

**Adolescent alcohol use and participation in  
organised activities: A mixed methods  
study of British young people.**

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**Thesis submitted for the degree of**

**Doctor of Philosophy**

**School of Dentistry**

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**DECLARATION**

This work has not been submitted in substance for any other degree or award at this or any other university or place of learning, nor is being submitted concurrently in candidature for any degree or other award.

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## **ABSTRACT**

Those who misuse alcohol are a burden on health services, the economy and society generally. Compared to their peers, British adolescents report some of the highest levels of alcohol use in Europe. Community organisations can potentially play an important role in the delivery of policy interventions aimed at reducing alcohol misuse. However, little is known about British adolescents' engagement with these organisations, and related activities, and therefore the role that participation in community activities plays in adolescent alcohol use.

This thesis presents findings from an investigation into young people's participation in organised activities (OAs), such as sports and special groups. While the research was primarily motivated by psychological theories of adolescent risk taking their application was in an ecological framework that identified broader social and environmental determinants of behaviour.

An explanatory mixed method design was used. This consisted of two longitudinal studies using data from the Avon Longitudinal Study of Parents and Children (ALSPAC), two cross-sectional studies of male young offenders and non-offenders and a qualitative study involving practitioners involved with the care and management of vulnerable young people.

Findings revealed that individual-level characteristics associated with risk-taking behaviours predicted OA participation and that more vulnerable young people participated less in OAs. The analysis of qualitative data indicated that there were barriers to youngsters' participation in OAs at multiple levels.

Longitudinal analyses showed that those participating in sport OAs were more likely to report alcohol use compared to adolescents who did not participate in any OA and participants in non-sport OAs. Cross-sectional analyses showed that young offenders in team sports reported lower levels of hazardous alcohol use compared to young offenders who did not participate in any OA. Qualitative work explored how OA participation might impact vulnerable young people's alcohol use and showed that the structures of organisations were important for how practitioners worked and the mechanisms identified.

These findings highlighted OA participation inequalities among British adolescents and the importance of community contexts for future adolescent alcohol use interventions.

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## LIST OF ABBREVIATIONS

ADHD	Attention Deficit Hyperactivity Disorder
ALSPAC	Avon Longitudinal Study of Parents and Children
AISS	Arnett's Inventory of Sensation Seeking
DTI	Diffusion Tensor Imaging
fMRI	functional Magnetic Resonance Imaging
OA	Organised Activities
WASI	Wechsler Abbreviated Scale of Intelligence
WISC-III	Wechsler Intelligence Scale for Children
WHO	World Health Organisation
YOT	Youth Offending Team

# **1 Introduction, literature review and thesis aims**

This chapter provides an introduction to adolescent alcohol use and participation in organised activities, outlining why adolescent alcohol use is an important topic for investigation and why organised activities are argued to be influential for alcohol use. It then reviews and evaluates studies that have investigated the relationship between organised activity participation and adolescent alcohol use. This is followed by a discussion of psychological determinants of adolescent risk-taking behaviour and how it can inform the investigation of organised activity participation and adolescent alcohol use. This chapter ends with an overview of the research questions and an outline of subsequent chapters in this thesis.

## *1.1 Introduction*

### *1.1.1 Alcohol use: A public health issue*

Cultures across the world have consumed alcoholic beverages for hundreds of years (McGovern, 2009); however, intoxication and dependence leads to both chronic and acute health impacts (World Health Organisation, WHO, 2014). At a population level, numerous diseases of both the body and mind are wholly or partially attributable to alcohol misuse, and those who misuse alcohol are also a burden on society and the economy (WHO, 2014).

Alcohol use is one of the top five risk factors for disease, disability and death throughout the world (Lim et al., 2013; WHO, 2014). Different patterns of alcohol use, such as the quantity consumed, frequency of use and even quality of alcohol can lead to various alcohol-related harms (Rehm, Kanteres, & Lachenmeier, 2010a; Rehm et al., 2003). Alcohol consumption is a component cause of more than 200



health conditions (WHO, 2014) including neuropsychiatric conditions (Samokhvalov, Irving, Mohapatra, & Rehm, 2010), gastrointestinal disease (Rehm et al., 2010b), cancers (Nelson et al., 2013), fetal alcohol syndrome (Foltran, Gregori, Franchin, Verduci, & Giovannini, 2011), infectious disease (Lönnroth, Williams, Stadlin, Jaramillo, & Dye, 2008) as well as intentional and unintentional injuries (Cherpitel, 2014; Cherpitel, Ye, Bond, & Borges, 2003; Taylor et al., 2010). Frequency of alcohol use is also a risk-factor for immediate health outcomes. Heavy episodic drinking, or drinking more than six standard drinks on one occasion, can lead to acute alcohol poisoning, injuries and violence (WHO, 2014).

An individual who consumes alcohol may not only harm themselves, but others in society as well. For example, alcohol use can result in injury of others through accidents (Cherpitel et al., 2003; Gmel & Rehm, 2003). Alcohol dependency and abuse can also lead to neglect and have negative impacts on the mental health of family and friends (Casswell, You, & Huckle, 2011; WHO, 2014). Alcohol also brings significant economic costs to society (Navarro, Doran, & Shakeshaft, 2011; Rehm et al., 2009). In 2009 alcohol-attributed costs in Great Britain were estimated at about 21 billion pounds (HM Government, 2012).

#### *1.1.1.1 Adolescent alcohol use*

Experimentation with alcohol often begins during adolescence (Hellandsjø Bu, Watten, Foxcroft, Ingebrigtsen, & Relling, 2002). Initiation of alcohol use before the age of 14 is associated with an increased risk of alcohol dependence, later alcohol abuse (DeWit, Adlaf, Offord, & Ogborne, 2000; Kraus, Bloomfield, Augustin, & Reese, 2000) and an increased risk of alcohol-related motor vehicle crashes and injuries (Hingson, Edwards, Heeren, & Rosenbloom, 2009). Alcohol use in

adolescence is also associated with physical injuries (Bonomo et al., 2001), violence, crime (Fergusson & Horwood, 2002), risky sexual behaviour (Valois, Oeltmann, Waller, & Hussey, 1999) and motor accidents (Lang, Waller, & Shope, 1997).

Compared to other European nations, adolescents in Britain report particularly high rates of alcohol use (WHO, 2009). In a national representative survey of students in England and Wales, between 21-25% of 15 year old students reported being drunk at least once by 13 years of age, much higher than the European average of 15%. In Wales, 54% of girls and 52% of boys reported being drunk at least twice by 15 years of age, higher than rates in England (50% and 40% respectively) and the European average (34%; WHO, 2009).

Although alcohol use initiation has been declining among younger age groups in Britain since 2001, it is the most common substance experimented with during adolescence, more so than tobacco or drugs (Fuller, 2011). In 2013, the median number of units consumed by students in England who drank in the past week was 5.0 units (4.8 for boys and 5.3 for girls; Fuller & Hawkins, 2013). The consumption of large amounts of alcohol during heavy drinking sessions has been attributed to increased risks for alcohol-related harm among young people (U.S. Surgeon General, 2007). In a recent British longitudinal study of adolescent alcohol use, one in three participants were classified as hazardous or harmful drinkers at 16 years of age and this was also largely determined by alcohol use at 13 and 15 years of age (Heron et al., 2012).

Trajectories of risk-taking behaviours begin in adolescence and have long-lasting impacts later in life (Dahl, 2004). Dahl (2004) suggested that altering these trajectories in positive ways during adolescence can have large beneficial effects if

addressed during this time. Preventing and reducing harmful alcohol use has been identified as an international public health priority (WHO, 2014). How young people spend their time outside of school is an important contributor to the development of risk-taking behaviours (Farb & Matjasko, 2011) and community organisations have been identified as important settings for policy interventions (WHO, 2010). Organised activities (OAs) are a form of community settings that can be used for the delivery of alcohol use prevention strategies. The following sections provide a discussion of OAs, how they might impact young people's alcohol use and a review of studies that investigate the relationship between OA participation and adolescent alcohol use.

### *1.1.2 Organised activities*

OAs is an umbrella-term used to describe a wide range of activities not part of a school curriculum and include diverse contexts including school-based extracurricular activities, community organisations and youth development programmes (Bohnert, Fredricks, & Randall, 2010). A crucial aspect of OAs is that they take place outside school hours in addition to mandatory education. Organised activities can be contrasted with alternative ways that young people spend their time such as formal education, employment, doing household chores, and "hanging out" (Mahoney, Harris & Eccles, 2006).

In many countries, OA participation is a normal experience for young people (Bohnert et al., 2010; Mahoney et al., 2006). OA contexts have become the focus of increased attention from many areas of research because of their potential to shape young people's health, behaviour and development. These contexts are believed to offer young people the means to express and explore their identity (Feldman &

Matjasko, 2005), experience and deal with challenges outside of education, and the ability to acquire and practice specific social, physical and intellectual skills that are useful in a variety of settings (Eccles, Barber, Stone, & Hunt, 2003). OAs may also help build social capital by developing a sense of agency in communities, be valued and recognised by a group, and establish supportive networks that can provide current and future help (Eccles et al., 2003). These mechanisms are also of interest to criminologists as OA participation has been argued to address proximal risk factors for crime and offending behaviours among disaffected young people (Parker, Meek, & Lewis, 2013). Participation in OAs has also been of interest in educational settings because of its link with improved academic achievement and school connectedness (Mahoney & Cairns, 1997).

#### *1.1.2.1 Organised activities and ecological frameworks*

Numerous explanations have been suggested to explain why OA participation leads to positive outcomes. Ecological models have been used as frameworks to ingrate the different psychological and sociological literatures of development through OA participation. This has encouraged researchers to consider the joint direct and indirect effects of participation on adolescent functioning and behaviours (Feldman & Matjasko, 2005). For example, Bronfenbrenner's ecological model of development (1979) highlighted that individual development is influenced by ongoing qualities in settings where adolescents live and interactions between these settings (Bronfenbrenner, 1979, 1998). Ecological models have been used to investigate OAs such as extracurricular activities, and how they might impact development and wellbeing (Gilman, Meyers, & Perez, 2004; Zaff, Moore, Papillo, & Williams, 2003); however, there is no commonly accepted theoretical model used

to explain the association between these types of activities and alcohol use outcomes (Hoffmann, 2006).

While many studies have investigated the relationship between OA participation and alcohol use outcomes, few studies have discussed the theoretical basis for these relationships. When provided, explanations draw on a range of psycho-social theories which focus on similar and overlapping mechanisms. This creates considerable challenges in applying them within an ecological framework. Due to varying characteristics of OAs, such as physical activity components, certain types of OAs like sports may have unique relationships with alcohol use (this is discussed more below). Although OAs are often promoted because of their ability to bring about positive and desirable changes among young people, a theoretical overview of how OAs might impact alcohol use specifically has not been discussed within the reviewed literature.

The MRC guidelines for complex interventions state an important early task is to develop a theoretical understanding of the likely processes of change by drawing on existing evidence (Campbell et al., 2000; Craig et al., 2008). Public health interventions based on theory can be more effective (National Institute for Health and Clinical Excellence, 2007) and a better understanding of OAs and associated alcohol use outcomes needs to be developed if OA settings or OAs themselves are to be used as interventions.

## *1.2 Literature review*

The following section presents a detailed discussion of the relevant literature. First a theoretical overview is provided about the proposed mechanisms by which OAs

impact adolescent alcohol use. This is then followed by a review of studies which have investigated relationships between OA participation and alcohol use.

Literature searches were conducted on Medline (from 1946) and Psychinfo (1806 to present). Terms related to alcohol use included alcohol drinking terms such as alcohol, binge drinking, alcohol drinking patterns, alcoholism, alcohol abuse, binge drinking and intoxication. Terms related to OA participation were more extensive as these were meant to encompass a wide range of activities and included: school club membership, afterschool programmes, athletic participation, athletic training, clubs (social organisation), extracurricular activities and sports. Search hits were limited to articles that were published in peer reviewed journals, focused on humans and were written in English. Results were also limited to papers published in or after the year 1982 and focused on school age groups (age 6 to 12) and adolescence (age 13 to 17). Searches for papers using the combined search terms related to alcohol use and OA participation with limits yielded 51 results. The abstracts of these papers were then read, resulting in 14 papers that were relevant for the current study. Additional searches for articles were made on google scholar using key search terms and references of key papers were also investigated. Of interest and of main focus in this literature review were school-aged young people and not college students or adult groups.

## *1.2.1 How organised activity participation might impact alcohol use*

### *1.2.1.1 Mechanisms that reduce adolescent alcohol use*

#### *1.2.1.1.1 Supervision*

To engage in delinquent and other risky behaviours youngsters need a time and a place where they are not supervised, such as after school (Eccles et al., 2003; Mahoney et al., 2006; Mahoney, Larson, Eccles & Lord, 2005). The increase in time spent in an OA takes away time from participating in other unstructured and unsupervised activities decreasing “windows of opportunity” for alcohol use (Wichstrøm & Wichstrøm, 2009). Similarly, participation in OAs is distinguished from other types of unstructured leisure activities because they are often facilitated by adults (Wichstrøm & Wichstrøm, 2009).

#### *1.2.1.1.2 Skill development*

Increased time spent in OA contexts provides greater exposure to learning environments which facilitate skill development (Hansen, Larson, & Dworkin, 2003; Reed W Larson, Hansen, & Moneta, 2006). Breadth, or the number of different activities young people participate in, has been suggested to lead to the development of a wide range of competencies (Denault & Poulin, 2009; Fredricks & Eccles, 2006a, 2006b; Larson et al., 2006; Rose-Krasnor, 2009), and identity exploration in adolescence (Busseri, Rose-Krasnor, Willoughby, & Chalmers, 2006; Fredricks & Eccles, 2006a). Several studies have investigated relationships between breadth of activities and alcohol use outcomes (Denault & Poulin, 2009; Fredricks & Eccles, 2006a, 2006b), arguing that participation in more OA contexts contributes to increased time in supervised OA contexts leading to less time in unstructured activities and therefore fewer opportunities to engage in risky behaviour.

#### *1.2.1.1.3 Commitment building*

Participation in OAs such as extracurricular activities protects against early termination of education in at-risk students (Mahoney et al., 2003; Mahoney & Cairns, 1997), predicts better educational attainment (Mahoney et al., Fredricks & Eccles, 2006b; 2003) and school belonging (Fredricks & Eccles, 2006a). To explain this, studies have drawn on Hirschi's social control theory (Hirschi, 1969/2002), stating that involvement in conventional activities strengthens bonds to conventional society, diminishing deviant behaviours. OA participation may lead to greater commitments to conventional institutions (such as school and employment) as they provide rewarding experiences. This may lead to less risk-taking behaviours and less alcohol use because involvement in such risk-taking behaviour would threaten young people's ability to participate in OAs (Zill, 1995). According to Hirshi, "a person may be simply too busy doing conventional things to find time to engage in deviant behaviour" (1969/2002, p. 22). Advocates of social control theory have referred to this statement to support claims that the amount of time in OAs provides fewer opportunities to engage in delinquent behaviours. However, Barnes, Hoffman, Welte, Farrell & Dintcheff (2007) questioned whether Hirschi's statement intended to explain increased bonding to society through OA participation. According to Barnes et al. (2007), Hirschi acknowledged that many types of activities (that could be considered OAs), may be unrelated to delinquent acts because they may not support the development of conventional "success goals" (p. 191).

#### *1.2.1.1.4 Health choices*

OAs that incorporate physical activity may lead to less alcohol use because of possible negative health consequences. Wichstrøm & Wichstrøm (2009) proposed



that involvement in sports leads to an “orientation toward success” and that negative effects from alcohol use reduce physical abilities. Sport participants may therefore limit their alcohol use due to a fear of jeopardising their achievement and skill. This is also suggested to be more important for individuals who participate in competitive sports at higher levels (Wichstrøm & Wichstrøm, 2009).

#### *1.2.1.1.5 Peer influences*

OA participation might impact alcohol use through peer socialisation. Advocates of social learning theory argue that social networks and relationships determine the likelihood of problem behaviours (Akers, 1992; Dorius, Bahr, Hoffmann, & Harmon, 2004). Hirschi’s social control theory (Hirschi, 1969/2002) has also been used to explain the importance of attachment, arguing that OAs expose students to conventional peers (such as those who exhibit less delinquent behaviours) and positive role models (Eccles et al., 2003; Mahoney et al., 2003). Through this, participation can motivate young people to engage in conventional activities and refrain from problem behaviours such as alcohol use (Hoffmann, 2006).

Although this perspective assumes that peer influences in OAs have a positive impact on health outcomes by reducing alcohol use, others have questioned whether this effect might lead to increases in alcohol use (Zill, 1995). For example, Wichstrøm & Wichstrøm (2009) argued that participation in sport is a social activity and as such, may increase a young person’s social network. This would in turn increase the probability of meeting peers who already engage in substance use. If participation is segregated by age however, than the possibility of being introduced to older peers who engage in alcohol use sooner, is reduced (Wichstrøm & Wichstrøm, 2009).

### *1.2.1.2 Mechanisms that increase adolescent alcohol use*

#### *1.2.1.2.1 Sport culture*

Another mechanism that may reflect peer influences in OA contexts surrounds cultures and traditions within OAs. This has been discussed predominantly for sports and their social rituals. Zhou, O'Brien & Heim (2013) stated that "the social practices in sports can complement those of drinking" and that "sporting participation and drinking behaviours are linked by their social significances" (pg. 3). That is, both drinking and participation in sport is a social phenomenon and can therefore occur together.

There may be a culture of alcohol use in sport contexts that is encouraged. For example, sport psychologists have suggested that sport participants receive increased pressure from team mates and coaches to drink because it facilitates team cohesion (Leichliter, Meilman, Presley, & Cashin, 1998). Sport participants may drink more alcohol because of drinking rituals associated with sporting events (Glassman, Werch, Jobli, & Bian, 2007) and as a reward for participation (O'Brien, Ali, Cotter, O'shea, & Stannard, 2007). Others have argued that alcohol is used to promote masculine values (Kingsland et al., 2013) and drinking in sport contexts provides opportunities to express this by testing stamina (Peretti-Watel, 2009; Smith & Waddington, 2004).

#### *1.2.1.2.2 Advertising in sport*

At the policy level, sport participants may be more likely to drink alcohol due to alcohol marketing and promotions targeting sport clubs (Nelson & Wechsler, 2003; O'Brien et al., 2014). This has been shown to predict alcohol use for sport participants in university settings who receive sponsorship from the alcohol industry

(Kelly, 2013; O'Brien et al., 2014). How this might impact adolescent alcohol use in OA contexts among younger age groups has not been discussed within the literature.

#### *1.2.1.2.3 Poor coping*

While participation in OAs is seen as beneficial, negative impacts from OA participation have also been highlighted. According to the over-scheduling hypothesis, young people who devote a large amount of time to OA participation, coupled with pressure from parents and extensive time commitment, are at risk for a variety of adjustment problems and increased alcohol use (Mahoney et al., 2006). In relation to sports, alcohol use has been suggested to be used as a coping mechanism (O'Brien et al., 2007).

#### *1.2.1.3 An ecological framework for participation in organised activities and adolescent alcohol use*

A multifaceted framework that can accommodate these mechanisms to explain how OAs might impact young people's alcohol use is a socioecological framework outlined by McLeroy, Bibeau, Steckler & Glanz (1988). Similar to Bronfenbrenner's ecological framework for development (Bronfenbrenner, 1979, 1998), the framework outlined by McLeroy et al., (1988) accounts for individual, social and wider determinants of health behaviour that can be targeted for intervention.

The mechanisms outlined above might occur at different levels. McLeroy's et al. ecological framework is composed of five levels and represents intrapersonal factors, interpersonal processes, institutional factors, community factors and public policy (1988). Intrapersonal (also called individual-level factors) are individual characteristics such as behaviour, knowledge, attitudes, skills and self-concepts. Interpersonal processes focus on social networks of formal and informal groups that

can influence health behaviours and include family, friends and work groups. Institutional factors in the ecological model represent the social institutions that individuals find themselves in, such as schools and the work place and have formal and informal rules and regulations for operation. Community factors represent relationships among organisations and networks within defined boundaries while public policy concerns local to national laws and policies.

An illustration of the mechanisms discussed above and how they might fit within this ecological framework are presented in Table 1.1. At the interpersonal level, individual-level pathways reflecting motives for alcohol use are presented. Pathways related to social groups and relationships are presented at the interpersonal level while factors related to the OA settings themselves and how they might impact alcohol use are presented at the institutional level. Several pathways occur at more than one level. For example, commitment to friends may lead to greater peer influences but commitment can also be made to OA institutions as well. Higher-level pathways identified related to alcohol advertising and sponsorship are presented at the policy level. Mechanisms which might increase alcohol use are presented to the right and those which are argued to decrease alcohol use are presented to the left. Mechanisms are also distinguished if they are specific to participation in sport contexts as studies have shown the relationship between OA participation and alcohol can depend on whether young people are involved in sport/non-sport activities (discussed in detail in the next section). It should be noted that these mechanisms are those cited in studies which have investigated relationships between OAs and alcohol use and does not disregard other possible explanations for relationships at all levels.

*Table 1.1 Mechanisms from organised activity participation that increase and decrease alcohol use*

<b>Decreases alcohol use</b>	<b>Increases alcohol use</b>
<b>Intrapersonal Level</b>	
Skill development Health choices*	Poor coping
<b>Interpersonal Level</b>	
Supervision Commitment to groups Peer influences	Sport culture*  Peer influences
<b>Institutional Level</b>	
Commitment to organisations	
<b>Community Level</b>	
<b>Policy Level</b>	
	Alcohol advertising*

*\*mechanism is specific to sport participation*

### *1.2.2 Studies on the relationship between organised activity participation and adolescent alcohol use.*

As outlined above, several suggestions have been made to explain how OAs might impact alcohol use. Building on these theories, many cross-sectional and longitudinal studies have investigated relationships between OA participation and alcohol use outcomes. Understanding the nature of these relationships has been made difficult however because of disparities between studies. For example, OAs have been measured differently with some studies limiting analyses to school-based activities and others only investigating one type of OA, such as sports. Alcohol use is also measured differently with some studies measuring recent alcohol use and others measuring heavy episodic drinking. Nevertheless, an account is provided

below of studies which have investigated these relationships among young people in an attempt to identify common patterns of these relationships.

#### *1.2.2.1 Time spent in OAs*

Several studies have compared participants in OAs with non-OA participants on reported alcohol use outcomes arguing that OA participation reduces alcohol use because it occupies adolescent's free time. Darling (2005) investigated school-based extracurricular activities and frequency of alcohol use among high school students. Cross-sectional analyses showed that participants and non-participants did not differ on alcohol use frequency. Longitudinal analyses with the same sample showed that years of participation as well as year-on-year variations in participation, were not associated with alcohol use outcomes after controlling for grade, gender, ethnicity and previous levels of alcohol use.

Similar to Darling (2005), Fredricks & Eccles (2006a) examined longitudinal relationships between extracurricular activity participation and alcohol use in high school. In contrast however, participants were categorised into mutually exclusive groups according to their participation patterns over time: no participation, participation at one wave, participation at two waves and participation at all three waves of the study. After controlling for gender and parent education, participation in activities across more waves predicted less alcohol use in high school for older cohorts, but no relationships were found among younger cohorts.

Intensity, or the amount of time young people participate in OA contexts, has also been investigated. Denault and Poulin (2009) found that young people who dedicated more hours per week to participate in school and community OAs between 7th and 11th grade were not more or less likely to report alcohol use in 11th grade

after controlling for prior outcomes, family income and gender. As an indicator of intensity, Fredricks & Eccles (2006a) investigated the amount of different school-based activities young people participated in. Participation in total number of extracurricular activities did not predict alcohol use one year later after controlling for gender, parent education and parental missing information.

#### *1.2.2.2 Breadth*

Breadth, or the number of different types of activities participated in (Bohnert et al., 2010), has been investigated in studies that have been mainly interested in developmental outcomes. By measuring breadth, OAs are grouped together according to common features and participation across different groups of activities is summed to create a total score. For example, Fredricks & Eccles (2006a) grouped OAs into sports, prosocial activities (including volunteering, service clubs at school, and religious or service activities in the community), performing arts (participation in band, drama, art or dance), academic clubs and school involvement (student government, pep club or cheerleading). In their study, participation in more groups was not found to predict later alcohol use among students.

Instead, Denault & Poulin (2009) grouped activities into seven categories: individual sports, team sports, performance and fine arts, academic clubs and organisations, community-oriented activities, service activities and faith-based groups. After controlling for gender and family income, breadth of participation did not predict student alcohol use at 11th grade.

Fredricks & Eccles (2006b) investigated a more narrow measure of breadth which included participation in sports, school clubs and prosocial extracurricular activities among 11th grade students. They found that breadth in activities was

associated with less alcohol use particularly for females; however, among African American students breadth was associated with more alcohol use.

### *1.2.2.3 Activity type*

While breadth, intensity and general OA participation may correspond with the amount of time young people spend in some OA contexts, they fail to capture other dimensions of participation which may impact alcohol use. As mentioned above, cultures and practices within OA contexts may influence young people's alcohol use. This has been an influential concept in studies that have studied sport participation in particular. Sport participation may lead to less alcohol use because it can negatively impact physical performance (Wichstrøm & Wichstrøm, 2009). These theories however, are not supported by studies which show that sport and alcohol use are positively associated in adulthood (O'Brien et al., 2007; Poortinga, 2007). As discussed below, these assumptions conflict with many findings that have investigated relationships between adolescent alcohol use and participation in sport contexts.

#### *1.2.2.3.1 Sport participation*

Numerous studies and several systematic reviews have investigated the relationship between sport participation and substance use (Diehl et al., 2012; Kwan, Bobko, Faulkner, Donnelly, & Cairney, 2014; Lisha & Sussman, 2010; Darren Mays, Gatti, & Thompson, 2011). Participation in sports is associated with less tobacco and drug use (Diehl et al., 2012; Kwan et al., 2014) but a positive relationship between sport participation and alcohol use is often observed among older adolescents in high school and young adults in university (Diehl et al., 2012; Kwan et al., 2014; Lisha &



Sussman, 2010). The relationship between alcohol use and sport participation remains ambiguous for younger age groups (Wichstrøm & Wichstrøm, 2009).

Cross-sectional studies have investigated these relationships by comparing alcohol use outcomes between those who participate in sports and those who do not participate in sports. Several studies found no significant differences between sport and non-sport participants on several alcohol use outcomes including alcohol use in the past month (Pate, Trost, Levin, & Dowda, 2000), binge drinking (defined as having five or more drinks in a row in a couple of hours; Pate et al., 2000); alcohol-related problems (Moulton, Moulton, Whittington, & Cosio, 2000) and alcohol use in the past year (Naylor, Gardner, & Zaichkowsky, 2001). In contrast, several studies have shown that those who participate in sports are less likely to consume alcohol (Mays & Thompson, 2009; Hellandsjø Bu et al., 2002) or get drunk earlier in adolescence (Hellandsjø Bu et al., 2002). Female athletes have been shown to report less alcohol use than female non-athletes (Mays & Thompson, 2009); however, a study of American high school students found that compared to females who did not participate in any sports, female athletes who participated in three or more sport teams were more likely to binge drink (Women's Sport Foundation, 2001). A study of French high school students found that athletes were more likely to report alcohol use (Lorente, Souville, Griffet, & Grélot, 2004).

