 859-870.
- Morris JM. (1995) The significance of saturation. *Qualitative Health Research* 5(2), 147-149.
- Morris JM. (2000) Determining sample size. *Qualitative Health Research* 10(1), 3-5.
- National Institute for Health and Care Excellence. (2014) Obesity: identification, assessment and management. Retrieved from <https://www.nice.org.uk/guidance/cg189/resources/obesity-identification-assessment-and-management-35109821097925>

- Nelson MC, Story M, Larson NI, Neumark-Sztainer D & Lytle LA. (2008) Emerging adulthood and college-aged youth: An overlooked age for weight-related behaviour change. *Obesity* 16(1), 2205-2211.
- Neuman W. (2000) *Social research methods: Qualitative and quantitative approaches* (4th ed.). Allyn and Bacon, Boston, MA.
- Ntoumanis N & Standage M. (2009) Motivation in physical education classes. A self-determination theory perspective. *Theory and Research in Education* 7(2), 194-202.
- Puhl R & Heuer C. (2010) Obesity Stigma: Important Considerations for Public Health. *Am J Public Health* 100(6), 1019–1028.
- Rimmer JH & Yamaki K. (2006) Obesity and intellectual disability. *Mental Retardation and Developmental Disabilities Research Reviews*, 12(1), 22-27.
- Ryan RM & Deci EL. (2000) Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist* 55(1), 68-78.
- Ryan RM & Deci EL. (2007) Intrinsic and extrinsic motivation in exercise and sport. In: *Intrinsic motivation and self-determination in exercise and sport* (Eds M. S. Hagger, & N. L. D. Chatzisarantis), pp. 1-19. Human Kinetics, Champaign, IL.
- Ryan RM & Deci EL. (2006) Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality* 74, 1557-1585.
- Sanders CE, Field TM, Diego M & Kaplan M. (2000) The relationship of internet use to depression and social isolation among adolescents. *Adolescence* 35(138), 237-242.
- Scottish Government. (2012). Scottish Index of Multiple Deprivation. Retrieved from <http://www.gov.scot/Topics/Statistics/SIMD/SIMDPostcodeLookup>
- Sinkkonen HM, Puhakka H & Merilainen M. (2014) Internet use and addiction among Finnish adolescents (15-19 years). *Journal of Adolescence* 37(2), 123-131.
- Sohler N, Lubetkin E, Levy J, Soghomonian C & Rimmerman A. (2009) Factors associated with obesity and coronary heart disease in people with intellectual disabilities. *Social Work in Health Care* 48(1), 76-89.

Stancliffe RJ. (1997) Community living-unit size, staff presence, and residents' choice-making. *Ment Retard* (1), 1-9.

Stancliffe RJ, Larkin KC, Larson S, Engler J, Bershadsky J, Taub S et al. (2011) Overweight and obesity among adults with intellectual disabilities who use intellectual disability/developmental disability services in 20 U.S. States. *American Journal on Intellectual and Developmental Disabilities* 116, 401-418.

Tirosh A, Shai I, Afek A, Dubnov-Raz G, Ayalon N, Gordon B et al. (2011) Adolescent BMI trajectory and risk of diabetes versus coronary disease. *The New England Journal of Medicine* 364(14), 1315-1325.

Tong A, Sainsbury P & Craig J. (2007) Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care* 19(6), 349-357.

Walker HM, Calkins C, Wehmeyer ML, Walker L, Bacon A, Palmer SB et al. (2011) A Social-Ecological Approach to Promote Self-Determination. *Exceptionality* 19(1), 6-18.

Wehmeyer M. (2001) Self-determination and mental retardation. *International Review of ResearchMental Retardation* 24, 1-48.

Wehmeyer ML & Bolding N. (2001) Enhanced self-determination of adults with intellectual disability as an outcome of moving to community-based work or living environments. *Journal of Intellectual Disability Research* 45(5), 371-383.

Wehmeyer ML, Metzler CA. (1995) How self-determined are people with mental - retardation- the national consumer survey. *Ment Retard* 33(2), 111-119.

Wehmeyer ML, Kelchner K & Richards S. (1996) Essential characteristics of self-determined behavior of individuals with mental retardation. *American Journal on Mental Retardation* 100(6), 632-642.

de Winter CF, Bastiaanse L, Hilgenkamp TIM, Evenhuis HM & Echteld MA. (2012) Overweight and obesity in older people with intellectual disability. *Research in Developmental Disabilities* 33, 398-405.

World Health Organisation. (2015) *Fact sheets: Noncommunicable diseases*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs355/en/>

World Health Organisation. (2016) *Fact sheets: Obesity and overweight*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/>

Zecevic CA, Tremblay L, Lovsin T & Michel L. (2010) Parental influence on young children's physical activity. *International Journal of Pediatrics* 2010, 1-9.