More consistent relationships have been found for specific types of sports. For example, several studies have shown that participation in team sports is associated with more alcohol use. Peretti-Watel, Beck & Legleye (2002) found that compared to “athletic sports” (e.g. cycling, track and field) as well as “strength and combat sports” (e.g. weightlifting, boxing and judo), French adolescents in team

sports were more likely to report repeated drunkenness (being drunk ten or more times in the past 30 days; Peretti-Watel et al., 2002). In a study of elite French student athletes, team sport participants were also more likely to have drunk alcohol in the past month (Peretti-Watel et al., 2003). Among a study of Canadian secondary school students, McCaul, Baker & Yardley (2004) investigated the type of activity (individual vs. team sport) with level of physical intensity of the sport. High-intensity team activities were a significant predictor of both alcohol use frequency in the past month and binge drinking in the past month (defined as five or more drinks on one occasion).

A criticism of these studies is that they are “not well suited for answering an inherently aetiological question” (Wichstrøm & Wichstrøm, 2009) and cannot help understand the order of cause and effect. Alcohol use increases with age during adolescence (Denault, Poulin, & Pedersen, 2009) while sport participation decreases (Denault & Poulin, 2009; Denault, Poulin, & Pedersen, 2009). Wichstrøm & Wichstrøm (2009) argued that not controlling for age may lead to artificial relationships between participation in sports and alcohol use.

While some longitudinal studies have investigated prospective relationships between sport participation and future alcohol use (Aaron et al., 1993; Eitle, Turner, & Eitle, 2003; Fredricks & Eccles, 2006b); they have also been criticised because they fail to systematically control for third variables which might explain relationships including age and other confounding variables (Wichstrøm & Wichstrøm, 2009). To address this, Wichstrøm & Wichstrøm (2009) investigated sport participation and reported alcohol use among a sample of Norwegian adolescents 13-19 years old and observed these relationships over a period of 13

years. At the start of the study, non-sport participants reported more intoxication than sport participants after controlling for family structure, pubertal timing, peer substance use, academic achievement, socioeconomic status and social acceptance. When participants were a mean age of 21.5 and 28.5 years, those who has been involved in sports at the beginning of the study were intoxicated more often than those who were not involved in sports. Those who were involved in team sports at 15 years of age also had an increased growth in intoxication over time, but those who were involved in endurance sports had a reduced growth in intoxication over time. Unfortunately only sports participants were investigated in these comparisons and non-sport participants were not considered.

#### *1.2.2.3.2 Other organised activities*

Studies have also investigated alcohol use outcomes according to participation in specific types of OAs rather than sports alone. For example, Fredricks & Eccles (2006b) investigated student's participation in extracurricular activities categorised as sport, school clubs and prosocial activities (volunteer or civil service activities) during the 11th grade. After controlling for gender, race, parent's educational attainment, self-esteem as well as 8th grade levels of alcohol use; cross-sectional relationships showed that adolescents in sports reported lower alcohol use (frequency of drinking and getting drunk) than students not involved in sports at 11th grade. Similar relationships were also found for participants in school clubs.

Longitudinal studies have also compared different types of OA participation with later alcohol use. Denault, et al. (2009) investigated the amount of hours students participated in sports, performance or fine arts groups as well as youth clubs and the amount of alcoholic beverages consumed in the past month. After controlling

for gender and family income, more intense sports participation in 7th grade predicted steeper increases in alcohol use over time while participation in youth clubs predicted less alcohol use. Similarly, Fredricks & Eccles (2006a) found that more participation in sports during high school predicted later alcohol use among older cohorts of their study, but not among younger cohorts.

Eccles & Barber (1999) investigated participation in OAs outside and within school settings among 10th graders and grouped them into the following categories: prosocial activities, performance activities, team sports, school involvement and academic clubs. After controlling for gender, mother's education, verbal and math ability scores, and 10th grade outcome measures, engagement in either prosocial OAs or performing art OAs predicted less alcohol use at 12th grade while participation in sports predicted more alcohol use. Using the same sample, Barber, Eccles, & Stone (2001) investigated alcohol use trajectories over a longer period of time. When participants were between 16-21 years, females who participated in sports during 10<sup>th</sup> grade increased their drinking levels at a faster rate than females not in sports, but the opposite was true for males. Involvement in prosocial activities was suggested to delay the timing of increased alcohol use as this group increased their drinking between the ages of 18 to 21 compared to non-prosocial participants who increased their drinking between 16 to 18 years of age. School involvement (participation in student government, pep club or cheerleading) however, was not related to any alcohol use mean levels or changes in drinking patterns over time.

In summary, studies investigating the relationship between OA participation and adolescent alcohol use have yielded conflicting results. While there is a lack of evidence to suggest that participation in OAs leads to less alcohol use, more

consistent findings show that participation in sports is associated with increased alcohol use and this depends on the age group in question. Studies of younger adolescents show that sport participants report less alcohol use at an early age (Hellandsjø Bu et al., 2002; Wichstrøm & Wichstrøm, 2009); however, longitudinal investigations show sport participants report increased levels of alcohol use in mid to late adolescence (Barber et al., 2001; A. S. Denault et al., 2009; Eccles & Barber, 1999; Wichstrøm & Wichstrøm, 2009). This may explain why there are less consistent findings among cross-sectional studies that encompass a wide age-range. There is also some indication that relationships with alcohol use may be stronger for team sports in particular (McCaul et al., 2004; Peretti-Watel et al., 2002; Wichstrøm & Wichstrøm, 2009).

### *1.2.3 Limitations to previous studies*

Understanding the relationship between OA participation and alcohol use is important if OA contexts are to be used as platforms to deliver alcohol interventions in community and school settings for adolescents. The studies above provide an indication of unique relationships existing in regards to specific types of OAs, such as sports. Nevertheless, applying these findings to British populations is limited due to a range of methodological issues. This section presents a critique of common features within the studies discussed above.

#### *1.2.3.1 Population*

Most of the studies that investigated relationships between OA participation and alcohol use have been conducted in North American populations (Barber et al., 2001; Crosnoe, 2002; Darling, 2005; Denault & Poulin, 2009; Denault et al., 2009; Duncan, Duncan, Strycker, & Chaumeton, 2002; Eccles & Barber, 1999; Elder,

Leaver-Dunn, Wang, Nagy, & Green, 2000; Fredricks & Eccles, 2006a, 2006b; Mays, DePadilla, Thompson, Kushner, & Windle, 2010; Mays & Thompson, 2009; McCaul et al., 2004; Moore & Werch, 2005; Moulton et al., 2000; Naylor et al., 2001; Pate et al., 2000; Peretti-Watel et al., 2002; Terry-McElrath, O'Malley, & Johnston, 2011; Women's Sport Foundation, 2001). Only a few have been conducted in European countries such as Norway (Hellandsjø Bu et al., 2002; Wichstrøm & Wichstrøm, 2009), France (Lorente et al., 2004; Peretti-Watel et al., 2002; Peretti-Watel et al., 2003), Switzerland (Ferron, Narring, Cauderay, & Michaud, 1999) and Iceland (Thorlindsson & Bernburg, 2006). None of the studies reviewed have been based on British populations.

In a recent systematic review, Kwan et al. (2014) cautioned the extrapolation of North American results from these studies to broader global contexts and highlighted that it was necessary to test the robustness of the relationship between adolescent alcohol use and sport participation in other countries. It has not been considered if differences in relationships might be attributed to alcohol use aetiology within populations and there are several reasons why relationships might be different in a British population.

Several North American longitudinal studies have shown that alcohol use in OA contexts such as sports increases after high school (Barber et al., 2001; Eitle et al., 2003; Terry-McElrath & O'Malley, 2011). In America the legal drinking age is 21; however, it is legal in the UK to provide alcohol to young people under the age of 18. It can therefore be questioned whether the timing of increased adolescent alcohol use is related to cultural-specific factors and alcohol policies. Within the UK, there is a relationship between sport involvement and alcohol use in adulthood

(Poortinga, 2007) but it is not clear when these relationships begin to emerge and if they are evident at a younger age compared to other populations.

Additionally, OAs may have a different place in UK society compared to North American populations. In North America sports and other OAs are often attached to school settings and many North American studies fail to account for OA participation outside of school. In the UK, it is not clear to what extent young people engage in community or school based activities alongside the mandatory school curriculum. The delivery and provision of OAs in British communities may differ from other nations and result in distinct participation patterns among young people. Recent studies have shown that access and provision to certain types of OAs (termed out-of-school learning) at the school-level vary greatly throughout the UK (Power, Taylor, Rees, & Jones, 2009; Taylor, Power, & Rees, 2009). There may also be different motivations for participation in OAs. In contrast to the UK, sport participation in American high schools can lead to rewards such as scholarships to elite universities.

#### *1.2.3.2 Measurement of organised activities*

It has been suggested that OA participation leads to less adolescent alcohol use because it occupies adolescent's free time in contexts which are supervised by adults (Eccles et al., 2003; Mahoney et al., 2006). With the exception of Denault & Poulin, (2009) most studies have investigated OA participation in school-settings such as extra-curricular participation; however, this is just one type of OA setting that can impact on alcohol use outcomes (Dawkins, Williams, & Guilbault, 2006). Comparing those who participate in school-based OA contexts to those who do not fails to account for other OA contexts young people engage in during their free time.

Another criticism related to this, is that all studies have been based on student populations. As discussed previously, participation in OAs is believed to increase school-connectedness (Fredricks & Eccles, 2006a) and reduce termination of education early among at-risk youth (Mahoney et al., 2003; Mahoney & Cairns, 1997). Limiting studies to student samples risks excluding young people who do not attend mainstream schools regularly and who might benefit differently from OA participation. In early adolescence there may be a protective effect of sport on early alcohol use as demonstrated by longitudinal studies (Wichstrøm & Wichstrøm, 2009) but this understanding is limited due to how studies have measured OA participation.

For example, all studies (with the exception of Fredricks & Eccles, 2006a) have investigated associations of alcohol use using dichotomous measures of OA participation and treated participation as an “all or nothing” approach (Bohnert et al., 2010, p. 577). In their study of participation in sports and delinquency, Gardner, Roath & Brooks-Gunn (2009) argued that few studies had considered the heterogeneity of youth who do not participate in sports and Bohnert et al. (2010) added that this presents as a problem for the investigation of OAs. For example, young people who participate in an OA such as sports have been compared to those who do not participate in sports, yet this group would include those who participate in other non-athletic activities and youth who do not participate in any OA contexts at all (Gardner et al., 2009). Gardner (2009) argued this was problematic because of consistent differences in risky behaviours between those who participate in OAs and those who do not. Young people who do not participate in any OAs at all may show different associations with outcomes compared to those who participate in specific types of OAs.



Identifying what influences selection into OA participation is therefore important for understanding relationships between OA participation and associated outcomes, such as alcohol use, because it can help explain relationships among different groups of young people. Unfortunately few studies have investigated and identified important individual-level predictors of OA participation and therefore little is known about how these groups (e.g., those who participate in different types of OAs and those who do not participate in any OAs at all) differ in characteristics other than on demographic factors (Bohnert et al., 2010). Identifying important individual-level factors important for OA participation can also inform the development of targeted interventions that aim to increase OA participation for young people who are less-likely to participate.

#### *1.2.3.3 Self-selection factors*

In an attempt to correct for systematic differences between adolescents who differ in OA participation patterns, studies have controlled for “self-selection factors” in analyses. These unobserved variables might explain the relationship between OA participation and alcohol use. As stated by Fredricks & Eccles (2006b):

“...few studies have adjusted for the self-selection factors that may explain why some individuals choose to participate in extracurricular activities and others do not. As a consequence of self-selection factors, differences in the outcomes between participants and nonparticipants may reflect pre-existing differences between the two groups. Selection factors also are often associated with positive development outcomes, and failing to control for these variables overstates the benefits of extracurricular participation” (p. 699).

Only a handful of studies have examined the relationship between OA participation and alcohol use while controlling for individual-level characteristics which may act as self-selection factors. These have been limited to measures of

academic motivation (Fredricks & Eccles, 2006b), internalising behaviours, externalising behaviours (Peck, Vida, & Eccles, 2008) and pubertal timing (Wichstrøm & Wichstrøm, 2009). In several of these studies, accounting for these variables reduced the associations between OA participation and outcomes (Fredricks & Eccles, 2006b; Wichstrøm & Wichstrøm, 2009).

A recurrent criticism of studies is their failure to account for self-selection characteristics which reflect similar motives for both OA participation and alcohol use (Wichstrøm & Wichstrøm, 2009). This has been argued in studies that have found positive relationships between participation in sports and alcohol use. Peck et al. (2008) highlighted the role of individual-level factors stating:

“The results of these diverse studies suggest that it is not simply participating in sports that drives the apparent relation between sports activity and alcohol use: rather, there are a variety of factors characterizing youth who participate in sports that may influence alcohol use, including personal factors (e.g. temperament and identity) involved with choosing to participate in specific kinds of activities (including both sports and drinking)...” (p. 70).

Perreti-Watel et al. (2002) highlighted that relationships may be attributed to characteristics involved in risk-taking behaviours such as sensation-seeking, stating “...sporting activity and drug use may be impelled by similar motives or values. For example, both activities may reveal similar impulses to sensation seeking, the search for thrill, vertigo or ‘flow’ ” (p. 150).

The importance of individual-level characteristics related to risk-taking behaviours is an area that has not yet been applied to OA participation. As discussed in the next session, these psychological influences change with age and show strong associations with both alcohol use and may also impact OA participation. Not only can these individual-level factors help elucidate the relationship between OA

participation and alcohol use among adolescents; it can also help explain how OAs might be used to promote healthy development during a time when risk-taking behaviours often increase.

### *1.3 Risk-taking in adolescence*

Adolescence marks the transition from childhood to adulthood and is often perceived as a period of increased storm and stress (Arnett, 1999). Notable changes occur across physiological and social domains, reflecting an integrated and complex time of human development (Dahl, 2004). Although late childhood and adolescence is often presumed to be the healthiest period of life (Kleinert, 2007), many risk-taking behaviours are initiated during adolescence (MacArthur et al., 2012) and contribute to increased rates of morbidity observed during this time (Viner et al., 2011).

Within the last decade the advancement of brain imaging technology, such as functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI), has facilitated a better understanding of brain development across the lifespan. Physiological changes of the adolescent brain are associated with the development of skills such as decision making and planning ahead (Giedd et al., 2012). As such, several theories have drawn on this evidence to explain why adolescence is a time of increased risk-taking behaviours.

#### *1.3.1 Developmental neuroscience and risk-taking behaviours*

The dual-systems theory (Steinberg, 2010; Steinberg et al., 2008) is one of several theories of adolescent risk-taking behaviour that draw on research from developmental neuroscience (Casey, Jones, & Somerville, 2011; Somerville, Jones, & Casey, 2010). The main components of these theories are similar in that they focus on two developmental changes in the brain: a) sub-cortical changes in hormone

sensitivity which leads young people to seek out rewarding experiences and b) the gradual strengthening of connections between the prefrontal cortex and subcortical regions of the brain resulting in improved cognitive control. These components are discussed below.

#### *1.3.1.1 Sensation seeking*

Steinberg et al. (2008) defined these two developmental changes as two neurobiological systems. The first, called the “socio-emotional system”, reflects changes in dopaminergic activity localised in the limbic and paralimbic areas of the brain. Dopamine plays a critical role in the brain’s reward circuitry (Steinberg, 2010) and this system is “especially sensitive to social and emotional stimuli, that is particularly important for reward processing, and that is remodelled in early adolescence by the hormonal changes of puberty.” (Steinberg, 2007, p. 56).

In their reviews, Somerville et al. (2010) and Casey et al. (2011) highlighted the results of imaging studies and neurobiological evidence supporting the notion that adolescence is a unique time for increases in reward-seeking and sensation seeking behaviour. For example, evidence from fMRI studies showed that compared to children and adults, adolescents have heightened activation in the ventral striatum when receiving a reward, a subcortical area of the brain important for the processing of rewards (Casey et al., 2011; Ernst et al., 2005; Somerville et al., 2010; Van Leijenhorst et al., 2010). Literature from rodent studies also show that dopaminergic pathways change in puberty leading to redistribution of dopamine receptor concentration in areas of the limbic system and this is likely to increase reward-seeking behaviour (Steinberg, 2010).

From this evidence it is suggested that adolescents have “enhanced motivation to seek out incentives and new experiences” (Somerville, Jones & Casey, 2010). It has also been suggested that adolescents have increased sensitivity to rewards and that adolescents are more easily aroused (Steinberg, 2007). The natural increases in reward-seeking and sensation-seeking behaviours that follow from these physiological changes are argued by some to be a primitive biological mechanism that facilitates the development of autonomy and independence during adolescence (Casey, Jones, & Hare, 2008; Laviola, Macrì, Morley-Fletcher, & Adriani, 2003; Somerville et al., 2010; Spear, 2000; Steinberg et al., 2008).

Increases in reward seeking behaviours begin in puberty and follows a curve-linear pattern, peaking in early-mid adolescence (Quinn & Harden, 2013). Supporting evidence for this stems from studies that show sensation seeking is associated with pubertal timing (Martin et al., 2002). Sensation-seeking is defined as a biologically-based personality trait representing “the need for varied, novel and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experience” (Zuckerman, 1979, p. 10).

Sensation seeking is associated with adolescent alcohol use (Martin et al., 2002) and increases in sensation seeking predict alcohol use in adolescence. For example, MacPherson, Magidson, Reynolds, Kahler, & Lejuez (2010) found that increases in sensation seeking among 9 - 12 year olds predicted greater odds of alcohol use in adolescence. In a study of 8 – 10 year old children, Pedersen, Molina, Belendiuk, & Donovan (2012) found that increases in sensation seeking during childhood predicted later alcohol use at 16 years of age. Sharper increases in

sensation seeking also predicted greater levels of adolescent alcohol use among European American children, but not African American children.

#### *1.3.1.2 Cognitive control*

Change in density and volume of grey matter in the brain occur during adolescence and areas of the prefrontal cortex are among the last to fully develop (Giedd et al., 2012). Area of grey matter, particularly the frontal cortex, are related to higher-level cognitive functioning, such as abstract thinking, decision making and planning ahead (Giedd et al., 2012). The second system outlined by Steinberg (Steinberg et al., 2008) is the cognitive control system and comprises of the lateral prefrontal and parietal cortices as well as parts of the anterior cingulate cortex which connect to the socio-emotional system (Steinberg, 2007). The cognitive control system has been described as “...the ability to suppress inappropriate actions in favour of goal-directed ones, especially in the presence of compelling incentives” (Casey et al., 2011, p. 24) and develops linearly throughout childhood and adolescence into adulthood.

Several different terms and concepts have been used to describe this cognitive-control system. While Steinberg uses terms such as self-regulation, others have referred to it as impulsivity control (Pedersen et al., 2012; Quinn & Harden, 2013). It has been suggested that the development of the cognitive control system over time reflects growing connections of white matter between the prefrontal cortex and the meso-limbic system, areas of the subcortex important for the socio-emotional system (Somerville et al., 2010). Evidence from DTI studies have shown that white matter tracts between the prefrontal cortex and striatum mature over time and that the strength of these connections are associated with better inhibitory control (Liston

et al., 2006). Inhibitory control is described as an internally generated act of control required in many real-life situations and defined as the ability to stop a planned or ongoing thought or action that has already been initiated (Williams, Ponesse, Schachar, Logan, & Tannock, 1999). Lack of inhibitory control has been shown to predict alcohol problems as well as drug use in mid to late adolescence (Nigg et al., 2006).

#### *1.3.1.3 The dual-systems theory and adolescent risk-taking behaviours*

According to the dual-systems theory, risk-taking is the result of the divergent developmental trajectories of the socio-emotional system (a curve-shaped trajectory which peaks in adolescence) and the cognitive control system (a linear trajectory which develops over time and plateaus in adulthood; Steinberg et al., 2008). Adolescents with increased sensation seeking seek out thrilling experiences; however, they have not yet fully developed their cognitive control system and thus the ability to regulate their drives and impulses. Increases in sensation seeking during early and midadolescence and gradual improvement in inhibitory control are used to explain why risk-taking behaviours increase during adolescence (Casey et al., 2011; Somerville et al., 2010; Steinberg, 2010; Steinberg et al., 2008). This theory is therefore similar to others that highlight “two important, empirically and conceptually distinct facets” of impulsivity and sensations seeking (Quinn & Harden, 2013, p. 223).

One study has examined the longitudinal development of impulsivity and sensation seeking and associations with adolescent alcohol use. Using data from the National Longitudinal Study of Youth, Quinn et al (2013) found that self-reported measures of sensation seeking and impulsivity changed during the course of

adolescence. Individuals who declined more slowly in their impulsivity as well as their sensation seeking increased their alcohol use more rapidly. This study showed that individual-level characteristics important for risk-taking behaviours fluctuate during adolescence and are important determinants of risk-taking behaviours.

A limitation to this study, and to theories similar to the dual-systems approach, is that they do not account for the wider influences of risk-taking behaviours. Although individual-level measures of sensation seeking and inhibitory control may increase risks for alcohol use, contextual factors, such as parental supervision and other sources of behavioural control, may also be important for their occurrence. Quinn et al (2013) suggested that since parental and familial influences fade in early adulthood, young people with more individual-level risk-factors would be more likely to initiate or escalate substance use. As discussed above, OA contexts are argued to increase supervision, but also contribute to the development of skills. Young people who are at an increased risk of alcohol use (due to high levels of sensation seeking and low levels of inhibitory control), may report less alcohol use if they participate in OAs compared to those who do not participate in OAs. It has not yet been tested if sensation seeking and inhibitory control predict alcohol use controlling for these social contexts.

#### *1.4 Risk-taking behaviours and participation in organised activities*

The dual-system theory highlights the importance of reward-seeking behaviours and cognitive control for risk-taking behaviours such as alcohol use. Several studies have also investigated if these individual-level characteristics are associated with forms of OA participation.



#### *1.4.1 Sensation seeking and participation in organised activities*

Earlier work by Zuckerman (1983) suggested that high sensation seekers were more likely to participate in specific types of sports, for instance those that “provide unusual sensations and novel experiences such as those involved in sky-diving, hang gliding, skiing and scuba diving” (p.290). The majority of studies that have investigated risk-taking propensities in association with OA participation have measured sensation seeking using the Sensation Seeking Scale – V (Zuckerman, 1983). This scale measures four aspects of risk-taking: “Thrill and Adventure Seeking” measures the presence of engaging in physically risky activities, “Experience Seeking” measures aspects of life that relate to a non-conforming lifestyle, “Disinhibition” measures sensation seeking through social stimulation (such as drinking) and “Boredom Susceptibility” measures a dislike to boredom from unchanging conditions. Zuckerman (1992) stressed that sensation seeking is not an essential motivation for sensation seeking behaviour in that risks are not taken for the sake of taking risk alone, there has to be some kind of novel experience to justify it.

D’Silva, Grant Harrington, Palmgreen, Donohew, & Puzles Lorch (2001) found that in an American sample of youth aged 16-25, high sensation seekers participated in a greater number of activities than low sensation seekers. They also found that high sensation seekers could be differentiated from low sensation seekers from their involvement in action-adventure activities (such as scuba diving, mountain climbing, white water rafting, kayaking, rock climbing, canoeing and snow skiing) as well as conflict-combat activities (such as survival games, role playing, martial arts and paintball). Diehm and Armatas (2004) compared golfers to surfers and found that surfers scored significantly higher on thrill and adventure seeking,

experience seeking, and the disinhibition sub-scale of sensation-seeking while boredom susceptibility was not significantly different between the two groups.

Cazenave, Le Scanff, & Woodman (2007) also found significant differences on sensation seeking scores between groups of woman who participated in high-risk sports (base jumping, parachuting, skiing, snowboarding and mountain biking) for leisure purposes (without supervision) or professional purposes (with supervision) and those who participated in non-risk sports (swimming, dancing, golf, athletics, table tennis). It was found that those who were involved in high-risk sports for leisure purposes had higher sensation seeking scores than those who were professionals. Those who did not engage in high-risk sports had the lowest levels of sensation seeking.

The majority of research regarding sensation seeking and sport participation has compared participants in extreme sports with less-extreme sports (Jack & Ronan, 1998), but there is evidence that sensation seeking may also be associated with less-risky activities. For example, Joireman, Fick, & Anderson (2002) found that scores on the thrill and adventure seeking scales as well as disinhibition subscale of the Sensation Seeking Scale - V predicted involvement in playing chess.

Unfortunately many of these studies have been cross-sectional and did not control for age. Over time, participation in OAs decreases (Denault & Poulin, 2009; Fredricks & Eccles, 2006a; Wichstrøm & Wichstrøm, 2009) and according to the dual-systems theory (Steinberg, 2010; Steinberg et al., 2008), adolescents have higher levels of sensation seeking than adults. As a result, stronger associations between OA participation and sensation seeking may exist among adolescents compared to older age groups. This may contribute to artificial relationships in

studies which show associations between sensation seeking and participation in certain types of risky activities (Cazenave et al., 2007; D'Silva et al., 2001) as well as the number of activities participated in (D'Silva et al., 2001), if participants in are not matched according to age.

Additionally, the Sensation Seeking Scale - V measure of sensation seeking includes several items regarding alcohol and drug consumption (Roth & Herzberg, 2004). As discussed previously, participation in sports has been associated with increased alcohol use among adults (Poortinga, 2007; Wichstrøm & Wichstrøm, 2009) and older adolescents (Eccles & Barber, 1999; Eccles et al., 2003; Fredricks & Eccles, 2006a, 2006b). It is therefore not clear if relationships between sensation seeking and sports are confounded by items relating to alcohol use.

Sensation seeking also plays an important role in understanding relationships between types of OA participation and alcohol use outcomes. Those who participate in sports are more likely to report higher alcohol use (Eccles & Barber, 1999; Eccles et al., 2003; Fredricks & Eccles, 2006a, 2006b; Wichstrøm & Wichstrøm, 2009) and sensation seeking is associated with participation in certain types of sports (Jack & Ronan, 1998). It is not known, however, if participants who do not participate in any OAs and have higher levels of sensation seeking are more likely to report greater levels of alcohol use. Such young people may report increased alcohol use due to less time in OA contexts compared to those who do participate in OAs and have high sensation seeking. Distinguishing young people according to different types of participation patterns can help determine if sensation seeking contributes to increased alcohol use for certain groups of young people.

#### *1.4.2 Inhibitory control and participation in organised activities*

Although low inhibitory control has been shown to predict alcohol use (Nigg et al., 2006), there are reasons to suggest that it may also contribute to participation in OAs during adolescence. In Cazenave's et al., (2007) study on sensation seeking and high risk sports, it was suggested that sport professionals were less impulsive and approached risk-taking in a more structured way than individuals who participates in sports for leisure purposes without supervision. The ability to master a risky behaviour may be partially explained by ability to plan ahead and "anticipation of inherent danger" (Cazenave et al, 2007, p. 431). Cazenave et al. highlighted how perceptions of risk and cognitive processes may be associated with participation in organised high-risk sports.

The sport psychology literature has investigated individual-level characteristics associated with participation; however, this has often been limited to participation in elite sports and has focused on characteristics such as motivation and personality traits (Vestberg, Gustafson, Maurex, Ingvar, & Petrovic, 2012). The relationship between executive functioning and participation in sport has largely been neglected (Vestberg et al., 2012). Vestberg et al., (2012) found that creativity, response inhibition and cognitive flexibility were significantly higher among elite football players compared to normal controls and highest among football players in a higher division. Performance on executive functioning tasks correlated with performance, measured as the numbers of goals scored and assisted two months later. Other studies have found that participation in specific types of sports is associated with better inhibitory control. In a study of Taiwanese students, those who participated in baseball had better inhibitory control compared to those who participated in similar levels of swimming and those who did not participate in sports

(Wang et al., 2013). In this study however, baseball players were on average older than swimmers and differences between these two groups could be explained by better inhibitory control that develops linearly with age (Liston et al., 2006). Studies by Vestburg and Wang investigated these relationships among young adults and it is not known if inhibitory control is associated with participation in sports or other OAs during adolescence.

Inhibitory control may be important for OA participation among youth, particularly for children who often display inhibitory control difficulties such as children with Attention Deficit Hyperactivity Disorder (ADHD). Engel-Yeger & Ziv-On (2011) investigated preferences for OA participation (how much participants enjoy OAs) among 6-10 year old boys. Compared to control participants with normal development, children with ADHD showed lower preferences to participate in “formal OAs” which involved rules or goals and were facilitated by a coach, leader or instructor. Children with ADHD also had less preference to participate in activities generally, compared to controls. In a similar study of 8-11 year old boys, Shimoni, Engel-Yeger, & Tirosh (2010) measured actual participation in OAs and intensity of participation in the past four months. Boys with ADHD were less likely to report more intense participation in formal and informal OAs, and reported less enjoyment in formal activities compared to controls.

Some studies have suggested that young people with inhibitory control difficulties may be less likely to participate in sports. Inhibitory control difficulties are comorbid with motor control and developmental problems (Beyer, 1999; Pan, Tsai, & Chu, 2009) and may lead to difficulties in physical activities (Engel-Yeger & Ziv-On, 2011) and organised play (Cairney et al., 2005). It has also been suggested

that in sports these young people may face greater difficulties following rules, heightened emotional reactivity and therefore increased levels of aggression in OAs (Johnson & Rosen, 2000). Engel-Yeger & Ziv-On (2011) found that children with ADHD were less likely to prefer participation in physical activities compared to controls. Other studies have found that symptoms of inattention in childhood predict physical inactivity in adolescence (Khalife et al., 2014). Shimoni et al. (2010) however, did not find any significant differences between boys with ADHD and controls on the frequency of participation in active or physical activities.

Children with ADHD are also less likely to participate in other types of OAs besides sports. For example, Engel-Yeger & Ziv-On (2011) found children with ADHD were less likely to prefer participation in social and skill-based activities compared to controls. Shimoni et al (2010) also found that boys with ADHD participated less frequently in social as well as skilled based activities. Participation in OAs that require long hours of practice before improvements are seen, such as playing a musical instrument, are argued to be challenging for children who have difficulties with delays of reward (Engel-Yeger & Ziv-On, 2011).

It has not yet been tested whether inhibitory control predicts different types of OA participation among young people. Young people may be excluded from participation due to this individual-level characteristic and if this is true, this suggests that OAs should be delivered differently for them. If relationships exist between those who participate in no OAs and alcohol use this could be explained by inhibitory control difficulties as these also predict increases in adolescent alcohol use (Nigg et al., 2006; Peach & Gaultney, 2013; Pedersen et al., 2012; Quinn & Harden, 2013).

In summary, characteristics which are important for risk-taking behaviours, namely sensation seeking and inhibitory control, may also be influential for OA participation among young people. Studies have not yet investigated whether sensation seeking predicts different types of OA participation in adolescence. Inhibitory control measures have also been limited to adults and have not been investigated among adolescents, although studies which have investigated ADHD and OA participation among children suggest that similar relationships may exist for younger groups. If these individual-level characteristics are important for OA participation they can help explain relationships between OA participation and alcohol use and shed light on how interventions to improve OA participation might be developed for different groups of young people.

### *1.5 Research questions, aims and thesis outline*

This thesis investigates OA participation and associated alcohol use among British young people using a mixed methods design. It aims to understand who participates in OAs and identify important determinants of OA participation. Psychological theories of risk-taking behaviour are applied to these investigations in order to further develop an understanding of how OAs might be used as interventions for adolescent alcohol use. It also aims to build on past literature by investigating if sensation seeking and inhibitory control are associated with OA participation and if this shapes relationships between OA participation and adolescent alcohol use. It aims to address limitations in past studies by examining the following research questions in groups of young people in the UK.

The following research questions guide the current investigations by asking:

- 1) Who participates in organised activities among British young people?

- 2) What is the relationship between participation in organised activities and alcohol use among British adolescents?

The present chapter reviewed studies that investigated OA participation and adolescence alcohol use, discussing their results and possible mechanisms for these relationships. Criticisms of these studies and why individual-level characteristics associated with risk-taking behaviours are important for understanding relationships were discussed and the research aims of this thesis were subsequently outlined.

Chapter two provides a methodological overview of the thesis, outlining the mixed methods approach used. It also provides details of the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort which is used in studies presented in Chapters three and four. Recruitment procedures, sample numbers, attrition rates, representation of the sample and measures used to investigate the research questions are described in detail. It also provides a discussion of challenges encountered with the ALSPAC data, providing a rationale for the analytical strategies used in Chapters three and four.

Chapter three aims to investigate who participates in OAs and tests whether individual-level factors associated with risk taking behaviours predict OA participation within the ALSPAC cohort. More specifically, sensation seeking and inhibitory control measures are used to predict OA participation in sports and special groups at a mean age of 11.7 years of age as well as other types of OA participation in the evenings and weekends at a mean age of 15.5 years of age. Hypotheses specific to this study are presented within chapter three.

Chapter four applies findings from Chapter three to the investigation of adolescent alcohol use. It tests whether OA participation predicts adolescent alcohol



use at a mean age of 15.5 and 16.5 years of age after controlling for a range of confounding variables. Those who participate in no OAs, sport OAs and other types of OAs are compared on these relationships. Analyses also investigate if these relationships depend on levels of sensation seeking. Hypotheses specific to this study are presented within chapter four.

For reasons discussed in chapters two, three and four, the ALSPAC samples used in analyses are less-representative of participants from low income and low social class backgrounds. In order to investigate the research questions among less-represented groups, Chapter five aims to examine OA participation and alcohol use among a group of young offenders with low socioeconomic status from South Wales. Within this chapter two studies are presented. Study A compares levels of reported alcohol use among young offenders to a nationally represented sample of Welsh male students. Study B investigates relationships between OA participation and indicators of hazardous drinking among young offenders and a group of non-offenders matched on socioeconomic status, estimated IQ, sex and age. In contrast to chapters three and four, participation in team sports and associations with hazardous drinking are investigated.

Chapter six presents a qualitative study which aims to follow up results from the previous chapters and bring them into context. The results of the quantitative studies presented in Chapters three, four and five are integrated at this point to inform the qualitative study. Following from Chapter five, the continued exploration of these findings among young people less likely to be represented in research is of interest. This qualitative study investigates barriers to OA participation for vulnerable young people and how participation in OAs may impact vulnerable young

people's alcohol use. Only the results of this qualitative study are discussed within this chapter.

Findings from Chapters three, four, five and six are interpreted together in Chapter seven. An overall discussion of factors important for OA participation as well as relationships between OAs and alcohol use are presented. A discussion is also provided about the implications of these findings, and how they can inform interventions for adolescent alcohol use in community settings. This chapter concludes with suggestions for future research and a summary of this thesis.

## **2 Methodological overview**

This chapter provides a rationale for the mixed methods approach used in this thesis as well as an overview of the quantitative and qualitative studies. It also provides a detailed overview of the Avon Longitudinal Study of Parents and Children (ALSPAC), the longitudinal cohort used for analyses in Chapter three and four. The recruitment procedures for the ALSPAC study are presented, as well as the representation of the sample and the measures used in analyses. The number of participants and associated sample characteristics for those included in analyses are provided in Chapters three and four respectively.

### *2.1 Mixed methods designs and epistemological considerations in interdisciplinary research*

This thesis largely draws on psychological theories of adolescent risk-taking behaviour to inform the investigation of research questions. The use of experimental design and quantitative methods in psychology is an approach that currently prevails in the sciences and previously dominated the social sciences until the 1960's (Tierny, 2006). When qualitative research began to gain momentum in the social sciences there was no commonly agreed label to define this pre-existing paradigm that influenced research methodology up until that point (Morgan, 2007). Challengers to this long-standing method called it "positivism". Positivism has been described in social science theory as an ontological approach, where "...apprehendable reality is assumed to exist, driven by immutable natural laws and mechanisms" and "Knowledge of the 'way things are' is conventionally summarised in the form of time- and context-free generalisations" (Guba & Lincoln, 1994, p. 109). From this perspective, the use of valid and reliable methods enables truth to become observable.

Critics of this traditional approach and associated quantitative methods instead highlighted the importance of meaning embedded in social relationships and interactions (Garland, 2002). Movements such as social constructionism challenged ways of understanding and how we create our knowledge, arguing it was not based on unbiased observation but dependent on when and where in the world one lives and how individuals construct their own realities through daily interactions and social life (Burr, 2003). These two approaches reflected contrasting epistemologies, that is, beliefs or world views on the nature and claims made about truth, and the “objective knowledge” about that reality (Morgan, 2007).

Quantitative methods are often labelled as “positivist” by anti-positivists when in reality, few quantitative researches would agree with this naïve form of realism in practice. In the social sciences, the term positivist is now used as a form of abuse used against anyone who conducts quantitative research (Clark et al., 2007), consolidating method with epistemology (Baum, 1995) and misrepresenting the assumptions of quantitative researchers (Yu, 2006). Psychological research during the past few decades has rarely fit this extreme form of positivism (Abbas Tashakkori & Teddlie, 2003a). Tashakkori & Teddlie (1998) argued that within psychological research, predicting behaviours is probabilistic at best and only at an aggregate level. Relativity of perception is a major component of some psychological theories (such as attribution theory) and behaviour has often been believed to have multiple causes such as environmental factors and debates surround on what these constitute (Waszak & Sines, 2003).

Morgan argued moving away from the use of paradigms within social sciences because hierarchal approaches to ontology, epistemology and methodology

as outlined by Guba and Lincoln (1994) inevitably determine the methods that are used (Morgan, 2007). Others have suggested that the use of quantitative and qualitative methods is a third paradigm in itself to accept that some problems lend themselves to either qualitative research, quantitative research or both (Johnson & Onwuegbuzie, 2004). This approach can be achieved by switching between alternative paradigms in mixed methods research (Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998). It has also been argued that social research is not defined by distinct paradigms but by a group of ideas that a researcher adopts to greater or lesser extents (Hammersley, 1995).

The research presented in this thesis does not side with an ontological position such as positivism or constructivism; however, it is important to note that a researcher's approach to a topic of investigation is shaped by their beliefs of how knowledge is acquired. The author of this thesis accepts that there is an objective reality independent of our perception; however, measures used in research may not correspond perfectly to that objective reality and can serve as an operational definition. Unlike positivism, the author does not fully accept that reality follows universal, stable laws. This is a particularly challenging area for this thesis because it integrates theories of risk taking behaviours from neuroscience, psychology and sociology. Theories of adolescent risk taking behaviours discussed in Chapter one from neuroscience stem from studies of neuroplasticity, informed by physiological processes underpinned by universal laws of chemical reactions. At a very basic level, these fundamental laws do not work differently between individuals, but individuals do differ in their biology and this can impact their development and growth. The impact of psychological development on risk taking behaviours is also dependent on immediate social context such as parenting and peers. Influences at the societal level

are also important. As discussed in Chapter 1, the provision of OAs and their place in a community might differ between societies resulting in relationships between OAs and risk taking behaviours that vary from culture to culture. Therefore, the relationships observed in this thesis aren't argued to be universal truths independent of time and place, but rather complex relationships that are generalisable to others to varying degrees.

Traditionally, psychology is seen as a science that asks "Why?" (Marecek, 2003). It seeks to explain the causes and origins of human behaviour, describes these relationships in terms of magnitude (Eisner, 2003) and highlights the role of objectivity to account for researcher biases. These methods however, have been criticised for their reductionist and simplistic approach because they do not address the everyday realities of people (Eisner, 2003). Psychological researchers have engaged less in qualitative methods because of the types of questions asked and how it fits with beliefs of what can be objectively studied.

The same polarised dilemmas have also been faced in public health research. Methods that use quasi-experimental designs and cohort studies attempt to control over a range of variables to make internally valid findings (Baum, 1995). Epidemiological approaches have been considered too reductionist and interpretative methods are seen as too subjective to add to scientific knowledge (Baum, 1995). As such, quantitative methods have been argued to be less powerful in understanding more complex issues (Baum, 1995).

In contrast to quantitative research, qualitative research asks the question: "how?" and can account for how culture, time and social life help create human action and meaning (Marecek, 2003). Lincoln & Guba (2000) argued that

“qualitative researchers stress the socially constructed nature of reality, the intimate relationship between researcher and what is studied, and the situational constraints that shape enquiry... They seek to answer questions that stress how social experience is created and given meaning” (p. 8). These answers are often complex and cannot be addressed through experimentation in laboratory settings using a reductionist approach, however, qualitative research fits well with understanding that which is unobservable and properties associated with consciousness (Schweder, 1996). By using qualitative research the exact answer to what is really ‘real’ may not be found, but can nevertheless construct a picture that may bring us a step closer to the truth (Camic, Rhodes, & Yardley, 2003).

This thesis accepts the limitations to using solely a qualitative or quantitative method to developing a full understanding of the phenomena under investigation and addresses this by using a mixed methods approach. The quantitative studies of this thesis, which are the main focus, use methods often identified within positivist approaches. They aim to control for confounding variables as much as possible and test hypotheses. The use of qualitative methods in this thesis (Chapter six) was able to address the limitations of the quantitative methods by understanding mechanisms that can explain observed relationships and the contexts in which they occur (Pawson & Tilley, 1997) and recognises that human reasons can serve as causal explanations (Bhaskar, 1989).

Waszak & Sines (2003) highlighted that explaining social problems with psychological explanations “...requires a pragmatic approach to problem solving that the use of mixed methods offers.” and “...allows for the possibility of uncontrollable factors (e.g. cultural norms) being introduced into the study that are



not well-understood by the researcher ahead of time. The collection of qualitative data becomes a necessary adjunct to quantitative data.” (p. 558). It is with this rationale that a mixed methods design is used to understand and investigate the research questions in this thesis.

### *2.1.1 Mixed methods design*

Mixed methods is a procedure for collecting, analysing and combining both quantitative and qualitative research within a study to gain a better understanding of the problem (Tashakkori & Teddlie, 2003b). Mixed methods approaches have many benefits over conducting a study with solely qualitative or quantitative research as neither methods are sufficient by themselves in capturing the details and trends of a situation (Ivankova, Creswell, & Stick, 2006). It enables a wider variety of tools for data collection and answers questions that cannot be answered by a single method (Creswell & Plano Clark, 2007).

For this thesis an explanatory sequential mixed methods design was used (Creswell, 2014). With this approach the researcher first collects quantitative data, which has the priority for addressing the study’s research questions, (Creswell & Plano Clark, 2011; Ivankova et al., 2006), and then uses these results to develop the qualitative study (Ivankova et al., 2006). The important aspects of the quantitative study that can inform the qualitative study can be based on outlier cases, significant predictors, significant results, insignificant results or even demographic information (Creswell, 2014). Results from the quantitative study inform the participants selected for the qualitative study and the questions asked. A strength of this design is that it can explain how variables interact (the mechanisms) in more depth through the qualitative follow-up study (Creswell, 2014; Creswell & Plano Clark, 2011).

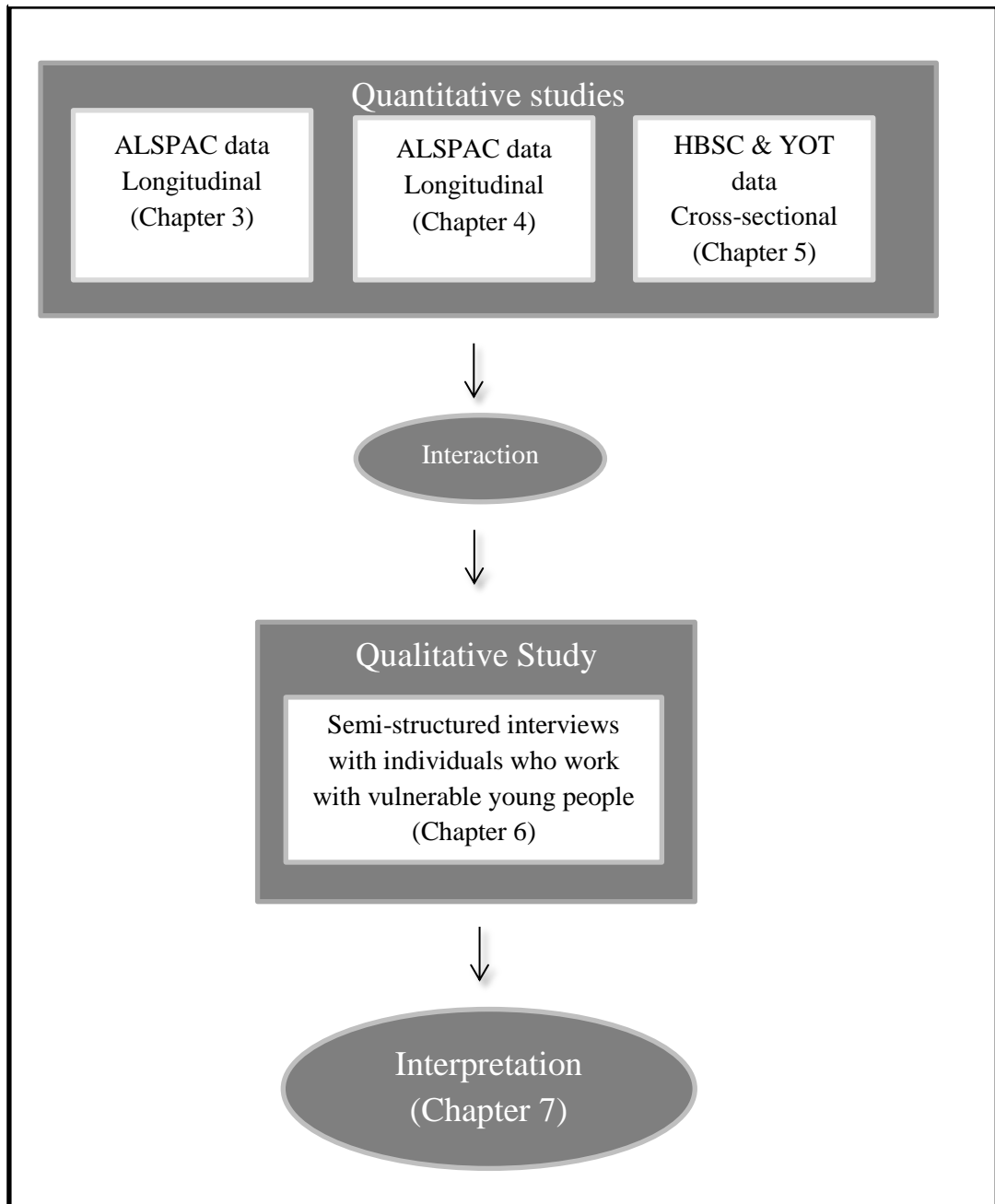
In a sequential design the quantitative and qualitative components are connected in the intermediate stage when data from the quantitative study in the first phase informs the qualitative study in the second phase (Ivankova et al., 2006) and the level of interaction between the quantitative and qualitative data occurs before the final interpretation (Creswell & Plano Clark, 2011). In the final discussion of this thesis (Chapter seven) the interpretation of these findings are taken together and presented. How the qualitative results help explain the quantitative results is discussed as well as how the accuracy of these findings may be limited by the different approaches used in the separate studies (Creswell, 2014).

This design is often used when researchers have a quantitative background or when investigating fields new to qualitative approaches (Creswell, 2014). This design has also been implemented in both social and behavioural sciences research (Ivankova et al., 2006). It was suitable for this thesis because of its sequential design where one database builds gradually on the other, and due to the limited amount of time for the completion of the study which is often a limitation to mixed methods research generally (Creswell & Plano Clark, 2011).

A limitation to this approach is the difficulties that arise when determining which significant points of interest should be followed up from the quantitative study in the qualitative study (Creswell, 2014; Creswell & Plano Clark, 2011). The qualitative study in this thesis explored quantitative findings further by exploring how OA participation might impact alcohol use among vulnerable groups of young people, such as young offenders represented in Chapter five (these groups of young people were also less likely to be represented in the two longitudinal studies in chapters three and four). Figure 2.1 below illustrates the different components of the

quantitative studies and the qualitative study used in this thesis and in what chapters they are presented.

Figure 2.1 Diagram of the explanatory mixed methods design used in the present study



## 2.2 *ALSPAC cohort*

The first set of quantitative studies presented in this thesis used data from the Avon Longitudinal Study of Parents and Children (ALSPAC). Also known as Children of the 90's, it is an on-going health survey that follows the lives of British children born during the early 1990's. ALSPAC originated from a WHO European-sponsored initiative that recommended birth cohort studies should examine modifiable influences on health and development (Boyd et al., 2013). ALSPAC was one of several pan-European longitudinal birth cohorts involved in the European Longitudinal Study of Pregnancy and Children (ELSPAC). ELSPAC aimed to determine ways in which genotype and environmental characteristics influenced health and development in both children and their parents (Fraser et al., 2013). The original design rules of the ELSPAC cohorts were (Golding, Pembrey, Jones, & Team, 2001):

- 1) All pregnant mothers should be included in the study that are resident in a defined geographical area and expected to deliver between identified dates.
- 2) The mother and her partner's health records should be linked with self-completion questionnaires filled out by the mother and her partner.
- 3) All information should be kept highly confidential and anonymous.
- 4) Observation should be the main focus with as little intervening as possible in the normal course of pregnancy and childhood.
- 5) All study centres should ask the same questions in the same way, with the exception of a few defined culture-specific modifications.

- 6) Additional detailed information could be collected by the study, but the core data set could not be omitted.
- 7) A copy of collected data should be cleaned by instructions provided by the Bristol office and sent to Bristol for comparative analysis.

ALSPAC followed the lives of children from birth and throughout their development, capturing many facets of their life as they aged. Information such as DNA, physiological and psychological development, family and peer relationships as well as their community environment were collected. The child participants as well as their parents/caregivers and teachers were approached for data collection.

### *2.2.1 Recruitment*

Mothers were recruited to ALSPAC during their pregnancy. Eligible criteria required mothers were resident in the old administrative county of Avon while pregnant and had an expected delivery date between the 1<sup>st</sup> of April 1990 and the 31<sup>st</sup> of December 1992 (Boyd et al., 2013). This geographical area had a population of 1 million (this included the city of Bristol) and comprised of a mixture of rural areas, inner city neighbourhoods characterised by deprivation, as well as suburbs and moderate-sized towns (Boyd et al., 2013).

To encourage participation, a range of methods were used (Golding et al., 2001). Posters were printed for display within communities, mothers were sent information from hospitals and community midwives discussed the ALSPAC study during health visits. Pregnant mothers were approached by ALSPAC staff when they attended routine ultrasound examinations during their pregnancy. Local and national coverage about the study was reported in the press, on the radio and TV. After

delivery mothers that were not enrolled but eligible were also approached by ALSPAC staff while they were in the maternity hospital (Golding et al., 2001).

Approximately seven days after being approached to participate a brochure was sent out to eligible participants. The first questionnaire was mailed to the mother provided she had not previously stated she did not want to take part. If no response had been received after seven days a reminder letter was sent as well as a second reminder after a further 10 days. If no response was received after one month, a member of the study team visited the home or rang the mother in order to encourage her to participate and complete questionnaires (Golding et al., 2001).

### *2.2.2 Design*

Mothers, their partners and study children were contacted regularly for data collection. The most common form of data collection was questionnaire. During pregnancy mothers were sent three questionnaires depending on when in their pregnancy they were recruited. From the age of five children began to answer questionnaires themselves (Golding et al., 2001). When child participants were 18 years of age, data collection had occurred at 68 time points and included 34 child-completed questionnaires, nine ‘focus’ clinical assessments (described below) and 25 child-based questionnaires completed by the mother or primary caregiver (Boyd et al., 2013).

#### *2.2.2.1 Focus clinics*

Children and their parents were invited to attend specially designed focus clinics from when children were seven years old and participated in numerous detailed assessments. These comprised of physiological and health examinations,

questionnaires, in-depth interviews and behavioural tasks. The age when these clinics occurred can be seen in Table 2.1.

Parents were invited to focus clinics if their child was alive, their address was known, and they hadn't previously refused to participate in the study. Approximately three months before the ideal date of attending parents were sent an initial letter explaining the focus clinics and asked to return a form. A postal reminder was sent three weeks later if there was no response to the initial letter. After a further two weeks the names were passed on to the family liaison officer who tried to make contact over the phone or through a visit with the family. If these families were still not contacted after three months they were sent a 'last-chance' letter. Those who could attend following these letters were sent an invitation letter with a date they were asked to confirm. Parents were also sent a letter for the child's teacher as well as to their own employers requesting leave of absence.

#### *2.2.2.2 Questionnaires*

Questionnaires were posted to families. These could be specific for the mother, her partner or her child to complete. Returned questionnaires were coded by undergraduate students. All coding was cross-checked by a second person and then double-keyed and verified using a commercial bureau (Golding et al., 2001). The mean age of participants when these questionnaires were completed is shown in Table 2.1.

#### *2.2.3 Sample numbers*

Describing participant numbers in terms of pregnancies or individuals in a cohort sample can be complex. A mother in ALSPAC might have had two separate pregnancies during the recruitment phase and one pregnant mother may have



delivered more than one foetus during one pregnancy. ALSPAC uses the term “enrolled pregnancies” to describe recruited pregnancies and “women” to describe unique individual women (Fraser et al., 2013).