Table 1: Participant details

Participant name	School attended	Age	Home living status	BMI
Keith	School A	17	With parents	23 (healthy weight) – check – this is adult BMI
George	School A	17	With parents	19.6 (healthy weight)
Brian	School B	17	With mother	Unknown
Suzanne	School B	16	With parents	18 (underweight)
Kevin	School C	17	With grandmother	24.5 (healthy weight)
Stephanie	School C	17	In residential children's home	18.1 (underweight)
Kirsty	School C	18	With mother and stays with dad at weekend	21.1 (healthy height)
Craig	School D	17	With mother	26.3 (overweight)
Thomas	School D	17	With uncle and aunt	21.5 (healthy weight)
Ronald	School D	17	With mother	21.3 (healthy weight)

Figure 1. Recruitment and sampling flowchart

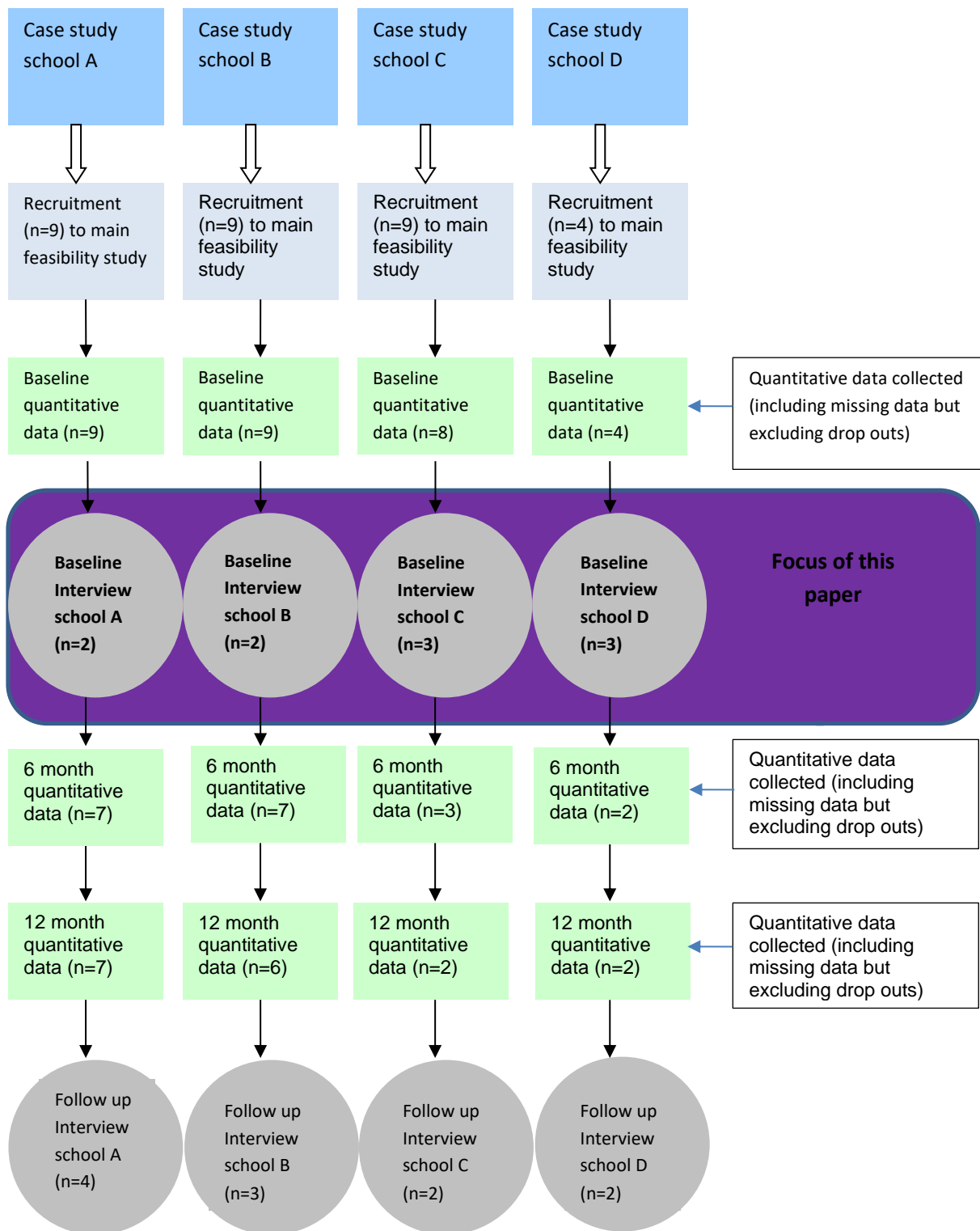


Figure 2: Thematic map