14,541 pregnancies were initially enrolled in ALSPAC and 674 of these were excluded because of unknown outcomes or the pregnancy did not result in a live birth (Fraser et al., 2013). Later on during the study phase ALSPAC recruited more participants which would have had been eligible to participate based on the initial study criteria but for several reasons were missed during recruitment (Boyd et al., 2013). These participants did not have information on mother’s obstetric data and therefore were not used in the analyses described in Chapters three and four. With the acknowledgement of this booster sample the total “eligible sample” for ALSPAC is 20,248 pregnancies where 71.8% were recruited during pregnancy (Boyd et al., 2013).

Of the 14,541 pregnancies recruited during gestation, 68 had no known birth outcome, 195 were twin births, 3 were triplet births and 1 was a quadruplet birth resulting in 14,676 known fetuses (Boyd et al., 2013). Of these, 14,062 resulted in live born children and 13,988 children were still alive at one year of age. From information on maternity, birth and child health records as well as ALSPAC recruitment records, 20,390 known fetuses were eligible for participation in ALSPAC and resulted in 19,600 (96.1%) live births, 685 (3.4%) miscarriages and 105 (0.5%) stillbirths (Boyd et al., 2013). Miscarriage (loss prior to 20 weeks gestation) is believed to be under representative in the ALSPAC cohort (Boyd et al., 2013). Throughout the study period, ALSPAC has provided data through self-report

by the child or by the mother on 14,009 children (71.5% of 19,600 eligible live births; Boyd et al., 2013).

#### *2.2.3.1 Retention*

Several strategies were employed by ALSPAC to retain response rates over time. Media coverage about study developments were announced on the radio, television and newspapers. News letters about the study were sent to parents of the study children three times a year and 'Professional newsletters' were also sent to health professionals in the Avon area. Unless mothers indicated that they did not want this to happen, children were sent birthday cards every year regardless of whether or not mothers were still completing questionnaires.

#### *2.2.3.2 Attrition*

Despite attempts to retain participation, numbers of ALSPAC participants decreased over time. Since ALSPAC's start, participant numbers have varied between 5,000 and 13,700 with more than 9,467 having completed at least 10 questionnaires to date (Fraser et al., 2013). Attrition rates throughout the study were greatest when the child participants were in infancy and again when they began to enter adulthood (Boyd et al., 2013). There were more participants that selectively choose to participate in certain single data collection time points rather than across several of them. For example, during adolescence 6,155 (48.2% of 12,776 eligible participants) actively participated in all 12 data collection time points during this time and 9,600 (75% of 12,776) were represented in at least one of the data collection times (Boyd et al., 2013). A core-subsample of 3,000 families was represented in the 55 assessments for the whole sample and 5,777 families were represented in 75% or more of these assessments (Boyd et al., 2013).

Table 2.1 below shows the data collection time points of measures used in this thesis and the number of participants represented at each of these data collection time points. The percentage of females, participants from higher income households and those who were white increased throughout the ALSPAC study. The information in this table is limited to those participants in the core sample (those recruited during pregnancy) and does not include triplet or quadruplet births.

*Table 2.1 Description of participants at each wave used in analyses*

Wave	Characteristics						
	n	Age (years)			Female (%)	White (%)	High income <sup>c</sup> (%)
		M (SD)	Min	Max			
C	11,949 <sub>a</sub>	32.6 <sup>b</sup> (1.54)	11	43	6,072 (48.3)	11,531 (95.0)	3,464 (51.4)
N	7,745	8.2 (0.21)	7.9	11.5	3,814 (49.2)	7,136 (96.2)	3,510 (50.9)
F8	7,170	8.7 (0.29)	7.5	10.5	3,577 (49.9)	6,542 (96.1)	2,887 (53.3)
KT	7,957	8.8 (0.23)	8.1	10.8	3,889 (48.9)	7,302 (96.3)	3,219 (52.0)
Q	7,831	10.3 (0.15)	10.1	13.5	3,840 (49.0)	7,194 (96.3)	3,192 (52.7)
F10	7,168	10.7 (0.26)	9.8	12.3	3,608 (50.3)	6,529 (96.0)	2,832 (53.1)
KW	7,157	11.7 (0.14)	11.5	13.8	3,569 (49.9)	6,605 (96.4)	2,963 (53.1)
F11	6,794	11.8 (0.24)	10.4	13.6	3,437 (50.6)	6,199 (96.1)	2,685 (53.2)
TF2	5,824	13.9 (0.21)	12.5	15.2	2,952 (50.7)	5,350 (96.2)	2,422 (54.8)
TF3	5,247	15.5 (0.35)	14.3	17.7	2,771 (52.8)	4,774 (95.7)	2,219 (55.7)
CCX A	5,435	16.0 (0.29)	14.8	18.0	3,149 (57.9)	4,789 (96.1)	2,311 (52.9)
CCS	4,190	16.7 (0.24)	16.5	18.1	3,032 (59.2)	4,523 (96.1)	2,259 (54.4)

a = number of pregnancies, b = weeks gestation, c = household income of £400+/week

Note: C, N, KT, Q, CCXA and CCS represent questionnaires while F8, F10, F11, TF2 and TF3 represent focus clinics.

### 2.2.3.3 Representation

Representation of the ALSPAC sample was determined after the study began because it was not possible to ascertain if recruitment did not work. There was “no convenient sampling frame to support a systematic invitation of all eligible

individuals available” (Boyd et al., 2013, p. 113) and although ALSPAC had information on the initiation cards returned from recruited participants, there was no information about the amount of invitation cards distributed and not returned. Nevertheless, it is estimated that the substantial majority (82%) of woman were invited to enrol during recruitment (Boyd et al., 2013).

Representation of the ALSPAC sample has been defined retrospectively at several time points with various sources of information. Comparisons were made using the 1991 census between mothers resident in the Avon area with infants less than one year of age and those living in the whole of Britain (Fraser et al., 2013). Further comparisons were made between participants in ALSPAC (using data collected eight months postnatally) with mothers living in Avon (Fraser et al., 2013). When compared to the rest of Britain, mothers who had infants in Avon were more likely than those in the rest of Britain to have a car available to the household and live in owner-occupied accommodation. Avon mothers were also less likely to be non-white and have one or more persons per room in their household. Mothers in Avon and mothers in Britain were just as likely to be married. When ALSPAC mothers at eight months postnatally were compared to those in Avon, they were more likely be married, to have a car in their household and to live in owner-occupied accommodation. They were also more likely to be white but despite having higher socioeconomic status, mothers in ALSPAC were more likely than mothers in Avon and Britain to be living in crowded conditions (more than one person per room; Fraser et al., 2013).

At 16 years of age comparisons were made between ALSPAC participants who were enrolled, ALSPAC participants who showed different patterns of

enrolment and a national comparative sample (Boyd et al., 2013). Comparison to the national sample was made with data from the National Pupil Database (NPD) Key stage 4 (KS4) dataset, which recorded pupil census and assessment for all pupils in English schools. 14,878 eligible children from ALSPAC were linked to a subset of the NPD and KS4 that were associated with government-maintained establishments. When compared, the ALSPAC enrolled sample at 16 was more likely to be white and less likely to be eligible for free school meals compared to the national sample. In addition, those who participated recently in the study were more likely to be female. Compared to the national sample, it was found that the ALSPAC enrolled sample had a higher education attainment at age 16 but this difference did not exist when the national sample was compared to the ALSPAC eligible sample. The gap in attainment scores also increased as participation in ALSPAC increased. Those who had been lost to attrition or had not participated recently had lower educational attainment when compared to the national average (Boyd et al., 2013).

#### *2.2.4 Measures*

The measures used for analyses in Chapters three and four are listed below. A summary of the measures as well as how and when they were administered are presented in tables 2.2 and 2.3 below.

##### *2.2.4.1 Demographics*

###### *2.2.4.1.1 Gender*

The child's gender was recorded from official birth certificates.

#### 2.2.4.1.2 *Age*

Age was recorded as the number of weeks from the child's birth date to the date the questionnaire or interview took place. Age was determined by dividing this number by 52.1557 (number of weeks in a year) to determine their age in years.

#### 2.2.4.1.3 *Ethnicity*

Child's ethnicity was reported by the mother during pregnancy. This was reported in questionnaire 'C' (32 weeks gestation), as either white or non-white.

#### 2.2.4.1.4 *Mother's social class*

The Registrar General's classification of occupations (Office of National Statistics, 1991) was used to measure mother's social class. Six categories were used: V (unskilled) or IV (semiskilled) manual; III (skilled manual or nonmanual); II (managerial and technical); and I (professional). This was reported by the mother at 32 weeks gestation in questionnaire 'C'. The last two categories (unskilled and semiskilled) were merged in analyses due to low numbers within these groups.

#### 2.2.4.1.5 *Income*

Average family household income per week was used to measure income and was reported by the mother when the child was a mean age of 8.2 years (SD = 0.21). This was categorically reported as either "less than £100 / £100-£199 / £200-£299 / £300-£399 / £400+ per week". The lowest two groups (<£100 and £100-£199 per week) were merged in analyses due to low numbers within these groups.

#### 2.2.4.1.6 *Adults in house*

Mothers reported the number of adults living in the household when the child was a mean age of 10.3 years (SD = 0.15). This continuous variable was categorised as 1, 2 or 3+ adults.

#### 2.2.4.2 *Psychological measures*

##### 2.2.4.2.1 *Sensation seeking*

Arnett's Inventory of Sensation Seeking (AISS: Arnett, 1994) was used to measure sensation seeking and was based on ten items from the intensity subscale. Statements such as "it would be interesting to see a car accident happen", or "I like to stand on a high cliff looking down" aimed to measure a child's preference for experiences that elicit strong sensations. A 4-item likert-scale was used for the following responses: "not like me at all / not much like me / quite like me / very like me". One item on the scale was altered to make it more age-appropriate. Higher scores indicated higher levels of sensation seeking. In contrast to other measures of Sensation Seeking the AISS is "conceived as being influenced by a biological predisposition which interacts with the social environment" and does not contain items associated with antisocial or norm-breaking behaviour (Roth & Herzberg, 2004, p. 206). The AISS has been validated as a measure of risk taking behaviour in other populations (Andrew & Cronin, 1997; Arnett, 1994; Roth & Herzberg, 2004). Data were collected at three time points, at a mean age of 11.8 years (SD = 0.24), 13.9 years (SD = 0.21) and 16.7 years (SD = 0.24). A list of the questions which contributed to this scale can be found Appendix A.

#### 2.2.4.2.2 *Inhibitory control*

The Stop-Signal Task (Handley, Capon, Beveridge, Dennis, & Evans, 2004) was used to measure inhibitory control at a mean age of 11.8 years (SD = 0.24). The behavioural task measures an individual's ability to terminate a previously learnt motor response (Williams et al., 1999). In this version of the task participants sat in front of a computer monitor with their two index fingers placed on two buttons labelled "X" and "O". Primary trials and stop signal trials were performed. On primary trials a smiley face was visible on the screen and children were asked to focus on this. An X or O was then presented on the screen and the child was instructed to press the corresponding button as quickly as possible in response to the visual presentation of the letter on the screen. From 30 primary trials (15 X's and 15 O's), a response time was calculated based on the child's mean reaction time. The primary trials allowed the child to familiarise themselves with the task and were also used to calculate a tone delay used in the next set of trials. In this second part of the task, the stop signal trials, an auditory tone was presented after subjects were presented with an X or O. This occurred randomly on 16 out of the 48 trials. The auditory tone was presented at 150 ms (difficult condition) or 250 ms (easy condition) before the calculated mean reaction time of the primary trials. On the trials where the tone was presented children were instructed to not press the button and to inhibit their motor response.

The outcome measure used for this task was the number of trials inhibited during the 150ms stop signal trials. This was converted into a dichotomous measure representing high and low inhibitory control. Based on previous ALSPAC studies using this task (Kothari, Solmi, Treasure, & Micali, 2013), the top ten percent of



those who failed to inhibit their motor response most often on the stop-signal trials were categorised as low inhibitory control.

#### *2.2.4.2.3 Estimated Intelligence Quotient*

IQ was measured by a shortened form of the Wechsler Intelligence Scale for Children (WISC- III; Wechsler, Golomnok, & Rust, 1992) and the reduced Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). These were administered in the form of interviews at a mean age of 8.7 years (SD = 0.29) and 15.5 years (SD = 0.35). The WISC total score included five verbal subtests (information, similarities, arithmetic, vocabulary and comprehension) and five performance subtests (picture completion, coding, picture engagement, block design and object assembly). The total score was calculated using age-scaled scores across these tests. The WASI was based on vocabulary and matrix reasoning subtests. The t-scores for the subtests were summed and the total score was scaled according to age.

#### *2.2.4.2.4 Conduct Problems*

The prorated score from the conduct disorder subscale of the Strength and Difficulties Questionnaire (Goodman, 1997) was used to measure symptoms of children's conduct problems. The questionnaire has well-established reliability in terms of internal consistency and retest stability (Goodman, 2001). This was administered at a mean age of 11.7 years (SD = 0.14) and completed by the mother of the child. Scores ranged from 0 to 10. Similar to previous ALSPAC studies using this measure, a dichotomous measure was created where the low tails of the distribution of gender-specific scores (closest to 10%) were categorised as having conduct problems (Hibbeln et al., 2007).

Conduct problems were also measured at a mean age of 15.5 years ( $SD = 0.35$ ). Participants reported via a computer-based questionnaire whether they engaged in a range of 16 antisocial activities within the last year such as written or spray painted on property that did not belong to them, frequency they stole something from a shop or store or frequency they sold an illegal drug to someone. Participants responded to these items as “not at all / just once / 2-5 times / 6+ times”. These items were taken from the Edinburgh Study of Youth Transitions in Crime (Smith & McVie, 2003) and the items used to determine antisocial behaviour were similar to previous procedures used in ALSPAC studies (MacArthur et al., 2012). A dichotomous measure was created indicating if participants engaged in any of the activities at least once within the last year. A full list of these items are provided in Appendix A.

#### *2.2.4.3 Alcohol use*

##### *2.2.4.3.1 Alcohol use at 13 years of age*

At a mean age of 13.9 years ( $SD = 0.21$ ) participants reported the number of times they had a whole drink in the past six months during an interview. A whole drink was defined as a can of beer, a glass of wine, a bottle of alcopop or a shot of spirits (vodka, gin, etc). A dichotomous measure indicated those who had at least one whole drink in the past six months.

##### *2.2.4.3.2 Alcohol use at 15 years of age*

At 15.5 years of age ( $SD = 0.35$ ) alcohol use was measured via a computer-based questionnaire. In total, four alcohol use outcomes were investigated from this data collection time point.

Participants were asked about their drinking pattern and choose from the following mutually exclusive categories: “only tried drinking once or twice / used to drink sometimes but do not drink now / drink less than once a week / drink one or two days a week / drink more than two days a week but not every day / drink every day”. A dichotomous variable was created to indicate those who reported drinking alcohol use every week. Those who reported drinking at one/two days a week, more than two days a week or every day were considered to drink on a weekly basis.

Participants were asked how many times they had had a full drink of alcohol in the past 30 days. Categorical responses included: 0, 1-2, 3-5, 6-9, 10-19, 20-39, 40-99 or 100+. A dichotomous measure of alcohol use in the past month was developed from these responses and indicated whether or not participants had at least one full drink of alcohol in the past 30 days.

Finally, participants were also asked how many times they had a full drink of alcohol in the past six months. Categorical responses to this question included: 0, 1-2, 3-5, 6-9, 10-19, 20-39, 40-99 or 100+. A dichotomous measure of alcohol use in the past six months was developed from these responses and indicated whether or not participants reported consuming at least one full drink in the past six months. For all alcohol use measures at this time point a whole drink was defined as a small bottle or ½ pint of beer, a small glass of wine, or a shot of whisky, gin, or vodka.

#### *2.2.4.3.3 Alcohol use at 16 years of age*

At a mean age of 16.7 years (SD = 0.24) alcohol use was measured via a questionnaire. Three alcohol use outcomes were investigated from this data collection time point.

Participants were asked how many full drinks of beer (including lager, cider and alcopops), wine and spirits they drank in the past 30 days. Categorical responses to this question included: 0, 1-2, 3-5, 6-9, 10-19, 20-39, 40+. A dichotomous measure of drinking in the past month was developed which indicated whether or not participants had at least one full drink of any alcoholic beverage in the past 30 days.

Participants were also asked “How many units of alcohol do you drink on a typical day when you are drinking?” Categorical responses to this question included: 1 or 2; 3 or 4; 5 or 6; 7, 8 or 9; 10 or more. A dichotomous variable was developed which indicated whether or not participants consumed three or more units when they drink alcohol. It was decided to dichotomise the variable at three units because 95% of the sample drank alcohol at this time point and classifying participants based on if they consumed any alcohol (for example creating a three-level variable comparing those who drank typically no alcohol, 1-2 units and 3+ units) was not feasible due to low numbers of non-drinkers. Those who drank less than 3 units in this measure therefore included a small percentage of participants who did not drink alcohol.

Finally, participants were asked “How often do you have six or more units of alcohol on one occasion?” Categorical responses to this question included “never / less than monthly / monthly / weekly / daily, almost daily”. A dichotomous variable was created to indicate those who reported consuming six or more units at least monthly. Those who reported monthly / weekly / daily or almost daily were considered to consume six or more units at least monthly. Investigating this outcome according to it’s frequency (on a monthly basis or more often) was chosen because 62% of participants reported drinking this amount less than monthly and this measure would be a good indicator of recurrent and more hazardous drinking

patterns as six units has been defined as heavy episodic drinking (WHO, 2014). For alcohol use measures at this time point one unit was defined as ½ a pint of average strength beer/lager, one glass of wine or one single measure of spirits.

#### *2.2.4.4 Peer alcohol use*

Peer alcohol use was measured at a mean age of 15.5 (SD = 0.35) years via a computer-based questionnaire. Participants were asked how many of their friends drank alcohol in the past year. This was reported as three mutually exclusive categories: “none / one or some / most or all”.

#### *2.2.4.5 Parental supervision*

At a mean age of 15.5 (SD = 0.35) years participants were asked via a computer-based questionnaire how often their parents knew who they were with, where they went, what they did and what time they would be back when they went out. These questions were taken from the Edinburgh Study of Youth Transitions in Crime (Smith & McVie, 2003). Answers were measured on a likert scale were “never / sometimes / usually / always”. Items were summed and those who scored between 0-4 were categorised as “never/sometimes”, a score of 5-8 was “usually” while 9-12 was “always”.

#### *2.2.4.6 Organised activity participation*

##### *2.2.4.6.1 Organised activities during childhood*

At a mean age of 8.8 years (SD = 0.23) and 11.7 years (SD = 0.14) mothers were asked about their child’s participation in OAs. Frequency of participation in special groups such as scouts or youth clubs was reported. Mothers also reported the frequency their child attended special classes or clubs for an activity (e.g. dancing, judo, football, or other sport). For both questions responses were measured on a

likert scale with responses ranging from “not at all / less than once a month / 1-3 times a month / once a week / 2-5 times a week / every day”. Figures 2.2 and 2.3 provide details of response rates for these variables before they were collapsed by the following methods.

*Figure 2.2 Frequency of participation in special groups and sport classes at a mean age of 8.8 years (shown as percentages)*

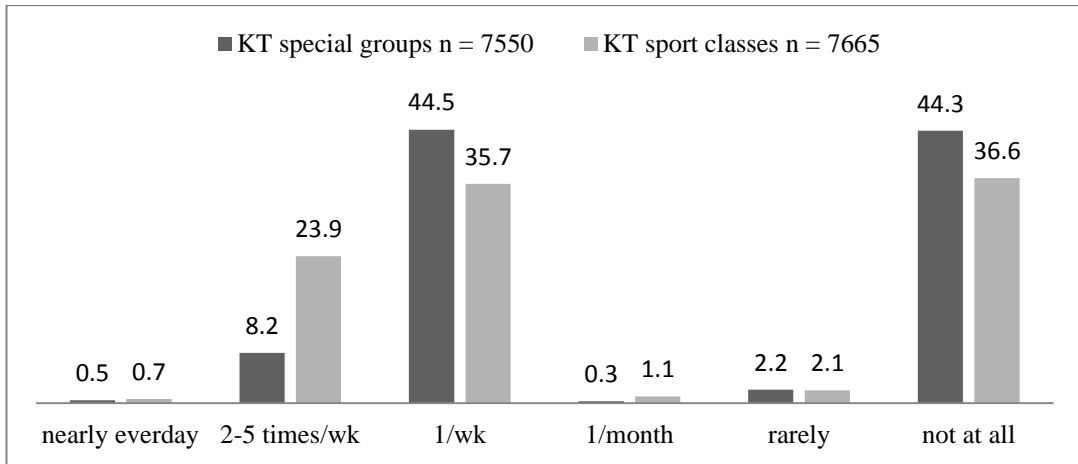
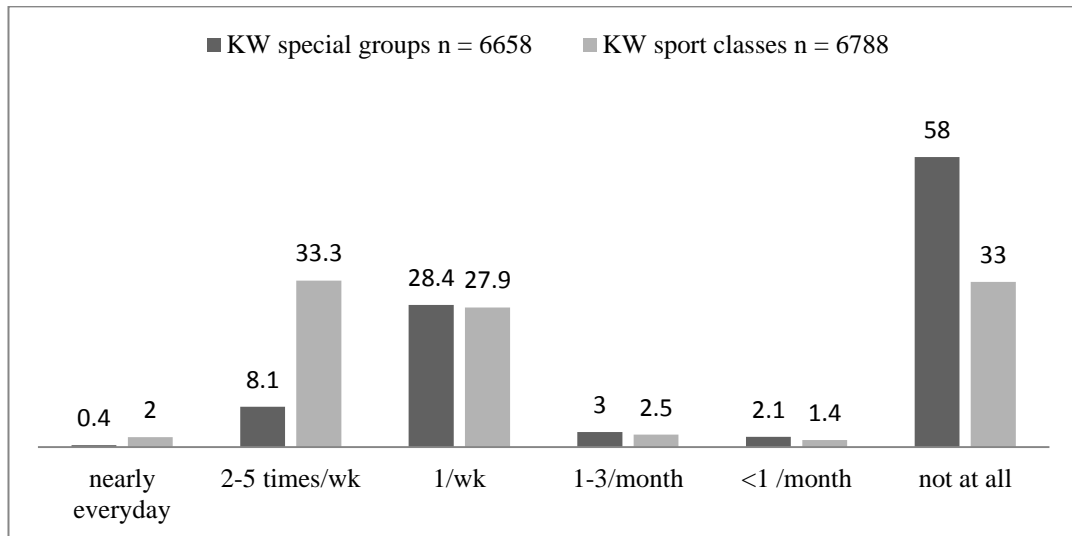


Figure 2.3 Frequency of participation in special groups and sport classes at a mean age of 11.7 years (shown as percentages)



Participation in OAs during childhood predominantly occurred either at least once a week or not at all (see Figures 2.1 and 2.2), with very few reporting participation a few times a month, less than once a month or nearly every day. It was therefore decided to dichotomise participation into two groups, those who participated at any frequency and those who did not participate at all.

From the two questions on OA participation (special activity classes and special groups), four indicators of participation were created. “Any OA” included those who participated in a special activity class or a special group. “No OA” represented those who did not participate in either activity. This dichotomous measure was mutually exclusive. More specific measures of participation type were also created for those who reported any participation. A “sport” group was created which represented those who participated in a special activity class while participation in a “special group” represented those who participated in a special group. These two categories were mutually inclusive. These methods were applied to

OA information from the KT questionnaire (age 8.8 years) and KW questionnaire (age 11.7 years).

#### *2.2.4.6.2 Organised activity participation at 15 years of age*

At a mean age of 15.5 years (SD = 0.35) participants were asked via a computer-based questionnaire if they attended youth clubs, groups or sports centres on evenings or on the weekends. This was reported as yes or no along with the frequency of participation. The frequency of participation was recorded as: most evenings; once a week; less than once a week; or never. The frequency of participation was in reference to participation at youth clubs, groups or sport centres generally, and not specific to an individual activity. Following this response, participants were asked to indicate the types of activity they participated in from six different, mutually inclusive activities: youth clubs, sports club/centre, dance (keep-fit/aerobics/dance class), music club/group, drama club as well as any other activity. These questions were used to develop the outcome measures below.

Similar to participation in childhood, a dichotomous measure was created to indicate whether or not the participant reported any participation in OAs during the evenings or weekends. Those who never participated in an OA were categorised as “no OAs”. Six indicators variables were then created for those who reported participation in the following specific activities: “sport”, “dance”, “music”, “drama” and “other”.

A measure indicating the amount of different activities participants engaged in was also developed. This measure, called breadth, was the sum of the different activities participants engaged in (including those who did not participate in any activity) and were categorised as 0, 1, 2 and 3+.



#### *2.2.4.6.3 Organised activity participation at 16 years of age*

At mean age of 16.0 years (SD = 0.29) participants were asked via a questionnaire whether they had participated in the following activities in the past school year after school: Sports clubs/teams, school/student councils, afterschool club, holiday club/activities, computer groups/club, art/drama/dance/music club or group, religious group/organisation, scouts/guides, youth club, environmental club/group, games/hobbies club, volunteering or other. A mutually exclusive variable was developed containing three categories. Participants were grouped into three groups; those who participated in a) a sport b) no activities and c) other activities.

#### *2.2.4.7 Summary of measures*

A list of measures used in Chapter three are provided in Table 2.2. The table shows the age of the participants when the measure was collected, if the data were collected via a questionnaire or at a focus clinic, the respondent and the method of data collection.

*Table 2.2 Measures used in Chapter three*

<b>Measure</b>	<b>Mean Age of Child (years)</b>	<b>Wave</b>	<b>Respondent</b>	<b>Method</b>
Ethnicity Social Class	Gestation	Questionnaire C	Mother	Questionnaire
Gender	Birth	Birth Certificate	-	-
Household income	8.2	Questionnaire N	Mother	Questionnaire
IQ	8.7	Focus Clinic F8	Child	Behavioural task
Organised activities	8.8	Questionnaire KT	Mother	Questionnaire
Adults in household	10.3	Questionnaire Q	Mother	Questionnaire
Inhibitory control	10.7	Focus Clinic F10	Child	Behavioural Task
Sensation seeking	11.8	Focus Clinic F11	Child	Questionnaire
Conduct problems Organised activities	11.7	Questionnaire KW	Mother	Questionnaire
Sensation seeking	13.9	Focus Clinic TF2	Child	Questionnaire
IQ Conduct problems organised activities	15.5	Focus Clinic TF3	Child	Interview, questionnaire

A list of measures used to in Chapter four are shown in Table 2.3. Similar to Table 2.2, it includes the age of the participant when the measure was collected, whether the data were collected via a questionnaire or focus clinic, the respondent and the method of data collection. In contrast to Table 2.3, this table includes measures of alcohol use, peer alcohol use and parental monitoring.

*Table 2.3 Measures used in Chapter four*

<b>Measures</b>	<b>Mean Age of Child (years)</b>	<b>Wave</b>	<b>Respondent</b>	<b>Method</b>
Ethnicity Social class	Gestation	Questionnaire C	Mother	Questionnaire
Gender	Birth	Birth Certificate	-	-
Household income	8.2	Questionnaire N	Mother	Questionnaire
Inhibitory control	10.7	Focus Clinic F10	Child	Behavioural Task
Sensation seeking	11.8	Focus Clinic F11	Child	Questionnaire
Conduct problems Organised Activities	11.7	Questionnaire KW	Mother	Questionnaire
Sensation seeking Previous alcohol use	13.9	Focus Clinic TF2	Child	Questionnaire, Interview
<b>IQ</b>				
Conduct problems Parental monitoring Organised activities Alcohol use Peer alcohol use	15.5	Focus Clinic TF3	Child	Questionnaire
Organised activities	16.0	Questionnaire CCXA	Child	Questionnaire
Alcohol use Sensation seeking	16.7	Questionnaire CCS	Child	Questionnaire

### *2.3 Challenges with ALSPAC data*

Several problems were encountered with the ALSPAC data that impacted how the data could be used. These problems resulted in modifications to the analytical procedure overtime and shaped how Chapters three and four ultimately answered the research questions. This section describes the challenges faced and where possible,

the solutions used to overcome these obstacles. Other analytical approaches that were considered, and the reasons for why they were not used, are also discussed.

### *2.3.1 Developmental theory and change over time*

In Chapter one the dual-systems theory and how it impacts risk-taking behaviours was discussed, with particular emphasis on how this relates to developmental changes during adolescence. Similar to McLeroy's et al. (1988) framework (see Chapter one), the contemporary developmental theory highlights the importance of levels within a framework and interactions between multiple levels that lead to behaviour change (Lerner & Castellino, 2002). With this approach, "the systemic dynamics of individual-context relations provide the bases of behaviour and development change" (Lerner & Castellino, 2002, p. 124), that is, behavioural change is a function of the individual within environmental contexts. This change is constrained by past developments, present contextual conditions and its' magnitude may vary across time (Lerner & Castellino, 2002). As such, contemporary development theory focuses on changes in relationships between different levels of "organisation which constitute human life" (Lerner & Castellino, 2002, p. 124).

Applying this theoretical framework to ALSPAC would have been suitable to test the dual-processing theory (Steinberg, 2010; Steinberg et al., 2008). The dual-processing theory aims to explain risk-taking behaviours by investigating the development of individual characteristics associated with the socio-emotional system and the cognitive control systems (see Chapter one for more detail; Steinberg, 2010; Steinberg et al., 2008). The extent to which these individual-level changes influence behaviour are also dependent on environmental factors, such as the presence of supervision and peers (Steinberg, 2004). Lerner & Castellino (2002) stated: "given

that adolescent development is the outcome of changes in this developmental system, then, for the ontogeny of the young person, the essential process of development involves changing relations between the developing youth and his or her changing context” (p. 126). From a developmental contextualism perspective, this would result in a relational unit analysis, not unilevel units of analysis (Lerner & Castellino, 2002).

Given this, analyses in Chapter three and four could have investigated the relationship between changes in sensation seeking (representing the socio-emotional system) and inhibitory control (the cognitive-control system). Since ALSPAC has a large amount of contextual information about participant’s environment and their social relationships, these factors could also be accounted for within the models.

There were several reasons why analysing the data from this perspective could not be carried out. The primary reason related to the data collection time points of sensation seeking and inhibitory control. For some individuals measurements of sensation seeking and inhibitory control occurred close in time. Of the 6,278 participants who had data on both sensation seeking and inhibitory control in early adolescence, 188 participants had these two measures recorded within 20 weeks of each other. For the majority of participants (50%), 51 to 64 weeks separated these two data collection time points. On average inhibitory control was measured at 10.7 years of age while sensation seeking was measured at 11.8 years of age. Later in adolescence sensation seeking was measured at 13.9 years of age while inhibitory control was again measured at age 15.5 years of age. The dual-processing theory highlights increased risk-taking when sensation seeking is high and inhibitory control is low. Due to the timing of these measures, increased risk would not be

reflective of differences between these measures at one point in time, or be consistent across time for every individual.

It was then considered whether the relationship between sensation seeking and inhibitory control could be assessed at two separate points in time, measuring instead the development of the two measures independently of each other. Upon closer inspection of the ASLPAC data, the inhibitory control measure at the second time point (measured at TF3, a mean age of 15.5 years) was not deemed reliable for use. This was unfortunate as ALSPAC had not alluded to any problems with this measure upon application for its use. Despite this, attempts were made to make sense of the data, and other experienced researchers within ALSPAC were consulted about its reliability. Those who had tried to work with it previously recommend avoiding its use at that time point. Thus, it was decided to use only one measurement of inhibitory control which was collected at the F10 focus clinic.

Due to the version of the stop signal task used to measure inhibitory control, it would have been difficult to infer developmental change between the two time points. The stop-signal task adopted for the ALSPAC study did not enable researchers to accurately account for differences in cognitive growth. The variances of parameters within the task (a stop-signal occurring at either 150ms or 250ms before the mean reaction time) resulted in a ceiling-effect at the second collection time point, indicating that the same task used at 11 years of age became easier with general cognitive development. To address this issue ALSPAC changed the parameters of the stop-signal trials; however, over the course of the study they were unable to find the appropriate level of challenge for the task.

Other stop-signal tasks incorporate a design within the behavioural task that enables the experiment to find the optimal level of challenge. Successful inhibited actions are mapped along with the various parameters used on multiple trials during one experimental block, producing a standardised probability function of inhibitory control (Aman, Roberts, & Pennington, 1998; Logan, Cowan, & Davis, 1984). Stop-signal tasks with this design can be used to compare individuals on their inhibitory control development because they are standardised and do not risk ceiling or floor effects of which were seen in the version used by ALSPAC.

Finally, an indicator of “cognitive risk” was also explored by developing a measure based on both the early measurement of sensation seeking and inhibitory control. For example, high/low inhibitory control could be added to the analyses as an interaction term with continuous scores of sensation seeking. After some debate it was decided to not use this interaction term in the model because these measures were collected at different time points. It was therefore decided that sensation seeking and inhibitory control would be used individually as predictors in the models and not as interactions. Only inhibition control at one time point was used in all models.

### 2.3.2 *Alcohol use measures*

Originally it was decided to investigate the initiation of alcohol use and the rate of increased use during adolescence; however, this proved to be difficult for several reasons. Many participants did not use alcohol regularly until mid-adolescence (age 15) and alcohol use for the whole ALSPAC sample was embargoed beyond 16 years of age.

Measuring alcohol use in the ALSPAC study began in early adolescence at the TF1 clinic (when participants were roughly 13 years of age) and even though not many young people reported using alcohol at this time point, using these data in the study proved difficult for several reasons. The first alcohol use questionnaire contained two versions, a Fast-track version and an original version. Similar questionnaire items from these two separate versions were already collapsed within the ALSPAC database to represent one variable; however, these variables did not provide values regarding missing data. It was not possible to decipher from the variable if participants did not attend the TF1 clinic (and were therefore not represented on the variable), or if the questionnaire item was not applicable to them.

With the help of administrative variables provided by ALSPAC it was attempted to identify the participants who attended TF1 and the version of the questionnaire they received in order to determine reasons for non-responses. Irregularities in the administrative data regarding the versions of questionnaires that were administered to participants were found when this was investigated. This was brought to the attention of ALSPAC in the hope they could explain how to address this, but they were unable to understand what had gone wrong and how to go about this problem. Therefore information regarding early alcohol use before the age of 13 was not used because information was limited to a small percentage of the sample and it was not systematically documented.

Questionnaire items regarding alcohol use (including their response categories) were not consistent across waves of data collection making longitudinal observations of alcohol consumption difficult. Of potential interest were the time points when participants reported a change in their alcohol drinking status, from



never drinking to reporting that they had drunk alcohol (more than a couple of sips). Upon closer inspection it was found that participants did not accurately report their drinking status across time. Some stated that they never drank alcohol when at a younger age they had reported drinking alcohol. It was therefore decided to use variables that investigated more recent patterns of alcohol use such as the current drinking patterns and alcohol use during the past 30 days. Due to the nature of analyses this was limited to 15 and 16 years of age when more of the sample had initiated alcohol use.

### *2.3.3 Data clustering*

Many schools provide opportunities to participate in OA contexts, although within the UK schools vary in their provision of these learning contexts (Power et al., 2009). Initially it was intended to control for school-level clustering by taking into account attendance in school or using multilevel modelling to account for school-based clusters within the sample. However, school-level information was limited to a sample of participants who attended schools in the BANES LEA (n = 6560). As discussed in previous chapters there are many limitations using school-based samples in determining who participates in OAs as well as the relationship between participation and reported alcohol use. If school-level information was to be included, the ALSPAC sample kept within the analyses would have been significantly reduced to individuals who were accounted for in the school system because only complete datasets were used (this is discussed in more detail below).

Another way to control for clustering was to use geographical information such as neighbourhood-level information. This information was available from 2001 Census Area Statistics (CAS). There was also a disadvantage using this approach.

Whilst CAS information could produce markers with quite small areas, any clusters with 5 or fewer participants living in them were removed due to disclosure risks thus eliminating these participants.

To control for clustering while retaining participant numbers it was decided to control for household-level clustering. In the ALSPAC sample some participants came from the same household because participant mothers had given birth twice during the recruitment phase or did not have a singleton birth. In total 202 pairs of siblings were present in sample and these were controlled for in analyses.

#### *2.3.4 Multiple imputation*

Many of the problems arising from the ALSPAC data stemmed from missing information on multiple occasions. The majority of participants did not participate in all waves of data collection in the study (Boyd et al., 2013). Although missing information can be corrected using multiple imputation and multiple imputation is a useful tool that enables comparison of imputed versus non-imputed data, this technique was not used. The following section describes why multiple imputation was not used and the implications this had on the current models used in chapters three and four.

Many longitudinal and epidemiological studies suffer from missing data. Researchers are often faced with two choices; they can either use a sample that has complete cases or they can use multiple imputation techniques (Sterne et al., 2009). Multiple imputation techniques provide an estimate for the missing values, allowing more participants to be used in the analyses; however, both options may lead to biases. Not using multiple imputation results in a lower sample and lower power. This may also create a sample systematically different from those who are not

included, biasing results, but multiple imputation may equally lead to biases and misleading interpretations if incorrectly applied to the data (Sterne et al., 2009).

Multiple imputation is a technique found in many ALSPAC studies. This technique is not a biased approach to dealing with missing data when data are missing completely at random. That is, there are no systematic differences between the missing values and the observed values (Sterne et al., 2009). Since it is not possible to distinguish between missing at random and missing not at random in observed data, sensitivity analyses examining the effect of different assumptions about the missing data mechanism must be applied (Sterne et al., 2009). This can be difficult because there is no information about the value of the variable that is missing. With longitudinal data, if a complete representation of the variable at time 1 is associated with missing variable at time 2, it is possible to determine whether missingness is associated with a value of a variable.

Analyses of the current data used in Chapters three and four showed that data were not missing at random. Factors associated with participation in OAs, for example IQ, parental monitoring, previous alcohol use and challenging behaviour, predicted whether or not individuals in ALSPAC had an outcome variable about OA participation. Participation in OAs during childhood also predicted missing data. Those who did not participate in OAs were more likely to have missing information. Therefore, it was decided to use complete cases as this would present less bias than imputing data when data were not missing at random.

In chapters three and four a summary of the investigation into missing data for each research question is provided. To account for any biases in using a complete

sample, a description of the samples used in the analyses are reported within each chapter.

### *2.3.5 Development of models*

As multiple imputation was not used a conscious effort was made to retain participant numbers in the analyses as high as possible. The ALSPAC study contains large amounts of information that could arguably be important to the research questions investigated. Including more measures in the model however would lead to fewer participants, a decrease in power, more complex models and an increasingly biased sample. Therefore the measures in the models were based on factors shown in previous studies to be important for these relationships. Chapters three and four discuss which measures were included for each model used.

### **3 Predictors of organised activity participation in adolescence**

This chapter presents findings from a quantitative study using data from ALSPAC. It aims to identify OA participation rates and important determinants of OA participation during childhood and adolescence. The role of individual-level predictors, such as sensation seeking, inhibitory control and conduct problems, are of focus in this study because of their association with risk-taking behaviours during adolescence..

### *3.1 Introduction*

As discussed in Chapter one, OAs are associated with positive outcomes during childhood and adolescence including improved academic achievement (Fredricks & Eccles, 2006a, 2008), psychological adjustment (Fredricks & Eccles, 2006a), and a reduced likelihood that a young person will terminate their education early (Mahoney et al., 2003; Mahoney & Cairns, 1997). Despite their associated benefits, many children do not participate in OAs. North-American studies have shown that between 14.6-36.8% of student samples (Darling, 2005; Eccles & Barber, 1999; Fredricks & Eccles, 2006a, 2006b, 2008) do not report any involvement.

While many studies have investigated associated outcomes from OA participation, less is known about what governs OA participation in the first place. Demographic determinants of participation (Bohnert et al., 2010; Dearing et al., 2009) have been investigated and children from low income families (Dearing et al., 2009) and ethnic minorities (Coughlan, Doherty, O'Neill, & McGuire, 2014) participate in OAs less often. Individual-level factors such as externalising and delinquent behaviour (Bohnert & Garber, 2007; Persson, Kerr, & Stattin, 2007) have also been shown to predict less OA participation; however, little is known about what other individual-level factors contribute to OA participation.

Understanding which individual-level factors that are important for OA participation will help refine initiatives and interventions that are designed to improve OA take up. For example, identification of factors that predict less participation can support strategies that aim to increase participation by considering how and where these individual-level characteristics present as challenges for young people. It can also help create opportunities for participation that are more suited for certain groups of young people.

The role of individual-level factors associated with risk taking behaviours has not been investigated as an important determinant of OA participation. In Chapter one, evidence was reviewed indicating both sensation seeking and inhibitory control may be important for participation in sports, although its' impact on other OAs is less certain. Sensation seeking and inhibitory control are both strongly implicated in adolescent risk taking (Casey et al., 2011; Somerville et al., 2010; Steinberg, 2010) as well as delinquency and substance misuse (Casey et al., 2011; MacPherson et al., 2010; Martin et al., 2002; Nigg et al., 2006; Peach & Gaultney, 2013; Pedersen et al., 2012; Quinn & Harden, 2013; Somerville et al., 2010; Steinberg, 2010). Social enterprises and youth programmes in the United States and United Kingdom use OAs, including sports-based interventions, to address risky behaviours such as delinquency and substance use (Kelly, 2013). OAs such as sports are attractive as diversionary activities due to their relationship with sensation seeking; however, inhibitory control difficulties might act as a barrier to OA participation.

### *3.1.1 Sensation seeking*

Sensation seeking is a personality trait that represents “the need for varied, novel and complex sensations and experiences, and the willingness to take physical and social

risks for the sake of such experience” (Zuckerman, 1979, p. 10). Sensation seeking personality traits are often used to explain why some individuals enjoy participating in certain leisure activities. For example, high sensation seekers are more likely to participate in extreme sports as well as combat activities compared to low sensation seekers (Cazenave et al., 2007; D'Silva et al., 2001; Zuckerman, 1994). Sensation seeking also predicts other less-risky activities such as chess (Joireman et al., 2002). While several studies have investigated sensation seeking as predictors of leisure activities (which can combine OAs as well as unstructured activities), and it is not yet clear if sensation seeking predicts types of OA participation.

The number of activities participated in, termed breadth, is also an important dimension of OA participation (Bohnert et al., 2010). High sensation seekers might enjoy a variety of activities because they provide varied and novel experiences (Roberti, 2004). Previous research has found that adolescents who are high sensation seekers participate in a greater number of leisure activities (D'Silva et al., 2001). It is not yet clear if sensation seeking also predicts the number of OAs young people engage in.

### *3.1.2 Inhibitory control*

Inhibitory control is an internally generated act of control required in many real-life situations and is defined as the ability to stop a planned or on-going thought or action that has already been initiated (Williams et al., 1999). Sport psychology research has focused on traits and attributes which facilitate performance among elite athletes and less attention has been given to how other factors associated with cognitive functioning may impact sports participation (Vestberg et al., 2012) or among young people. Vestberg et al (2012) suggested that many of the skills required for



participation in team sports can be translated to general cognitive domains and the ability of an athlete to inhibit responses is one such dimension. In sports, this ability has been associated with better performance (Vestberg et al., 2012).

Children who often display inhibitory control difficulties, such as children with ADHD, are less likely to participate in OAs (Engel-Yeger & Ziv-On, 2011; Shimoni et al., 2010) and are also less physically active during adolescence (Khalife et al., 2014). These young people may face greater difficulties in following rules, heightened emotional reactivity and therefore increased levels of aggression in OAs (Johnson & Rosen, 2000). Inhibitory control difficulties are also comorbid with motor control and developmental problems (Beyer, 1999; Pan et al., 2009) and may lead to difficulties with physical activities (Engel-Yeger & Ziv-On, 2011) and organised play (Cairney et al., 2005).

Evidence from these studies suggests that low inhibitory control may act as a possible barrier to sports participation. It is not yet understood if inhibitory control predicts participation in specific types of activities besides sports, such as clubs or special groups. Previous research has found that children with ADHD are less likely to participate in social and skill-based activities, such as playing a musical instrument (Engel-Yeger & Ziv-On, 2011; Shimoni et al., 2010). Engagement in activities such as these may require a long period of practice before improvements are seen and children who have difficulty with delay of rewards may find such activities difficult (Engel-Yeger & Ziv-On, 2011).

Additionally, conduct disorder is associated with response inhibition (Oosterlaan, Logan, & Sergeant, 1998) and ADHD (Biederman, Newcorn, & Sprich, 1991). Young people with conduct disorder symptoms are more likely to spend more

time watching TV and playing video games (Robertson, McAnally, & Hancox, 2013). They are also more likely to be physically inactive in adolescence (Khalife et al., 2014). It has been suggested that social impairments associated with conduct disorder may hinder children's participation in structured physical activities (Khalife et al., 2014). It is unclear whether inhibitory control and conduct disorder are independently related to OA participation. In order to understand the role of sensation seeking and inhibitory control in OA participation it would therefore be necessary to control for conduct disorder as a confounding factor.

In summary, individual differences may explain why young people vary in OA participation rates. By identifying individual-level characteristics important for OA participation, participation among young and vulnerable people can be targeted and facilitated. The identification of these individual-level factors may also have important methodological implications on future studies. If inhibitory control and sensation seeking are found to predict OA participation patterns, these would be important self-selection factors (Fredricks & Eccles, 2006b; Larson, 2000) to control for when investigating associated risk taking behavioural outcomes.

### *3.1.3 The current study*

The current study aimed to test whether individual-level factors (specifically inhibitory control and sensation seeking) predicted participation in OAs during childhood and adolescence. To do this, longitudinal data from ALSPAC were used (see Chapter two for information about the ALSPAC cohort). Analyses controlled for demographic circumstances, estimated IQ and conduct problems.

Based on the previous literature, it was hypothesised that greater sensation seeking would predict any participation in OAs as well as individual types of OAs

(such as sports and special groups) during childhood and adolescence. In adolescence it was predicted that greater sensation seeking would predict greater breadth of OA participation. In childhood and adolescence it was hypothesised that those with low inhibitory control would be less likely to participate in specific OAs and OAs generally in childhood and adolescence. It was also hypothesised that those with low inhibitory control would be less likely to participate in a greater breadth of activities.

## 3.2 *Method*

### 3.2.1 *Sample*

ALSPAC is a longitudinal, on-going population-based cohort (Golding, 2004; Golding et al., 2001). From 1991 to 1992 all pregnant mothers from three Bristol-based health districts within the UK were invited to participate. Mothers were eligible to participate if they lived in the area of Avon during pregnancy and if their expected delivery date was between 1 April 1991 and 31 December 1992; 14,541 pregnancies were recruited before birth and resulted in a sample of 14,676 fetuses. Of these 14,062 were live births of which 13,988 children were alive at one year of age (Boyd et al., 2013). Mothers, their partners and offspring have been followed up throughout the offspring's childhood and adolescence using questionnaires, as well as behavioural and experimental psychological tests (Fraser et al., 2013). Further details about the ALSPAC sample can be found in Chapter two.

### 3.2.2 *Measures*

#### 3.2.2.1 *Demographic information*

Participant's age was reported when OA participation outcomes were measured. This occurred at a mean age of 11.7 (SD = 0.14) and 15.5 (SD = 0.35) years. Dichotomous variables were used for gender (0 = male; 1 = female) and ethnicity (0 = other; 1 = white). Mother's social class was measured by the Registrar General Classification (Office of National Statistics, 1991) during pregnancy and categorised into six groups. For the analyses the two lowest groups were merged and this resulted in five categories: I (professional); II (managerial and technical); III (skilled manual); III (skilled non-manual); and IV (semiskilled and unskilled). Income was based on mother's reports of weekly household income. This was measured by four

categories: <£199/week, £200-£299/week, £300-£399/week and £400+/week. Mother's also reported the number of adults present in the household (coded as 0, 1, 2 and 3+). Figures 3.1 and 3.2 below show the mean ages of participants when these measures were collected.

### *3.2.2.2 Psychological measures*

#### *3.2.2.2.1 Sensation seeking*

Sensation seeking was measured during childhood and adolescence. At both time points the intensity subscale of the AISS was used (Arnett, 1994). Higher scores on this measure indicated greater sensation seeking.

#### *3.2.2.2.2 Inhibitory control*

Inhibitory control was measured during childhood using the Stop Signal Task (Handley et al., 2004) Performance on this task was measured as the number of correct trials inhibited when the stop signal occurred 150ms before the mean reaction time. The top 10% of participants who failed to inhibit their response the most number of times were coded as low inhibitory control. This is similar to previous studies in this sample that have used this measure (Kothari et al., 2013). A dichotomous variable of high (0) and low (1) inhibitory control was used.

#### *3.2.2.2.3 Estimated IQ*

IQ in childhood was estimated using the WISC- III (David Wechsler et al., 1992). This was based on the total score of five verbal subtests and five performance subtests. This total score was then scaled according to participant's age. In adolescence estimated IQ was measured by the WASI (WASI; Wechsler, 1999).

This was based on a total score from a vocabulary and matrix reasoning subtests and scaled according to participant's age.

#### *3.2.2.2.4 Conduct problems*

In childhood, conduct problems was measured by the conduct problems scale from the Strength and Difficulties Questionnaire (Goodman, 1997). The prorated score was used to create a dichotomous measure. To indicate sub-optimum behavioural outcomes the low tails of the distribution of gender-specific scores (closest to 10%) were categorised as having conduct problems. This is similar to previous studies using the ALSPAC cohort (Hibbeln et al., 2007).

In adolescence, participants who reported engagement in at least one antisocial behaviour in the past year were categorised as having conduct problems (a full list of the antisocial behaviours can be found in Appendix A). These items were taken from the Edinburgh Study of Youth Transitions in Crime (D. J. Smith & McVie, 2003) and have been used previously in this cohort (MacArthur et al., 2012). In childhood and adolescence, presence of conduct problems was scored as 1 and no conduct problems was scored as 0.

#### *3.2.2.2.5 Participation in organised activities*

Participation in OAs was measured in childhood twice, at a mean age of 8.8 (SD = 0.23) and 11.7 (SD = 0.14) years. At both time points mothers reported whether their child participated in special classes for an activity (e.g. dancing, judo, football, or other sport). Mothers also reported if their children participated in special groups such as scouts or youth clubs. For each of these questions the frequency of participation was also reported. Mothers reported if their child participated never, less than once a month, 1-3 times a month, once a week, 2-5 times a week or nearly

every day. A dichotomous, mutually exclusive variable was created indicating whether participations never attended any activity (categorised as “no participation”) or participated in either activity (categorised as “any participation”). For OA participation at 11.7 years of age, indicator variables were created indicating the type of activity children participated in. Those who reported participation in a special physical activity were categorised as “sport” and those who participated in special groups or clubs were categorised as “special group”. For childhood-based analyses, participation at 11.7 years of age was used as an outcome measure and participation at 8.8 years of age was used as a predictor.

At a mean age of 15.5 (SD = 0.35) years participants reported whether they attended youth clubs, groups, or sports centres on evenings or weekends. The frequency of participation in any activity (and not individual activities) was also measured. Participants reported if they attended most evenings, once a week or less than once a week. A mutually exclusive variable indicated whether or not they reported participation. Those who attended activities never/rarely were categorised as “no OA”. Participants also reported whether they did the following activities in the evenings or on weekends: youth clubs, sports club/centre, dance (keep-fit/aerobics/dance class), music club/group, drama club, or other. Although participants indicated the activities they participated in, the frequency of attending specific activities was not. Breadth was measured as the number of different activities reported and categorised as 0, 1, 2 or 3+.

### *3.2.3 Analytical approach*

Similar to previous research, those who participated in different types of activities were compared to those who did not participate in any activities (Gardner et al.,

2009). Comparing participation in an OA to those in no OAs (rather than just “everyone else”) is a more appropriate way of measuring participation (Bohnert et al., 2010; Farb & Matjasko, 2011). Those who do not participate in a specific activity might still participate in other forms of OAs (Bohnert et al., 2010). In the current study participation in a specific OA is therefore compared to those who do not participate in any type of OA and would exclude those who might participate in other forms of OAs (Gardner et al., 2009).

Logistic regressions were used to investigate dichotomous outcomes of participation in childhood. This approach enabled the comparison of those who participated in no activities to be compared with those who participated a) in at least one activity, b) a sport and c) a special group. For each of the logistic regressions the same model was used to predict dichotomous OA outcomes during childhood.

In adolescence two logistic regressions were used to predict dichotomous outcomes of participation. These analyses compared those who did not participate in any activity with a) those who participated in at least one activity and b) those who participated in a sport. A third outcome investigated breadth of activities using ordered logistic regression. The same model was used for each analysis in adolescence.

Figure 3.1 and 3.2 below shows the predictors used in the models, the mean age in years when measures were collected, and the three outcome variables investigated during childhood and adolescence. Categorical variables such as social class and income were added as dummy variables. Symptoms associated with challenging behaviours such as externalising behaviour have been shown to predict participation in OAs (Bohnert et al., 2010; Fredricks & Eccles, 2006b) and are



associated with attrition in longitudinal studies (Peck et al., 2008). In all analyses conduct problems was included in the models. IQ was also included in the model because it is associated with socioeconomic factors known to predict OA participation (Dearing, 2008). Finally, participation in some OAs may improve skills including executive functioning (Diamond & Lee, 2011). Therefore baseline measures of participation were included in all models and indicated participants who participated in any activity previously (irrespective of frequency).

*Figure 3.1 Predictors, mean age of participants and dichotomous outcomes investigated during childhood*

<b>Predictors</b>	<b>Mean age (years)</b>	<b>Dichotomous Outcomes</b> (mean age: 11.7 years)	
Previous participation	8.8	No OA participation	Any OA participation
Age at outcome	11.7		
Gender	Birth		
Ethnicity	Gestation	No OA participation	Sport
Social class	Gestation		
Income	8.2	No OA participation	Special group
Number of adults in household	10.3		
IQ	8.7		
Conduct problems	11.7		
Sensation Seeking	11.7		
Inhibitory control	10.7		

The model used to test adolescent outcomes included the same predictors (see figure 3.2). In this model IQ, conduct problems and sensation seeking were measures collected during adolescence and previous OA participation indicated any participation at 11 years of age. All analyses were carried out using STATA IC 11 software.

Figure 3.2 Predictors, mean age of participants and dichotomous outcomes investigated during adolescence

<u>Predictors</u>	<u>Mean age (years)</u>	<u>Dichotomous Outcomes</u> (mean age: 15.5 years)	
Previous participation	11.7	No OA participation	Any OA participation
Age at outcome	15.5		
Gender	Birth	No OA participation	Sport
Ethnicity	Gestation		
Social class	Gestation	Breadth	
Income	8.2		
Number of adults in household	10.3		
IQ	15.5		
Conduct problems	15.5		
Sensation Seeking	13.9		
Inhibitory control	10.7		

Logistic regressions calculate maximum likelihood estimates through an iterative process. As such, an equivalent statistic that represents how much of the data is explained, such as  $R^2$  in linear regressions, does not exist (U.C.L.A Statistical Consulting Group: What are pseudo R-squareds?). Therefore there are several ways to determine the data's goodness-of-fit. For all analyses conducted in Chapters three and four, the fit of the model was compared to the null model using a likelihood ratio chi-square test. A significant result indicated that the model used is a better fit of the data than an empty model with no predictors (U.C.L.A Statistical Consulting Group: STATA data analysis using examples: Logistic regression). The receiver operating characteristic (ROC) curve is a tool for diagnostic test evaluations and was also applied to all models. The ROC curve indicates the performance (sensitivity and specificity) of a binary classifier system and results in a number between zero and one, with higher values indicating better classification. For analyses in the current study, it was also of interest to test how the model was strengthened by the addition

of sensation seeking and inhibitory control to the models. To test their impact on the overall model, likelihood ratio tests were conducted that compared the nested model with the model without the variables.

#### *3.2.4 Missing outcome information*

The nature of missing ALSPAC data were explored in order to determine if multiple imputation (discussed in detail in Chapter two) could be applied to the data. To do this, it was tested whether measures used in the models predicted the presence of outcome data. This was tested among the individuals in ALSPAC that were eligible to participate at data collection time points when outcome variables were measured. Those who had outcome information were identified among those who were eligible to participate in childhood (questionnaire KW) and adolescence (clinic TF3). Univariate logistic regressions were then used to test if measures predicted the presence of outcome variables in the respective eligible samples (see Table B1 and Table B2 in Appendix B for details of these results).

Measures used in the models during childhood and adolescence were found to predict those who had missing outcome information and therefore exclusion from the analyses. In childhood, those who came from households with lower incomes, had high sensation seeking scores and were of lower social class were less likely to have outcome information on OA participation at 11 years of age. Individuals who were white, had a greater number of adults in their household, had higher IQ and had participated previously in OAs at eight years of age were more likely to have reported outcome information about OA participation in childhood.

In adolescence, individuals who were older, from households of lower income as well as lower social class were less likely to have outcome information

about OA participation. Participants who were white, female, had more adults in the household, previously participated in OAs at 11 years of age, and had higher IQ, were more likely to have outcome information about OA participation in adolescence. Unlike outcome information in childhood, sensation seeking did not predict outcome information in adolescence.

Participation in OAs was measured twice in both models (as a predictor and as an outcome). Participation in OAs at eight years of age predicted whether or not participants had outcome information at 11 years of age. OA participation at 11 years of age also predicted whether participants had outcome information at 15 years of age. Missing data were therefore associated with participation in OAs and not at random. Multiple imputation was not used, and the sample represented in analyses is different from the sample who have outcome information but were not included in analyses.

### *3.2.5 Sample characteristics*

Table 3.1 and 3.2 below shows how participants in analyses differed from participants not included in analyses on demographic information. Table 3.1 compares participants in the ALSPAC sample to those with outcome information at 11 years of age and participants included in analyses at 11 years of age. Table 3.2 compares participants in the ALSPAC sample to those with outcome information at 15 years of age and those included in analyses at 15 years of age.

*Table 3.1 Sample characteristics of ALSPAC sample, participants with an outcome measure and participants included in analyses at 11 years of age*

Measure	ALSPAC		Age 11 Outcome <sup>a</sup>		Age 11 Analyses <sup>b</sup>	
	N	M (SD)	N	M (SD)	N	M (SD)
Age (years)	7157	11.7 (0.1)	6415	11.7 (0.1)	2557	11.7 (0.1)
	N	%	N	%	N	%
Gender						
Male	7319	51.7	3257	50.8	1236	48.3
Female	6829	48.3	3158	49.2	1321	51.7
Ethnicity						
White	11,543	95.0	5933	96.5	2497	97.6
Other	613	5.0	217	3.5	60	2.4
Mother's Social Class						
I Professional	597	5.9	391	7.3	220	8.6
II Managerial	3185	31.5	1854	34.4	913	35.7
III Skilled Non Manual	4329	42.8	2262	41.9	1083	42.3
III skilled Manual	791	7.8	351	6.5	150	5.9
IV / V unskilled	1219	12.0	535	9.9	191	7.5
Weekly income						
<£199	787	11.5	516	10.2	164	6.4
£200-£299	1140	16.6	792	15.7	351	13.7
£300-£399	1453	21.1	1061	21.1	539	21.1
£400+	3510	50.9	2668	52.0	1503	58.8
Adults in household						
1	863	11.2	597	10.3	197	7.7
2	6433	83.5	4881	84.5	2248	87.9
3+	413	5.4	298	5.2	112	4.4

<sup>a</sup>Participants with OA participation outcome information age 11 <sup>b</sup> Participants included in analyses at age 11

*Table 3.2 Sample characteristics of ALSPAC sample, participants with an outcome measure and participants included in analyses at 15 years of age.*

Measure	ALSPAC		Age 15 Outcome <sup>a</sup>		Age 15 Analyses <sup>b</sup>	
	N	M (SD)	N	M (SD)	N	M (SD)
Age (years)	7157	11.7 (0.1)	5135	15.5 (0.3)	2147	15.4 (0.2)
	N	%	N	%	N	%
Gender						
Male	7319	51.7	2429	47.3	1029	47.9
Female	6829	48.3	2706	52.7	1118	52.1
Ethnicity						
White	11,543	95.0	4697	95.9	2088	97.2
Other	613	5.0	201	4.1	59	2.8
Mother's Social Class						
I Professional	597	5.9	337	7.7	191	8.9
II Managerial	3185	31.5	1586	36.3	810	37.7
III Skilled Non Manual	4329	42.8	1786	40.8	872	40.6
III skilled Manual	791	7.8	280	6.4	107	5.0
IV / V unskilled	1219	12.0	385	8.8	167	7.8
Weekly income						
<£199	787	11.5	342	8.7	129	6.0
£200-£299	1140	16.6	599	15.2	288	13.4
£300-£399	1453	21.1	798	20.2	431	20.1
£400+	3510	50.9	2207	55.9	1299	60.5
Adults in household						
1	863	11.2	416	9.3	164	7.6
2	6433	83.5	3821	85.7	1889	88.0
3+	413	5.4	222	5.0	94	4.4

<sup>a</sup>Participants with OA participation outcome information at age 15 <sup>b</sup>Participants included in analyses at age 15

It was tested whether or not measures used in the model predicted inclusion in analyses for those who had outcome data<sup>1</sup>. For each measure in the model a univariate logistic regression was used to test whether measures predicted inclusion or exclusion in the analyses (see Table B3 in Appendix B for details of these analyses when childhood outcomes were investigated).

<sup>1</sup> Participants who had an outcome variable were not included in analyses if they had any missing information on any of the measures used in the model.

It was found that demographic information predicted inclusion in analyses for those who had information on childhood outcomes. Participants were more likely to be included in analyses if they were female, white and had a higher number of adults in the household. Participants whose mothers were of lower social class were less likely to be included in the analyses compared to participants whose mothers were of highest social class. Similar differences were found with income. Participants with lower household incomes were less likely to be included in analyses than participants who came from households that earned £400+/week. Participants who were older were also less likely to be included in analyses during childhood.

Logistic regressions were also used to test if measures predicted inclusion in analyses for those who had outcome information during adolescence. Each measure in the model was tested using a univariate logistic regression to predict inclusion in analyses (see Table B4 in Appendix B for details of these results).

Similar differences in adolescence were found for demographic information. Those who were white were more likely to be included in analyses in adolescence while older adolescents were less likely to be included. Participants whose mothers were from the highest social class (i professional) were more likely to be included in analyses than those from lower social classes. Similar relationships existed with income. Participants who came from families who earned less than £400/week were less likely than those who came from household that earned at least £400/week to be included in analyses during adolescence.

### 3.3 Results

Before the results of the main analyses are presented, a description of the psychological characteristics and OA participation rates among those who are included in analyses and those who are not included in analyses are presented.

#### 3.3.1 Psychological measures

Table 3.3 below shows the distribution of psychological measures used in analyses. These are displayed for the entire ALSPAC sample, those who have outcome data as well as those who are represented in the analyses. The sample included in analyses during childhood differed from those not included in the analyses on these measures. Univariate logistic regressions showed that those who had higher IQ were more likely to be included in childhood-based analyses while those with conduct problems and low inhibitory control were less likely to be represented in these analyses. In adolescence those who had higher IQ were also more likely to be included in analyses. In contrast to the sample represented in childhood analyses, participants in analyses during adolescence did not differ on conduct problems, sensation seeking or inhibitory control (details of these analyses can be found in Appendix B).

Correlation analyses of psychological variables of those included in analyses demonstrated that conduct problems were moderately associated with sensation seeking ( $r_s^2 = .107, p < .001$ ) and IQ ( $r_s = -.102, p < .001$ ) during childhood. Low inhibitory control during childhood was associated with IQ in adolescence ( $r_s = -.049, p = .023$ ) and conduct problems in adolescence was associated with sensation seeking ( $r_s = .256, p < .001$ ) as well as IQ ( $r_s = -.060, p = .006$ ) in adolescence (see Table C1 in Appendix C for a correlation table of measures used in the models).

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<sup>2</sup> Unless otherwise stated, all correlations represent Spearman's rank correlation



*Table 3.3 Description of psychological variables in entire ASLPAC sample, participants with an outcome variable and participants included analyses*

Measure	ALSPAC sample		Outcome		Analysis	
	N	M (SD)	N	M (SD)	N	M (SD)
Childhood						
IQ	7044	104.2 (16.5)	4985	105.5 (16.2)	2557	107.4 (15.6)
Sensation seeking 11	6644	25.9 (4.3)	5044	25.8 (4.3)	2557	25.7 (4.3)
	N	%	N	%	N	%
Inhibitory control						
High	6044	90.9	4451	91.1	2347	91.8
Low	603	9.1	430	8.9	210	8.2
Conduct problems						
No	6520	92.6	5887	92.7	2402	93.9
Yes	521	7.4	465	7.3	155	6.1
Adolescence	N	M (SD)	N	M (SD)	N	M (SD)
IQ	4720	92.0 (13.0)	4700	92.0 (13.0)	2147	93.8 (12.5)
Sensation seeking 13	5626	26.3 (4.6)	4454	26.3 (4.6)	2147	26.3 (4.6)
	N	%	N	%	N	%
Inhibitory control						
High	6044	90.9	4012	91.4	1966	91.6
Low	603	9.1	379	8.6	181	8.4
Antisocial behaviour						
Yes	2557	49.9	2555	50.0	1058	49.3
No	2563	50.1	2560	50.0	1089	50.7

### 3.3.2 Organised activity participation

Table 3.4 below displays patterns of OA participation at eight, 11 and 15 years of age for the entire sample and those included in analyses. For those with outcome information, no participation in any OA increased slightly from 20.3% at eight years of age to 22.8% at 11 years of age. Sport in childhood had the highest participation rates compared to other activities with 62.1% of participants at age 8 and 65.5% of participants at age 11 reporting participation in sport classes. At age eight participation in both special groups and sports was the most frequent form of participation while at age 11 participation rates in special groups decreased and sport

was the most frequent type of participation. At eight years of age, 95.4% of those who participated in a special group participated at least once a week. Of those who participated in a sport, 95% reported participating at least once a week. At 11 years of age, 94.2% of those who participated in sport attended at least once a week while 87.9% participated in special groups at least once a week. In adolescence 50.9% reported no participation in any OA during the evenings or weekends and 41.7% of participants reported participation in an activity at least once a week. Sport had also the highest participation rate with 33.3% of adolescents attending a sport in the evenings of weekends. Those who did participate in an activity reported participation in 1.7 different types of activities on average ( $SD = 0.88$ ,  $min = 1$ ,  $max = 6$ ).

In table 3.4 it can be seen how distribution in OA participation changes between those with outcome information and those represented in analyses. The percentage of those who did not participate in OAs at age eight decreased from 20.3% to 14% and 22.8% to 17.6% at 11 years of age. Those who participated in both sports and special groups increased from 37.5% to 44.2% at eight years of age and 29.4% to 33.1% at 11 years of age. The magnitude of these differences was not as evident at 15 years of age.

Table 3.4 Participation in organised activities at 8, 11 and 15 years of age

Age (years)	Measure	Total		Analyses	
		N	%	N	%
8	OA Participation <sup>a</sup>				
	No Participation	1489	20.3	359	14.0
	Sport classes only	1802	24.6	597	23.4
	Special groups only	1297	17.7	470	18.4
	Both sport and special groups	2747	37.5	1131	44.2
11	OA Participation <sup>a</sup>				
	No participation	1460	22.8	451	17.6
	Sport classes only	2313	36.1	958	37.5
	Special groups only	759	11.8	301	11.8
	Both sport and special groups	1883	29.4	847	33.1
15	Participation in a sport centre/ group/youth club				
	Yes	2523	49.1	1106	51.5
	No	2612	50.9	1041	48.5
	Frequency of participation				
	Never/rarely	2612	50.9	1041	48.5
	Less than once a week	380	7.4	159	7.4
	At least once a week	1649	32.1	724	33.7
	Most evenings	493	9.6	223	10.4
	Participation in sport				
	Yes	1708	33.3	761	35.4
	No	3427	66.7	1386	64.6
	Participation in dance				
	Yes	601	11.7	257	12.0
	No	4534	88.3	1890	88.0
	Participation in youth club				
	Yes	874	17.0	358	16.7
	No	4261	83.0	1789	83.3
	Participation in music				
	Yes	330	93.6	160	7.5
	No	4805	6.4	1987	92.6
	Participation in drama club				
	Yes	301	5.9	135	6.3
No	4834	94.1	2012	93.7	
Participation in other					
Yes	522	10.2	231	10.8	
No	4613	89.8	1916	89.2	
Breadth <sup>b</sup>					
0	2612	50.9	1041	48.5	
1	1248	24.3	546	25.5	
2	851	16.6	374	17.4	
3+	417	8.1	184	8.6	

<sup>a</sup> representative of participations who provided information on both sports and special groups.

<sup>b</sup> seven participants did not specify activity type, therefore this number is lower.

### 3.3.3 *Predictors of organised activity participation in childhood*

The first analysis predicted the likelihood of participation in any activity. The model fit was significantly better than the null ( $\chi^2 (16) = 229.4, p < .001$ ) and had an area under the ROC curve of .72. The second analysis predicted participation in a sport class compared to those who did not participate in any OA. The model fit was significantly better than the null model ( $\chi^2 (16) = 237.2, p < .001$ ) and had an area under the ROC curve of .73. The final analysis predicted participation in special groups compared to those who did not participate in any OA. Similarly this model fit the data significantly better than the null model ( $\chi^2 (16) = 182.5, p < .001$ ) and had an area under the ROC curve of .73. Table 3.5 presents the results from these analyses.

Those who participated in any activity at age eight were more likely to participate in any activity, a sport and a special group at 11 years of age. Participants who came from households that earned £200-£299 a week were less likely than those who earned £400 a week to participate in any activity, a sport and a special group. Participants who came from households which earned less than £199 a week were also significantly less likely to participate in sports. Older participants were only significantly less likely to participate in special groups.

Individual-level measures also predicted forms of participation in childhood. Participants with higher estimated IQ and sensation seeking scores were more likely to participate in any activity, sports and special groups. Participants who had conduct problems and low inhibitory control were less likely to participate in a sport.

Likelihood ratio tests were conducted for all analyses to test whether adding sensation seeking and inhibitory control to the model improved model fit. The addition of these variables significantly improved the model when predicting any participation ( $\chi^2 (2) = 13.4, p = .001$ ), participation in sports ( $\chi^2 (2) = 17.0, p < .001$ ) and participation in special groups ( $\chi^2 (2) = 9.8, p = .007$ ).

#### *3.3.4 Predictors of organised activity participation in adolescence*

Logistic regressions tested whether measures predicted OA participation during adolescence. The first model predicted participation in any activity compared to no participation. The model fit was significantly better than the null model ( $\chi^2 (16) = 122.9, p < .001$ ) and yielded an area under the ROC curve of .63. The second model predicted sport participation compared to those who did not participate in any activity. This model also significantly fitted the data better than the null model ( $\chi^2 (16) = 134.9, p < .001$ ) and yielded an area under the ROC curve of .66. The final analysis predicted breadth of participation and was found to fit the data significantly better than the null model ( $\chi^2 (16) = 145.4, p < .001$ ). Results from these analyses can be seen in table 3.6.

Older adolescents and those who participated in an activity at age 11 years were more likely to participate in any activity, a sport and participate in a greater breadth of activities in adolescence. While females were less likely to participate in a sport, they were more likely to report greater breadth of participation. Those who came from households that earned less than £199 a week were less likely than those earning £400 a week to participate in sports and participate in a greater breadth of activities.

Participants with higher estimated IQ were more likely to participate in any activity, a sport and a greater breadth of OAs. Those who had higher sensation seeking scores were more likely to participate in a sport and report greater breadth. Participants with conduct problems were less likely to report participation in a sport only. Inhibitory control was not found to predict OA participation in adolescence.

Likelihood ratio tests were conducted on all analyses investigating adolescent outcomes to determine whether sensation seeking and inhibitory control improved model fit. The addition of these variables significantly improved the model when predicting sport participation in adolescence ( $\chi^2 (2) = 6.7, p = .267$ ), however, it did not improve the model when predicting any participation ( $\chi^2 (2) = 2.6, p = .036$ ) or breadth of participation ( $\chi^2 (2) = 4.3, p = .118$ ) in adolescence.

Table 3.5 Odd ratios and 95% confidence intervals for the measures used to predict participation patterns in childhood

Measures	Participation Patterns								
	Any activity <sup>a</sup>			Sport <sup>b</sup>			Special group <sup>c</sup>		
	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Previous participation	4.64	[3.60, 5.99]	<.001	5.10	[3.89, 6.67]	<.001	5.48	[4.01, 7.49]	<.001
Age	0.70	[0.26, 1.89]	.481	0.69	[0.26, 1.84]	.423	0.29	[0.09, 0.93]	.038
Female	1.04	[0.83, 1.31]	.718	1.01	[0.80, 1.27]	.945	1.13	[0.89, 1.45]	.322
White	1.39	[0.69, 2.84]	.359	1.29	[0.62, 2.67]	.499	2.06	[0.87, 4.85]	.099
Mother's social class (I)									
II	1.28	[0.82, 1.98]	.276	1.26	[0.81, 1.97]	.307	1.37	[0.86, 2.19]	.180
III (non-manual)	0.95	[0.62, 1.47]	.821	0.88	[0.57, 1.37]	.581	1.03	[0.65, 1.63]	.903
III (manual)	0.95	[0.52, 1.74]	.862	0.84	[0.45, 1.56]	.585	0.98	[0.51, 1.88]	.957
IV & V	1.02	[0.58, 1.80]	.939	1.01	[0.56, 1.83]	.969	0.93	[0.51, 1.70]	.823
Weekly income (£400+)									
<£199	0.69	[0.44, 0.11]	.107	0.61	[0.38, 0.99]	.044	0.92	[0.56, 1.50]	.741
£200-£299	0.55	[0.40, 0.76]	<.001	0.55	[0.39, 0.76]	<.001	0.58	[0.41, 0.83]	.002
£300-£399	0.81	[0.61, 1.07]	.145	0.78	[0.58, 1.04]	.089	0.88	[0.65, 1.20]	.431
Adults in household	1.14	[0.80, 1.63]	.458	1.27	[0.87, 1.84]	.216	1.19	[0.82, 1.75]	.362
Estimated IQ	1.01	[1.004, 1.02]	.001	1.01	[1.01, 1.02]	.001	1.01	[1.01, 1.02]	<.001
Conduct problems	0.70	[0.45, 1.09]	.117	0.56	[0.35, 0.90]	.015	0.84	[0.52, 1.37]	.494
Sensation seeking	1.04	[1.02, 1.07]	.002	1.05	[1.02, 1.08]	.001	1.04	[1.01, 1.07]	.003
Low inhibitory control	0.69	[0.48, 1.01]	.053	0.63	[0.43, .923]	.018	0.79	[0.52, 1.18]	.248

<sup>a</sup> n = 2557 <sup>b</sup> n = 2256 <sup>c</sup> n = 1599

Table 3.6 Odd ratios and 95% confidence intervals for the measures used to predict participation patterns in adolescence

Measures	Participation Patterns								
	Any activity <sup>a</sup>			Sport <sup>b</sup>			Breadth <sup>c</sup>		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Participation at age 11	3.15	[2.43, 4.08]	<.001	4.24	[3.05, 5.90]	<.001	3.31	[2.57, 4.26]	<.001
Age	0.64	[0.44, 0.93]	.018	0.62	[0.41, 0.94]	.025	0.68	[0.48, 0.97]	.032
Female	1.04	[0.86, 1.25]	.693	0.80	[0.65, 0.80]	.031	1.31	[1.10, 1.55]	.002
White	1.40	[0.83, 2.37]	.211	1.09	[0.62, 1.92]	.770	1.32	[0.79, 2.21]	.289
Mother's social class (I)									
II	1.16	[0.84, 1.62]	.370	1.21	[0.84, 1.75]	.305	1.17	[0.86, 1.59]	.325
III (non-manual)	1.17	[0.83, 1.64]	.362	1.15	[0.79, 1.68]	.467	1.07	[0.79, 1.46]	.664
III (manual)	1.09	[0.66, 1.81]	.738	1.07	[0.60, 1.90]	.814	1.05	[0.64, 1.71]	.849
IV & V	0.83	[0.52, 1.31]	.425	0.83	[0.49, 1.40]	.483	.903	[0.56, 1.44]	.670
Weekly income (£400+)									
<£199	0.70	[0.46, 1.05]	.085	0.50	[0.30, 0.84]	.008	.667	[0.45, 0.98]	.041
£200-£299	0.85	[0.64, 1.12]	.240	0.75	[0.54, 1.04]	.085	.865	[0.66, 1.13]	.284
£300-£399	0.98	[0.77, 1.23]	.845	0.92	[0.71, 1.19]	.512	.963	[0.78, 1.19]	.724
Adults in household	1.27	[0.98, 1.66]	.071	1.30	[0.98, 1.72]	.073	1.27	[0.99, 1.63]	.062
Estimated IQ	1.01	[1.003, 1.02]	.004	1.01	[1.002, 1.02]	.013	1.01	[1.004, 1.02]	.001
Conduct problems	0.85	[0.71, 1.02]	.080	0.79	[0.64, 0.97]	.022	.898	[0.76, 1.06]	.208
Sensation seeking	1.02	[0.996, 1.04]	.115	1.03	[1.01, 1.05]	.011	1.02	[1.0004, 1.04]	.045
Low inhibitory control	0.94	[0.69, 1.28]	.692	0.93	[0.65, 1.33]	.693	1.00	[0.74, 1.35]	.999

<sup>a</sup>n = 2147 <sup>b</sup>n = 1802 <sup>c</sup>n = 2145



### 3.4 *General discussion*

This study investigated OA participation rates and individual-level predictors of OA participation among young people using a British longitudinal cohort. Similar to North American studies, 14-17% of participants did not participate in OAs during childhood and during adolescence nearly half of participants did not participate in an OA on the evening or weekends<sup>3</sup>. Engagement in sports was the most common type of OA reported during childhood and adolescence. When investigating predictors of OA participation, low inhibitory control was found to predict less participation in sports only during childhood. Greater sensation seeking predicted involvement on all OA outcomes during childhood as well as participation in sports and greater breadth during adolescence. In both childhood and adolescence, those with conduct problems were less likely to participate in sports and previous participation was the strongest predictor of OA participation.

In contrast to participation in sports during childhood, children with low inhibitory control were not less likely to participate in special groups or clubs, showing these activities may be more inclusive than sports. Compared to other types of activities, sports may be less inclusive because of the perceived popularity and demand for skilled individuals (Johnson & Rosen, 2000). It is unclear if associations with motor development or the context of sports participation (such as rules, delivery or availability), leads to less sports participation among young people with inhibitory control difficulties. These findings have implications for children's access to OAs and the issue of disability in sports. According to the World Health Organisation, a

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<sup>3</sup> No participation in adolescence is more than what has been observed in North American studies. This may be due to the fact that participation in adolescence was restricted to the evening and weekends and might not have included OAs affiliated with schools, such as after school activities or OAs that occurred in other contexts than those specified in the questionnaire.

disability encompasses “impairments, activity limitations and participation restrictions” from the interaction between the individual’s body and their environment (WHO, 2012). Although disability in sports is normally thought of as physical in nature, inhibitory control difficulties may impact elements of sports performance and therefore present as a form of a disability.

A recurrent finding in this study showed previous participation predicted later OA participation, and highlights the need for early intervention to engage children in OAs to support long-term engagement and outcomes. The benefits from OA participation may be particularly notable for those who are worse off or disadvantaged (Diamond & Lee, 2011; Hallingberg, Moore, Morgan, Bowen, & Van Goozen, 2014; Mahoney, 2000; Mahoney & Cairns, 1997). It is therefore paramount to ensure opportunities to pursue OAs are available during childhood and adolescence because they offer unique learning environments (Larson, 2000), support the development of a range of skills, facilitate community engagement, provide a sense of belonging to a group, increase social networks (Eccles et al., 2003) and can address the risk factors related to youth crime (Parker et al., 2013).

In comparison to demographic factors such as mother’s social class, adults in the household, ethnicity and gender; individual-level factors were consistently found to predict childhood OA participation and significantly improved the models used to predict OA participation during childhood, confirming the importance of these characteristics during this time. Although investment in social programmes could alleviate economic and similar barriers to OA participation, it is uncertain whether it can address why young people with low inhibitory control and conduct problems are less likely to participate in OAs. This supports the use of an ecological framework to

address barriers to OA participation whereby multiple layers are targeted for intervention, rather than simply targeting one factor at one level (Eime, Young, Harvey, Charity, & Payne, 2013; McLeroy et al., 1988; Vella, Cliff, & Okely, 2014).

This study identifies the individual-level factors that could be targeted to increase OA participation and therefore the prevalence of positive outcomes that engagement offers, such as diversion away from more harmful risky activities. Sports are currently used as diversionary activities and are viewed as socially-acceptable forms of risk taking, yet young people with challenging behaviour or those who are socially excluded, such as young offenders, can be denied access to these sources of enjoyment (Kelly, 2012). Participation in sports may impact forms of executive functioning through exercise as well as character development (Diamond & Lee, 2011) and it has been suggested that specific types of OAs can be used as a clinical intervention for those who have inhibitory control difficulties (Wang et al., 2013). Although it is unclear whether inhibitory control improvement from sports alone could influence risk-taking behaviours in adolescence, it may act as an additional mechanisms in conjunction with the other channels outlined by Eccles et al. (2003) and Wichstrøm & Wichstrøm (2009).

The results of the current study also support patterns of OA participation found in other populations. Females were more likely to participate in a variety of activities (Denault & Poulin, 2009; Fredricks & Eccles, 2006a) and less likely to participate in sports during adolescence (Darling, 2005; Denault et al., 2009; Moore & Werch, 2005; Pate et al., 2000). In contrast to previous studies ethnicity was not found to predict participation (Coughlan et al., 2014) but this may be due to a small percentage of non-white participants in the sample.

Finally, these results highlight sensation seeking and inhibitory control as possible self-selection factors (Fredricks & Eccles, 2006b; Larson, 2000). These are variables that can mediate the relationship between OA participation and associated risk taking behaviour such as alcohol use. Although sensation seeking has been shown to predict participation in certain types of sports, this study uniquely assessed sensation seeking as a predictor of several different forms of OA participation, not sports alone. Future studies should control for sensation seeking when investigating the relationship between OA participation and associated risk taking behaviours. Measures of sensation seeking that do not contain items of norm-breaking behaviour, such as alcohol use, would be best suited for this purpose. Although constructs similar to sensation seeking have been previously acknowledged as self-selection factors (Larson, 2000; Peck et al., 2008; Peretti-Watel, 2009), inhibitory control has not. If an association is found between non-participation and the presence of risk-taking behaviours, inhibitory control might act inversely as a self-selection factor because it is associated with *less* OA participation during childhood.

#### *3.4.1.1 Strengths and limitations*

This study was able to use a large dataset to examine predictors of OA participation. In contrast to previous studies, IQ and inhibitory control were measured using validated behavioural tasks. A range of demographic information important for OA participation was also controlled for. Despite these advantages, this study possessed several limitations. The longitudinal dataset contained numerous points of missing information. Multiple imputation was not used because it was determined that information related to OA participation was not missing at random. As such, the sample was limited to participants with complete information and is less

representative of those with lower household income, lower social class as well as ethnic minorities. As this is an observational study, other confounding variables may explain relationships observed. Experimental studies or interventions are needed to confirm these findings. Although several of the psychological measures of interest were correlated, they varied in their association with different OA participation patterns suggesting independent relationships.

OA participation was also measured differently during childhood and adolescence making comparisons between these time points more difficult. Participation in adolescence was specific to evenings and weekends while childhood measures of participation were not. The context of where OAs took place was also not known. OA participation may be facilitated by schools and other organisations and they may vary in how they support engagement (Power et al., 2009; Taylor et al., 2009). For reasons described in Chapter three, school-level information could not be included in the models.

Another limitation to this study was the broad measure of sports and other OAs. It is not clear if those with inhibitory control and conduct problems would be less likely to participate in specific sports more so than others, such as individual sports rather than team sports. Other dimensions of participation, such as duration and frequency, may be important for associated developmental or behavioural outcomes (Bohnert et al., 2010). Although an element of duration was captured in models by accounting for previous participation, consistent and regular markers of participation across childhood and adolescence was not measured. Most participants who participated in activities during childhood reported regular participation and

attended at least once a week. Frequency of participation in specific activities during adolescence was not measured and is therefore not reported.

Finally, inhibitory control was only measured during childhood. At this early time point it may have been a weak indicator of inhibitory control important for adolescent OA participation in adolescence because it associated with white matter development (Liston et al., 2006), increases linearly with age (Casey et al., 2011; Steinberg, 2010) and self-control is malleable (Piquero, Jennings, & Farrington, 2010).

The finding that psychological factors associated with risk-taking behaviour are strong predictors of OA participation has important implications. At the individual level, certain characteristics (such as high sensation seeking) may lead young people to seek out specific types of activities; however, characteristics (such as inhibitory control) may also make it more difficult for them to participate. These findings add to the debate whether sports and other activities, are indeed “free for all” (Hartmann & Kwauk, 2011; Kelly, 2011) and whether children are being excluded or exclude themselves from OA participation because of their individual characteristics. This study also supports the inclusion of psychological variables to be controlled for in studies that examine the relationship between risk taking behaviours and OA participation.

## **4 Participation in organised activities and relationships with adolescent alcohol use**

This chapter presents findings from a longitudinal study using data from ALSPAC. It aims to investigate the relationship between adolescent alcohol use and OA participation among British adolescents. In contrast to previous studies, the impact of sensation seeking on these relationships is assessed.

#### *4.1 Introduction*

There is considerable debate surrounding the relationship between OA participation and adolescent alcohol use due to a variety of mixed findings on these relationships (Darling, 2005; Elder et al., 2000). Sports participation has been the most heavily studied OA participation type in relation to alcohol use. Conflicting results have shown more consumption among sport participants (Hoffmann, 2006; McCaul et al., 2004), less alcohol consumption among sport participants (Fredricks & Eccles, 2006a, 2006b) and no differences on alcohol consumption between sports participants and non-sport participants (Crosnoe, 2002; Ferron et al., 1999; Fredricks & Eccles, 2006a; Pate et al., 2000). Sport participation in childhood and adolescence has been associated with less alcohol use in childhood and early adolescence (Hellandsjø Bu et al., 2002; Mays & Thompson, 2009; Wichstrøm & Wichstrøm, 2009) but with increases in alcohol use overtime during mid-adolescence and early adulthood (Barber et al., 2001; Denault et al., 2009; Eccles & Barber, 1999; Fredricks & Eccles, 2006b; Wichstrøm & Wichstrøm, 2009).

In all of these studies, those who participated in a sport (or another type of OA) were compared to all other participants, or “everyone else”. This comparison group would have therefore included those who participate in other types of OAs other than the one investigated, as well as those who participate in no OAs. Bohnert et al (2010) highlighted the need to move away from dichotomising participation and



treating it as “all-or-nothing” (p. 577). Gardner et al. (2009) also highlighted that “...few studies have explicitly considered the heterogeneity of youth who do not participate in sports... This is problematic given that research consistently finds differences between these two groups.” (p. 342). Gardner et al. (2009) explained this importance based on the observation that those who participate in OAs usually demonstrate less risky behaviour than those in no OAs (Feldman & Matjasko, 2005; Mahoney et al., 2006).

Analyses in Chapter four show how individual-level factors may relate to these types of OA participation as described by Gardner et al. (2009). For example, sensation seeking was found to be an important determinant of sport participation during childhood and adolescence and inhibitory control predicted less participation in sports during childhood. This finding has important theoretical and methodological implications for studies that investigate the relationship between OA participation and alcohol use. Understanding the impact of individual-level factors may help explain if observed relationships between alcohol use and OA participation stem from OA participation per se, or are due to pre-existing individual characteristics of those who choose to participate in OAs. As highlighted by Kwan et al. (2014), previous studies have not investigated moderating effects of psychosocial factors on these relationships. Disentangling these relationships can help inform the development of interventions that aim to address adolescent alcohol use either through OAs or OA-related contexts.

#### *4.1.1 Self-selection factors*

Self-selection factors are variables which may explain observed relationships between OA participation and outcomes (Fredricks & Eccles, 2006b; Larson, 2000).

Regarding individual-level factors and alcohol use outcomes, Peck et al. (2008) stated “there are a variety of factors characterizing youth who participate in sports that may influence alcohol use, including personal factors (e.g. temperament and identity) involved with choosing to participate in specific kinds of activities...” (p. 70). Perreti-Watel (2009) pointed to the role of sensation seeking as a self-selection factor, stating the relationship between sports and drug use may be “impelled by similar motives or values. For example, both activities may reveal similar impulses to sensation seeking, the search for thrill, vertigo or ‘flow’.” (p. 150).

Sensation seeking is described as a personality trait associated with “the need for varied, novel and complex sensations and experiences” (Zuckerman, 1979, p. 10). Greater sensation seeking predicts participation in extreme sports (Cazenave et al., 2007; D’Silva et al., 2001; Zuckerman, 1994), other less-risky activities such as chess (Joireman et al., 2002) as well as the number of activities participated in (D’Silva et al., 2001). Greater sensation seeking is also associated with increases in adolescent alcohol use (MacPherson et al., 2010; Martin et al., 2002; Quinn & Harden, 2013).

The role of sensation seeking on the relationship between sports participation and alcohol use has not yet been investigated. In their longitudinal study, Wichstrøm & Wichstrøm (2009) investigated the relationship between participation in sports and alcohol use. Pubertal timing, which is associated with sensation seeking (Martin et al., 2002), was controlled for in analyses; however, their study only compared alcohol use among those who participated in different sport types and did not include those who participated in other OAs or no OAs.

Failing to control for self-selection factors such as sensation-seeking, might overstate the relationship between OA participation and alcohol use since sensation seeking is a well-established predictor of both measures. OA participation type and its relationship with alcohol use may also depend on levels of sensation seeking. Among those who participate in sports for example, adolescents with high sensation seeking may be more likely to report alcohol use than those with low sensation seeking. Participation in sports occupies free time and provides fewer windows of opportunity to engage in other forms of risky behaviour (Wichstrøm & Wichstrøm, 2009). Sports are often used in communities to divert young people from engaging in harmful activities, in part because sports can “create enjoyment and excitement, and thus provide an antidote to boredom” (Smith & Waddington, 2004, p. 284). From this perspective, participation is seen to displace other behaviours. Since sensation seeking increases during adolescence (MacPherson et al., 2010), adolescents with greater sensation seeking who participate in sports may be fulfilling their need for such experiences; however, individuals who are high sensation seekers but (for numerous reasons) do not participate in sports, may not have these needs met. High sensation seekers who do not participate in any OAs may therefore be more likely to engage in alcohol use during adolescence compared to adolescents with high sensation seeking who participate in sports.

#### *4.1.2 Confounding variables*

The relationship between OA participation and adolescent alcohol use cannot be viewed in isolation from other contextual factors. Only a limited number of studies have investigated the relationship between OA participation and alcohol use in

conjunction with established risk factors of alcohol use (Wichstrøm & Wichstrøm, 2009).

Peer alcohol use is a significant predictor of adolescent's alcohol use (Fergusson, Swain-Campbell, & Horwood, 2002) and the probability of a young person being introduced to alcohol through OA participation may correspond with the amount of alcohol use consumed by peers in OAs (Wichstrøm & Wichstrøm, 2009). Mays & Thompson et al. (2010) found that high school student's participation in different types of sports or level of participation did not predict alcohol use when perceived peer drinking was controlled for. Thorlindson and Bernburg (2006) investigated the relationship between different types of leisure activities and alcohol use, while controlling for peer alcohol use. Those who participated in sports and organised clubs were less likely to use alcohol, and that the impact of peer alcohol on these relationships was less among participants who had greater involvement in these activities.

Other studies have also controlled for family-level characteristics. A study of Norwegian adolescents found that participation in organised sports was associated with delayed alcohol use onset when controlling for family characteristics related to family control and organisation as well as friend's drinking frequency (Hellandsjø Bu et al., 2002). Mays, DePadilla, Thompson, Kushner & Windle (2010) found that North American high school students who participated in a sport showed greater increases in alcohol use during adolescence after controlling for perceived peer drinking and parental monitoring.

The relationship between OA participation and alcohol use may differ between populations and the nature and strength of this relationship among British

adolescents remains largely unknown. For example, OA participation may have little impact on adolescent alcohol use when applied to a more comprehensive approach. Including individual level variables in analyses can help define these relationships more accurately. If an OA participation type is found to predict alcohol use outcomes whilst controlling for the other factors, opportunities to intervene through OA participation in contexts in Britain can be identified and justified. These findings can help develop novel and theoretically robust interventions that take into account important variations at the individual level.

#### *4.1.3 The current study*

The current study used data from ALSPAC (see Chapter two for more information about this sample) and investigated whether OA participation during adolescence predicted patterns of alcohol use. OA participation in childhood and early adolescence has been associated with delayed alcohol use (Hellandsjø Bu et al., 2002; Mays & Thompson, 2009). For this reason, previous OA participation was also included in analyses. IQ, conduct disorder and inhibitory control were shown to predict sport participation in Chapter three and these measures were added as confounding variables to models along with parental supervision and perceived peer alcohol use. Baseline measures of alcohol use are important to include in models when investigating associated outcomes from OA participation (Fredricks & Eccles, 2006b), and were included. Participation in OAs has also been linked with unique drinking patterns such as drinking in early adolescence, recent alcohol use and repeated drunkenness (Mays & Thompson, 2009; Peretti-Watel et al., 2002). Therefore it was of interest to test if results were dependent on the type of alcohol use outcome reported.

It was hypothesised that participation in a sport would be associated with an increased likelihood of adolescent alcohol use compared to those who participated in no OAs and those who participate in other OAs. High sensation seekers in sports were hypothesised to be more likely to report alcohol use than low sensation seekers in sports. Finally, it was tested whether high sensation seekers in sports were more likely to report alcohol use than high sensation seekers in other OAs and no OAs.

## 4.2 *Method*

### 4.2.1 *Sample*

Similar to Chapter three, this study used data from ALSPAC, a longitudinal on-going study of 14,062 children born in the Bristol area between 1 April 1991 and 32 December 1992. Further details about the ALSPAC sample can be found in Chapter two.

### 4.2.2 *Measures*

#### 4.2.2.1 *Demographic information*

Age was reported when outcome variables on alcohol use were measured. This occurred at a mean age of 15.5 years (SD = 0.3) and 16.7 years (SD = 0.2). Dichotomous variables were used for gender (0 = male; 1 = female) and ethnicity (other = 0; white = 1). Mother's social class was measured by Registrar General Classification (Office of National Statistics, 1991) during pregnancy and categorised into six groups. For the analyses the two lowest groups were merged and this resulted in five categories: I (professional); II (managerial and technical); III (skilled manual); III (skilled non-manual); and IV (semiskilled and unskilled). Income was based on mother's reports of weekly household income. This was measured by four categories: <£199/week, £200-£299/week, £300-£399/week and £400+/week. Figures 4.1 – 4.3 below show the mean ages of participants when these measures were collected.

#### 4.2.2.2 *Alcohol use*

Alcohol use was measured at a mean age of 15.5 and 16.7 years by computer and paper-based questionnaires. In total, three dichotomous outcomes of alcohol use at

15.5 years of age and three dichotomous outcomes at 16.7 years of age were investigated.

The outcomes measured at 15.5 years of age indicated whether participants drank alcohol every week, consumed one full alcoholic drink in the past 30 days and whether participants consumed three or more drinks on a typical day when drinking. More details of these questionnaire items and how they were transformed to dichotomous outcomes are presented in Chapter two.

The dichotomous outcomes measured at 16.7 years of age indicated whether participants consumed one full alcoholic drink in the past 30 days, consumed three or more units on a typical day of drinking and whether participants consumed six or more units (heavy episodic drinking; WHO, 2014) on a monthly basis.

#### *4.2.2.3 Organised activity participation*

Participation in OAs was measured at a mean age of 15.5 and 16.7 years. At 15.5 years of age participants reported whether they attended youth clubs, groups, or sports centres on evenings or weekends. The frequency of participation in any activity (and not individual activities) was also measured and was recorded as: most evenings; once a week; less than once a week; or never/rarely. A mutually exclusive variable indicated whether or not they participated in an OA. Those who attended activities never/rarely were categorised as 'no OA'. Participants also reported whether they did the following activities in the evenings or on weekends: youth clubs, sports club/centre, dance (keep-fit/aerobics/dance class), music club/group, drama club, or other. Although participants indicated the activities they participated in, the frequency of attending specific activities was not. Based on these measures,



participants were grouped into three mutually exclusive groups; those who participated in a) a sport b) no OAs and c) other OAs.

At a mean age of 16.7 years of age participants were asked if they participated in the following activities outside of school: sports clubs/teams, school/student councils, breakfast clubs or after school club, holiday club or activities, computer clubs/groups, art/drama/dance/music clubs, groups or rehearsals, religious groups, scouts or guides, youth clubs, environmental club, games/hobbies clubs, volunteering or other. Participants were again grouped into three mutually exclusive groups; those who participated in a) a sport b) no OAs and c) other OAs.

#### *4.2.2.4 Covariates*

##### *4.2.2.4.1 Sensation seeking*

Sensation seeking was measured twice during adolescence, at a mean age of 13.7 and 16.7 years. At both time points the intensity subscale of the AISS was used (Arnett, 1994). Higher scores on this measure indicated greater sensation seeking. For follow-up analyses presented in the results, sensation seeking scores at age 16 years of age were dichotomised into high and low sensation seeking using a median split.

##### *4.2.2.4.2 Inhibitory control*

Inhibitory control was measured using the Stop Signal Task (Handley et al., 2004) at a mean age of 10.7 years. Performance on this task was measured as the number of correct trials inhibited when the stop signal occurred 150ms before the mean reaction time. The top 10% of participants who failed to inhibit their responses the most number of times were coded as low inhibitory control. This is similar to previous

studies that have used this measure in this cohort (Kothari et al., 2013). A dichotomous variable of high (0) and low (1) inhibitory control was used.

#### *4.2.2.4.3 Estimated IQ*

Estimated IQ was measured by the WASI (WASI; Wechsler, 1999) at a mean age of 15.5 years. This was based on a total score from the vocabulary and matrix reasoning subtests and scaled according to participant's age.

#### *4.2.2.4.4 Conduct problems*

At a mean age of 15.5 years, participants who reported engagement in at least one antisocial behaviour in the past year were categorised as having conduct problems (a full list of these behaviour items can be found in Appendix A). These items were taken from the Edinburgh Study of Youth Transitions in Crime (Smith & McVie, 2003) and have been used previously in this cohort (MacArthur et al., 2012). The presence of conduct problems was scored as 1 and no conduct problems was scored as 0.

#### *4.2.2.4.5 Parental supervision*

Parental supervision was measured at a mean age of 15.5 years via a computer-based questionnaire. Questions asked participants how often their parents knew who they were with, where they went, what they did and what time they would be back when they went out. These questions were also taken from the Edinburgh Study of Youth Transitions in Crime (Smith & McVie, 2003). Answers were measured on a likert scale using the following categories: "never; sometimes; usually; always". Each item was scored 0-4 and summed. Scores of 9-12 were categorised as high levels of parental supervision. A categorical variable was then created which compared lower levels of parental supervision (0) with high levels (1).

#### 4.2.2.4.6 *Peer alcohol use*

Peer alcohol use was measured at a mean age of 15.5 years via a computer-based questionnaire. Participants were asked how many of their friends drank alcohol in the past year. This was reported as three mutually exclusive categories: none; one or some; most or all. This was converted into a dichotomous variable with those reporting most or all of their friends drinking alcohol as 'high' levels of peer alcohol use.

#### 4.2.3 *Analytical approach*

Three models were used for the current analyses. Model A predicted alcohol use at 15 years of age and included OA participation measured at 15 years of age. Models B and C predicted alcohol use at 16 years of age; however, model B included OA participation measured at 15 years of age while Model C included OA participation measured at 16 years of age. Age, gender, ethnicity, social class, income, parental supervision, peer alcohol use, conduct problems, estimated IQ, inhibitory control, sensation seeking, previous alcohol use, previous OA participation and current OA participation were all used as predictors in each model. Logistic regressions were used to predict the dichotomous alcohol use outcomes. Figures 4.1 – 4.3 illustrate the predictors used in each model and the mean age in years when the measures were collected.

OA participation was included in the models as a categorical variable and contained three groups: participation in sports, no OAs and other OAs. This measure was added to the model as dummy variables to enable comparisons between groups. Those who participated in sports were entered as the reference category. Similar to analyses in chapter 3, those who participated in no OAs were compared to those who

participated in other OAs (rather than comparing those in sports to just “everyone else”). This method of approaching the data has previously been conducted and supported (Bohnert et al., 2010; Gardner et al., 2009). Categorical variables such as social class and income were also added as dummy variables with the highest income and highest social class added as the reference categories.

All models included peer alcohol use as a confounding variable; however, participation in OAs might also affect peer networks (Wichstrøm & Wichstrøm, 2009). If peer alcohol use mediates the relationship between participation and alcohol use, then including peer alcohol use in the model as a confounder may lead to over-adjustment and therefore under-estimate the relationship between OA participation and alcohol use outcomes. Sensitivity analyses were conducted by running all models without the inclusion of peer alcohol use as well. All analyses were carried out in STATA IC 11 software.

*Figure 4.1 Predictors in model A, age at data collection and dichotomous measures of alcohol use outcomes at 15.5 years of age*

<u>Predictors</u>	<u>Mean age (years)</u>	<u>Dichotomous Outcomes</u>
Age at outcome	15.5	Consumes Alcohol weekly (Yes/No)
Gender	Birth	
Ethnicity	Gestation	
Social class	Gestation	Consumed alcohol in past month (Yes/No)
Income	8.2	
Parental monitoring	15.5	
Peer alcohol use	15.5	Consumes at least 3 units on average when drinking (Yes/No)
Conduct problems	15.5	
Estimated IQ	15.5	
Inhibitory control	10.7	
Sensation seeking	13.9	
Previous alcohol use	13.9	
Previous Participation	11.7	
OA participation	15.5	

Figure 4.2 Predictors in model B, age at data collection and dichotomous measures of alcohol use outcomes at 16.7 years of age

<u>Predictors</u>	<u>Mean age (years)</u>		<u>Dichotomous Outcomes</u>
Age at outcome	16.7	}	Consumed alcohol in past month (Yes/No)
Gender	Birth		
Ethnicity	Gestation		
Social class	Gestation		Consumes at least 3 units on average when drinking (Yes/No)
Income	8.2		
Parental monitoring	15.5		
Peer alcohol use	15.5		
Conduct problems	15.5		
Estimated IQ	15.5		Consumes at least 6 units on monthly basis (Yes/No)
Inhibitory control	10.7		
Sensation seeking	16.7		
Previous alcohol use	13.9		
Previous participation	11.7		
OA participation	15.5		

Figure 4.3 Predictors in model C age at data collection and dichotomous measures of alcohol use outcomes at 16.7 years of age

<u>Predictors</u>	<u>Mean age (years)</u>		<u>Dichotomous Outcomes</u>
Age at outcome	16.7	}	Consumed alcohol in past month (Yes/No)
Gender	Birth		
Ethnicity	Gestation		
Social class	Gestation		Consumes at least 3 units on average when drinking (Yes/No)
Income	8.2		
Parental monitoring	15.5		
Peer alcohol use	15.5		
Conduct problems	15.5		
Estimated IQ	15.5		Consumes at least 6 units on monthly basis (Yes/No)
Inhibitory control	10.7		
Sensation seeking	16.7		
Previous alcohol use	13.9		
Previous participation	11.7		
OA participation	16.7		

#### 4.2.4 *Missing outcome information*

The ALSPAC data were explored to determine if missing data were missing at random and if multiple imputation could be applied to the data (discussed in detail in Chapter two). This was conducted with the same procedures outlined in Chapter three. Those who reported information about alcohol use at 15 and 16 years of age were identified. Univariate logistic regressions tested whether measures included in the models predicted the presence of outcome data for individuals who were eligible to participate at these time points (see Table D1 and Table D2 in Appendix D for details of these results).

Measures used in the models were found to predict those who had missing outcome information. At 15 years of age, older participants were less likely to have outcome information, while individuals who were female, white, had higher IQ and participated in an OA at 11 years of age were more likely to have outcome information. Participants with mothers from the highest social class as well as those from households with the highest weekly income were also more likely to have outcome information.

Measures used in the models were also found to predict those who had missing outcome information at 16 years of age. Participants who were older, had conduct problems, reported alcohol use at 13 years of age and reported that most of their friends consumed alcohol were less likely to have outcome information. Participants with mothers from the highest social class as well as those from households with the highest weekly income were more likely to have outcome information, as were those who were female, white, had high parental supervision, higher IQ and participated in OAs at 11 years of age.

Missing outcome data on alcohol use were predicted by many sample characteristics as well as measures specific to the study investigation, such as OA participation and alcohol use. Missing data were therefore determined to be not missing at random and multiple imputation was not used. The sample represented in analyses is thus limited to participants that have complete information on all measures. Differences between those with outcome data who are represented in analyses and those who are not are discussed in the following section.

#### *4.2.5 Sample characteristics*

Table 4.1 below shows the sample characteristics for the entire ALSPAC sample, participants with outcome data at 15 years of age and participants represented in analyses that tested Model A (alcohol use at 15 years of age). For each measure in the model a univariate logistic regression was used to test whether measures predicted inclusion or exclusion in the analyses (see Table D3 in Appendix D for details of these results).

Demographic information predicted inclusion in analyses for those who had outcome information at 15 years of age. Participants were more likely to be included in analyses if they were white and were less likely to be included in analyses if they were older. Participants with mothers from a lower social class were less likely to be included in analyses compared to participants with mothers from the highest social class. Participants of lower household incomes were also less likely to be included in analyses than participants from households that earned £400+/week.

Table 4.2 shows the sample characteristics for the entire ALSPAC sample, those with outcome data at 16 years of age and participants represented in analyses that tested Model C (alcohol use at 16 years of age). For each measure in the model a

univariate logistic regression was used to test whether measures predicted inclusion or exclusion in the analyses (see Table D4 in Appendix D for detailed results of these analyses).

*Table 4.1 Sample characteristics for the ALSPAC sample, participants with an outcome measure and participants included in analyses at 15 years of age*

Measure	ALSPAC		Outcome <sup>a</sup>		Analyses <sup>b</sup>	
	n	M (SD)	n	M (SD)	n	M (SD)
TF3 Age (years)	5,247	15.5 (0.3)	5,100	15.5 (0.4)	2,316	15.4 (0.2)
CCS Age (years)	4,901	16.7 (0.2)	-	-	-	-
	n	%	n	%	n	%
Gender						
Male	7,319	51.7	2,383	46.7	1,102	47.6
Female	6,829	48.3	2,717	53.3	1,214	52.4
Ethnicity						
White	11,543	95.0	4,651	95.8	2,249	97.1
Other	613	5.0	203	4.2	67	2.9
Mother's Social Class						
I Professional	597	5.9	335	7.8	204	8.8
II Managerial	3,185	31.5	1,570	36.3	887	38.3
III Skilled Non Manual	4,329	42.8	1,764	40.8	936	40.4
III skilled Manual	791	7.8	276	6.4	118	5.1
IV / V unskilled	1,219	12.0	378	8.7	171	7.4
Weekly income						
<£199	787	11.4	348	8.9	145	6.3
£200-£299	1,140	16.6	586	15.0	308	13.3
£300-£399	1,453	21.1	786	20.1	461	19.9
£400+	3,510	50.9	2,182	55.9	1,402	60.5

<sup>a</sup> Participants with outcome information in model A <sup>b</sup> Participants included in analyses for model A



*Table 4.2 Sample characteristics for the ALSPAC sample, participants with an outcome measure and participants included in analyses at age 16 years of age*

Measure	ALSPAC		Age 16 Outcome <sup>c</sup>		Age 16 Analyses <sup>d</sup>	
	n	M (SD)	n	M (SD)	n	M (SD)
TF3 Age (years)	5,247	15.5 (0.3)	-	-	-	-
CCS Age (years)	4,901	16.7 (0.2)	4855	16.7 (0.2)	1624	16.7 (0.2)
	n	%	n	%	n	%
Gender						
Male	7,319	51.7	1,988	41.0	705	43.1
Female	6,829	48.3	2,867	59.0	919	56.6
Ethnicity						
White	11,543	95.0	4,181	96.1	1,581	97.4
Other	613	5.0	180	3.9	43	2.7
Mother's Social Class						
I Professional	597	5.9	362	8.8	158	9.7
II Managerial	3,185	31.5	1,492	36.1	636	39.2
III Skilled Non Manual	4,329	42.8	1,664	40.3	635	39.1
III skilled Manual	791	7.8	237	5.7	82	5.1
IV / V unskilled	1,219	12.0	374	9.1	113	7.0
Weekly income						
<£199	787	11.4	319	8.4	95	5.9
£200-£299	1,140	16.6	554	14.6	195	12.0
£300-£399	1,453	21.1	735	19.4	291	17.9
£400+	3,510	50.9	2,180	57.6	1,043	64.2

<sup>c</sup> Participants with outcome information for model C <sup>d</sup> Participants included in analyses for model C

Similar differences for demographic information were found for those included in analyses at 16 years of age. Participants from household that earned less than £400/week were less likely than those from household that earned at least £400/week to be included in analyses. Similarly, participants with mothers from the highest social class were more likely to be included in analyses than those from lower social classes. Females and participants who were white were also more likely to be included in analyses.

### 4.3 Results

Before results from the main analyses are presented, a description of psychological characteristics, OA participation rates and alcohol use among those included in analyses and those not included in analyses are presented.

#### 4.3.1 Psychological measures and covariates

Table 4.3 shows the distribution of psychological measures and covariates used in analyses. These are displayed for the entire ALSPAC sample, those who have outcome data as well as those who are represented in the analyses (those included in analyses when testing models A and C).

Participants included in analyses at 15 years of age differed from those not included in the analyses on these measures. Univariate logistic regressions showed that higher IQ and participation in an OA at 11 years of age predicted inclusion in analyses. Those who participated in no OAs at 15 years of age were less likely than those who participated in a sport to be included in analyses (see table D3 in Appendix D).

Among psychological variables used in Model A, sensation seeking at 13 years of age and IQ was associated with conduct problems ( $r_s = .252, p < .001$ ;  $r_s = -.065, p = .002$ , respectively). Parental supervision was associated sensation seeking ( $r_s = -.172, p < .001$ ), conduct problems ( $r_s = -.310, p < .001$ ) and past alcohol use ( $r_s = -.182, p < .001$ ). Peer alcohol use was associated with parental supervision ( $r_s = -.199, p < .001$ ), conduct problems ( $r_s = -.261, p < .001$ ), sensation seeking ( $r_s = .178, p < .001$ ) and past alcohol use ( $r = .280, p < .001$ ); a correlation matrix of these measures can be found in Table E1 in Appendix E).

Participants included in analyses at 16 years of age also differed from those not included in the analyses. Higher levels of parental supervision, IQ, and sensation seeking predicted inclusion in analyses. Those who participated in an OA at 11 years of age as well as those who participated in no OAs at 16 years of age were less likely than those who participated in a sport to be included in analyses (see Table D4 in Appendix D).

Among psychological variables used in Model C, sensation seeking at 16 years of age correlated with conduct problems ( $r_s = .230, p < .001$ ). Parental supervision was associated with sensation seeking ( $r_s = -.177, p < .001$ ), conduct problems ( $r_s = -.313, p < .001$ ) and past alcohol use ( $r_s = -.178, p < .001$ ). Peer alcohol use was associated with parental supervision ( $r_s = -.211, p < .001$ ), conduct problems ( $r_s = .272, p < .001$ ), sensation seeking ( $r_s = .118, p < .001$ ) and past alcohol use ( $r_s = .285, p < .001$ ); a correlation matrix of these measures can be found in Table E2 in Appendix E).

Table 4.3 Predictors for entire ALSPAC sample, participants with outcome data and participants included in analyses at age 15 and 16

Measures	ALSPAC sample		Outcome age 15 years		Analyses age 15 years		Outcome age 16 years		Analyses age 16 years	
	n	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)
IQ	5,025	94.4 (13.1)	4,898	94.6 (13.0)	2,316	96.3 (12.6)	3,468	96.0 (12.8)	1,624	97.3 (12.7)
Sensation seeking										
Age 13 years	5,626	26.3 (4.6)	4,374	26.3 (4.6)	2,316	26.3 (4.6)	-	-	-	-
Age 16 years	4,754	25.6 (4.5)	-	-	-	-	4,717	25.6 (4.5)	1,624	26.0 (4.5)
	n	%	n	%	n	%	n	%	n	%
Low inhibitory control										
Yes	603	9.1	370	8.6%	196	8.5	322	8.7	143	8.8
No	6,044	90.9	3,944	91.4%	2,120	91.5	3,374	91.3	1,481	91.2
Conduct problems										
Yes	2,557	49.9	2,495	49.8	1,142	49.3	1,633	46.6	751	46.2
No	2,563	50.1	2,519	50.2	1,174	50.7	1,875	53.5	873	53.8
Parental supervision										
Low	2,502	48.8	2,452	48.9	1,101	47.5	1,632	46.5	720	44.3
High	2,629	51.2	2,561	51.1	1,215	52.5	1,878	53.5	904	55.7
High peer alcohol use										
Yes	3,431	67.3	3,368	67.4	1,546	66.8	2,292	65.5	1,048	64.5
No	1,667	32.7	1,629	32.6	770	33.3	1,205	34.5	576	35.5
Previous alcohol use										
Yes	2,377	40.9	1,833	40.9	953	41.1	1,407	38.3	610	37.6
No	3,429	59.1	2,647	59.1	1,363	58.9	2,263	61.7	1,014	62.4
Previous participation										
Yes	4,955	77.2	3,184	82.2	1,945	84.0	3,024	80.0	1,376	84.7
No	1,460	22.8	689	17.8	371	16.0	754	20.0	248	15.3

<sup>a</sup> Participants with outcome information in model A <sup>b</sup> Participants included in analyses for model A <sup>c</sup> Participants with outcome information for model C <sup>d</sup> Participants included in analyses for model C

### 4.3.2 Alcohol use

Table 4.4 presents patterns of alcohol use at 15 and 16 years of age. At 15 years of age the majority of participants had consumed alcohol. Of those with outcome information, 65% reported consuming alcohol in the past month. The percentage of those who drank alcohol in the past month increased from 65.5% at age 15 to 77.7% by 16 years of age. The percentage of those who consumed at least three units more than doubled from 30.2% at 15 years of age to 68.7% at 16 years of age. Participants also reported that at 16 years of age, 35.3% consumed at least six units on one occasion on a monthly basis. The distribution of these percentages were similar for those included in analyses.

*Table 4.4 Reported alcohol use for those with outcome information and those included in analyses*

Alcohol use at 15.5 years	Outcome		Analyses	
	n	%	n	%
Consumes alcohol weekly				
Yes	1,107	21.7	489	21.1
No	3,993	78.3	1,827	78.9
Consumed alcohol in past month				
Yes	3,281	65.0	1,507	65.5
No	1,771	35.0	792	34.5
Consumes at least 3 units when drinking				
Yes	1,476	30.2	649	29.0
No	3,409	69.8	1,591	71.0
Alcohol use at 16.7 years	n	%	n	%
Consumed alcohol in past month				
Yes	3,771	77.7	1,293	79.6
No	1,084	22.3	331	20.4
Consumes at least 3 units when drinking				
Yes	3,107	68.7	1,044	69.1
No	1,141	31.3	468	31.0
Consumes at least 6 units on monthly basis				
Yes	1,617	35.3	531	34.8
No	2,969	64.7	997	65.3

### 4.3.3 Organised activity participation

Table 4.5 shows distributions of OA participation at 15 and 16 years of age. At both time points, the majority of participants who participated in an OA reported participation in a sport rather than participation in other types of OAs. At 15 years of age, 50% of participants reported no OA participation while at 16 years of age 30% reported no OA participation.

Distributions of OA participation differed slightly among those included in the analyses compared to those with an outcome variable. For example, in table 4.5 it can be seen that the percentage of those who participated in sports increased in the sample included in the analyses, while the percentage of those who participated in no OAs decreased. From the investigation of missing data (Tables D1 and D2), it was found that those who did not participate in any OAs were more likely to be missing from the analyses than those who participated in sports and this highlights that OA participation was associated with missing data in the ALSPAC dataset.

*Table 4.5 Participation in organised activities at 15 and 16 years of age for entire ALSPAC sample and participants included in analyses*

<b>Activities</b>	<u>Age 15 years</u>				<u>Age 16 years</u>			
	<i>Outcome</i>		<i>Analyses</i>		<i>Outcome</i>		<i>Analyses</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
<i>Sports</i>	1676	33.4	827	35.7	1799	45.3	807	49.7
<i>No Activities</i>	2543	50.7	1113	48.1	1142	28.7	383	23.6
<i>Other participation</i>	796	15.9	376	16.2	1035	26.0	434	26.7

Correlation analyses (see Table E1) showed that OA participation at 15 years of age correlated with age ( $r_s = -0.063$ ,  $p = .002$ ); income ( $r_s = .095$ ,  $p < .001$ ), social

class ( $r_s = .062, p = .003$ ), peer alcohol use ( $r_s = -.059, p = .004$ ), IQ ( $r_s = .095, p < .001$ ), past alcohol use ( $r_s = -.067, p = .001$ ) and OA participation at 11 years of age ( $r_s = .196, p < .001$ ).

At 16 years of age, OA participation correlated with income ( $r_s = .141, p < .001$ ), social class ( $r_s = .109, p < .001$ ), IQ ( $r_s = .162, p < .001$ ), sensation seeking at 16 years of age ( $r_s = .105, p < .001$ ) and OA participation at 11 years of age ( $r_s = .236, p < .001$ ; see Table E2).

#### 4.3.4 Predictors of alcohol use at 15 years of age

Model A was tested on four alcohol use outcomes measured at 15 years of age. First, an investigation of model fit was applied to the data by testing if the model fit the data significantly better than the null model. An investigation of ROC curves for all models was also conducted (an explanation of these analytic strategies is presented in Chapter three).

When weekly drinking was investigated as an outcome, the model fit was significantly better than the null-model ( $\chi^2 (20) = 356.0, p < .001$ ) and yielded an area under the ROC curve of .79. The model was also used to predict alcohol use in the past month. The model fit was significantly better than the null-model ( $\chi^2 (20) = 483.0, p < .001$ ) and yielded an area under the ROC curve of .81. Finally, the model used to predict binge drinking fitted the data significantly better than the null-model ( $\chi^2 (20) = 329.0, p < .001$ ) and yielded an area under the ROC curve of .77. For all models, accuracy was either fair (ROC = .70-.80) or good (ROC = .80-.90) and all were significantly better in predicting outcomes than null models.

Tables 4.6 and 4.7 below show the results of these analyses. Across the models several factors were consistently shown to predict alcohol use. Participants

who reported early alcohol use, higher levels of peer alcohol use, conduct problems and greater sensation seeking at age 13 were more likely to have consumed alcohol weekly, in the past month and three units on average when drinking at 15 years of age. Higher levels of parental supervision were also found to predict less alcohol use across all models. Females were more likely to report alcohol use in the past month and to consume three units on average. Older adolescents were more likely to consume three units on average and those with higher IQ were less likely to consume three units. Social class and income were not found to predict alcohol use outcomes.

Measures of OA participation at 15 years of age did not predict alcohol use at the same age. Those who participated in sports were not more or less likely to report alcohol use than those in other OAs and no OAs across all models at age 15 (model A). Removing peer alcohol use from the model for sensitivity analysis did not result in changes to the results. Sport participants were not more or less likely than those in no OAs or other OAs to consume alcohol weekly (OR: 1.03, CI: 0.83-1.30,  $p = 0.748$ ; OR: 0.86, CI: 0.65-1.14,  $p = 0.301$ , respectively), consume alcohol in the past month (OR: 1.03, CI: 0.83-1.30,  $p = 0.748$ ; OR: 0.86, CI: 0.65-1.14,  $p = 0.301$ , respectively) and consume at least three units on average (OR: 1.03, CI: 0.82-1.29,  $p = 0.823$ ; OR: 0.832, CI: 0.61-1.13,  $p = 0.244$ , respectively).



Table 4.6 Odd ratios and 95% confidence intervals for measures used in model A to predict alcohol use outcomes at 15 years of age

Predictors	Consumes alcohol weekly <sup>a</sup>			Consumed alcohol in past month <sup>b</sup>			Consumes at least 3 units <sup>c</sup>		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age	1.55	[0.98, 2.46]	.061	1.55	[0.93, 2.59]	.091	1.98	[1.32, 2.99]	.001
Gender	0.95	[0.75, 1.21]	.684	1.37	[1.10, 1.70]	.005	1.68	[1.35, 2.09]	<.001
White	1.51	[0.74, 3.07]	.254	1.64	[0.86, 3.16]	.136	0.99	[0.52, 1.87]	.974
Mother's social class (I)									
II	0.68	[0.46, 1.001]	.050	0.87	[0.60, 1.27]	.477	0.97	[0.65, 1.44]	.885
III (non-manual)	0.90	[0.60, 1.35]	.601	1.04	[0.71, 1.53]	.851	0.96	[0.64, 1.45]	.860
III (manual)	1.02	[0.56, 1.87]	.940	1.21	[0.66, 2.19]	.541	1.31	[0.76, 2.26]	.339
IV & V	0.78	[0.44, 1.38]	.394	0.73	[0.44, 1.24]	.249	0.93	[0.54, 1.59]	.781
Weekly income (£400+)									
<£199	0.83	[0.50, 1.36]	.458	0.80	[0.50, 1.27]	.346	0.95	[0.61, 1.49]	.822
£200-£299	0.95	[0.66, 1.37]	.786	0.85	[0.62, 1.16]	.304	1.21	[0.89, 1.64]	.225
£300-£399	0.92	[0.68, 1.24]	.569	0.88	[0.67, 1.14]	.332	1.05	[0.80, 1.37]	.745
High parental supervision	0.61	[0.48, 0.77]	<.001	0.58	[0.47, .713]	<.001	0.58	[0.47, 0.72]	<.001
High peer alcohol use	2.95	[2.13, 4.09]	<.001	3.73	[3.02, 4.61]	<.001	3.44	[2.60, 4.55]	<.001
Conduct problems	1.99	[1.55, 2.55]	<.001	1.54	[1.24, 1.92]	<.001	1.82	[1.45, 2.27]	<.001
IQ	0.997	[0.99, 1.01]	.609	0.99	[0.99, 1.001]	.117	0.98	[0.97, 0.99]	<.001
Low inhibitory control	1.20	[0.79, 1.81]	.393	0.94	[0.64, 1.38]	.755	0.79	[0.54, 1.16]	.233
Sensation seeking age 13 years	1.07	[1.04, 1.09]	<.001	1.06	[1.03, 1.09]	<.001	1.06	[1.03, 1.09]	<.001
Alcohol use at age 13 years	3.29	[2.60, 4.16]	<.001	3.53	[2.81, 4.43]	<.001	1.85	[1.50, 2.29]	<.001
Previous participation	0.93	[0.67, 1.28]	.643	1.02	[0.77, 1.36]	.873	1.14	[0.85, 1.53]	.387
Sport participation age 15 years									
No participation	1.19	[0.93, 1.53]	.176	0.96	[0.76, 1.21]	.747	0.97	[0.81, 1.27]	.795
Other participation	0.80	[0.56, 1.15]	.224	0.85	[0.63, 1.15]	.279	0.79	[0.58, 1.09]	.158

<sup>a</sup> n = 2,316 <sup>b</sup> n = 2,300 <sup>c</sup> n = n = 2,241

#### 4.3.5 Alcohol use at age 16 years of age

The second and third analyses presented tested Models B and C on three alcohol use outcomes measured at 16 years of age. Model B included measures of OA participation at 15 years of age. When Model B was applied to investigate alcohol use in the past month, the model fit was significantly better than the null model ( $\chi^2(20) = 176.5, p < .001$ ) and yielded an area under the ROC curve of .74. When used to predict consumption of at least three units, the model fit was significantly better than the null-model ( $\chi^2(20) = 268.7, p < .001$ ) and yielded an area under the ROC curve of .76. When predicting the consumption of six units monthly, the model fit was significantly better than the null-model ( $\chi^2(20) = 241.1, p < .001$ ) and yielded an area under the ROC curve of .75. All the models fitted the data significantly better than models with no predictors and all were deemed fair (.70-.80) at correctly discriminating those with outcome data.

Table 4.8 displays the results of these analyses. Participants who reported early alcohol use, high levels of peer alcohol use and had greater sensation seeking at 16 years of age were more likely to drink alcohol in the past month, consume three or more units on average and drink at least six units monthly. Females were also more likely to drink in the past month and consume three units on average. Older participants were more likely to consume three units on average and at least six units monthly and participants that were white were only more likely to drink in the past month.

In model B, participation in OAs at 15 years of age predicted alcohol use outcomes at age 16 years of age. Compared to those who participated in sports, those in no OAs and other OAs were less likely to report consuming three or more units on

average. Those who participated in other OAs were also less likely to report drinking at least six units monthly than those who participated in sports.

When peer alcohol use was removed from the model results did not change. Sport participants were not more or less likely than those in no OAs or other OAs to consume alcohol in the past month (OR: 1.04, CI: 0.78-1.38,  $p = 0.776$ ; OR: 0.97, CI: 0.67-1.40,  $p = 0.861$ , respectively); however they were more likely to consume three units on average (OR: 0.75, CI: 0.58-0.98,  $p = 0.034$ ; OR: 0.62, CI: 0.44-0.97,  $p = 0.005$ , respectively). Sport participants were also more likely than those in other OAs to consume six or more units on average (OR: 0.62, CI: 0.44-0.88,  $p = 0.007$ ) but not those in no OAs (OR: 0.91, CI: 0.71-1.15,  $p = 0.418$ ).

Model C was used to predict alcohol use at 16 years of age and included measures of OA participation at 16 years of age. When the model was used to predict alcohol use in the past month the model fit was significantly better than the null model ( $\chi^2 (20) = 164.6$ ,  $p < .001$ ) and yielded an area under the ROC curve of .74. When used to investigate the consumption of at least three units the model fit was significantly better than the null model ( $\chi^2 (20) = 239.3$ ,  $p < .001$ ) and yielded an area under the ROC curve .76. When used to predict the consumption of six units monthly the model also fit the data significantly better than the null model ( $\chi^2 (20) = 213.7$ ,  $p < .001$ ) and yielded an area under the ROC curve of .75. These models fitted the data better than models with no predictors and all were fair (.70-.80) at correctly discriminating those with outcome data.

Table 4.9 displays the results of these analyses. Early alcohol use, high levels of peer alcohol use and greater sensation seeking at 16 years of age were consistent predictors of drinking in the past month, consuming three or more units and

consuming at least six units monthly. Participants with high levels of parental supervision were less likely to consume alcohol in the past month, consume at least three units and consume at least six units monthly. Participants with conduct problems were more likely to consume at least three units and consume at least six units monthly. Older participants were more likely to consume at least six units monthly. Females were more likely to report alcohol use in the past month and consume at least three units, but not six units monthly. Those with low household incomes were less likely to consume at least six units monthly and those from the lowest social class were less likely to consume at least three units.

Participation in OAs at 16 years of age predicted alcohol use outcomes at 16 years of age. Compared to those who participated in sports, those who participated in other OAs were less likely to consume alcohol in the past month. Those who participated in no OAs and other OAs at 16 years of age were less likely than those who participated in sports to consume at least three units.

When peer alcohol use was removed from the model results did not change. Sport participants were more likely than those in other OAs to consume alcohol in the past month (OR: 0.69, CI: 0.50-0.94,  $p = 0.019$ ) but not those in no OAs (OR: 0.98, CI: 0.69-1.39,  $p = 0.900$ ). Sport participants were also more likely than those in no OAs and those in other OAs to consume three units on average (OR: 0.71, CI: 0.52-0.98,  $p = 0.039$ ; OR: 0.62, CI: 0.47-0.83,  $p = 0.001$ , respectively). Sport participants were not more or less likely than those in no OAs or other OAs to consume six or more units on average (OR: 0.92, CI: 0.68-1.25,  $p = 0.611$ ; OR: 0.810, CI: 0.61-1.08,  $p = 0.146$ , respectively).

Table 4.7 Odd ratios and 95% confidence intervals for measures used in Model B to predict alcohol use outcomes at age 16

Predictors	alcohol in past month <sup>a</sup>			≥3 units on average <sup>b</sup>			≥ 6 units once a month <sup>c</sup>		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age	1.15	[0.68, 1.96]	.610	1.78	[1.07, 2.99]	.027	2.31	[1.47, 3.61]	<.001
Gender	1.59	[1.21, 2.10]	<.001	1.82	[1.40, 2.37]	<.001	1.10	[0.87, 1.40]	.416
White	2.19	[1.08, 4.42]	.029	1.58	[0.69, 3.59]	.277	1.37	[0.64, 2.93]	.420
Mother's social class (I)									
II	1.06	[0.67, 1.66]	.815	0.54	[0.35, 0.82]	.004	.9002	[0.61, 1.32]	.591
III (non-manual)	1.02	[0.64, 1.64]	.929	0.65	[0.42, 1.01]	.056	0.99	[0.67, 1.47]	.958
III (manual)	1.14	[0.58, 2.23]	.713	0.92	[0.47, 1.83]	.815	1.45	[0.79, 2.65]	.227
IV & V	.648	[0.36, 1.17]	.148	0.45	[0.25, 0.80]	.007	0.72	[0.40, 1.27]	.250
Weekly income (£400+)									
<£199	.777	[0.47, 1.30]	.336	0.89	[0.53, 1.49]	.660	0.54	[0.32, 0.93]	.027
£200-£299	.909	[0.62, 1.34]	.627	1.03	[0.70, 1.49]	.876	0.96	[0.68, 1.36]	.826
£300-£399	.809	[0.58, 1.13]	.214	0.95	[0.69, 1.30]	.736	0.96	[0.71, 1.30]	.779
High parental supervision	.691	[0.53, 0.90]	.007	0.54	[0.42, 0.70]	<.001	0.75	[0.60, 0.94]	.014
High peer alcohol use	1.95	[1.50, 2.54]	<.001	2.67	[2.08, 3.42]	<.001	2.45	[1.88, 3.19]	<.001
Conduct problems	1.25	[0.95, 1.64]	.112	1.74	[1.35, 2.26]	<.001	1.71	[1.35, 2.17]	<.001
IQ	1.003	[0.99, 1.01]	.452	0.99	[0.99, 1.005]	.325	0.99	[0.98, 1.001]	.087
Low inhibitory control	.974	[0.64, 1.49]	.903	0.67	[0.44, 1.02]	.061	0.79	[0.53, 1.18]	.255
Sensation seeking age 16 years	1.09	[1.05, 1.12]	<.001	1.08	[1.05, 1.11]	<.001	1.07	[1.04, 1.10]	<.001
Alcohol use at age 13 years	2.68	[1.96, 3.66]	<.001	1.69	[1.30, 2.21]	<.001	2.37	[1.90, 2.96]	<.001
Previous participation	1.19	[0.85, 1.65]	.316	0.95	[0.69, 1.32]	.761	0.96	[0.70, 1.31]	.776
Sport participation age 15 years									
No participation	1.01	[0.76, 1.35]	.948	0.71	[0.54, 0.93]	.013	0.87	[0.68, 1.11]	.254
Other participation	.986	[0.68, 1.43]	.942	0.62	[0.44, 0.88]	.008	0.62	[0.44, 0.89]	.008

<sup>a</sup> n = 1,800 <sup>b</sup> n = 1,691 <sup>c</sup> = 1,711

Table 4.8 Odd ratios and 95% confidence intervals for measures used in Model C to predict alcohol use outcomes at 16 years of age

Predictors	Alcohol in past month <sup>a</sup>			≥ 3 units on average <sup>b</sup>			≥ 6 units once a month <sup>c</sup>		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age	0.97	[0.56, 1.68]	.923	1.68	[0.98, 2.88]	.061	2.17	[1.35, 3.47]	.001
Gender	1.66	[1.24, 2.22]	<.001	1.93	[1.47, 2.55]	<.001	1.05	[0.81, 1.35]	.718
White	1.68	[0.75, 3.74]	.207	1.19	[0.50, 2.84]	.702	1.20	[0.51, 2.80]	.678
Mother's social class (I)									
II	1.12	[0.69, 1.80]	.655	0.63	[0.41, 0.99]	.042	0.99	[0.65, 1.50]	.942
III (non-manual)	0.96	[0.59, 1.57]	.874	0.72	[0.45, 1.15]	.167	1.05	[0.68, 1.61]	.823
III (manual)	1.15	[0.57, 2.32]	.695	1.12	[0.55, 2.29]	.763	1.71	[0.91, 3.24]	.098
IV & V	0.61	[0.33, 1.12]	.112	0.51	[0.28, 0.94]	.031	0.84	[0.45, 1.55]	.568
Weekly income (£400+)									
<£199	0.69	[0.40, 1.17]	.166	0.86	[0.50, 1.47]	.582	0.50	[0.28, 0.89]	.019
£200-£299	0.90	[0.60, 1.36]	.613	1.01	[0.68, 1.50]	.964	0.94	[0.65, 1.37]	.762
£300-£399	0.85	[0.60, 1.21]	.366	1.02	[0.74, 1.43]	.886	0.89	[0.65, 1.23]	.476
High parental supervision	0.68	[0.51, 0.90]	.007	0.55	[0.42, 0.72]	<.001	0.73	[0.58, 0.93]	.011
High peer alcohol use	2.01	[1.53, 2.64]	<.001	2.58	[2.00, 3.35]	<.001	2.56	[1.94, 3.39]	<.001
Conduct problems	1.23	[0.92, 1.64]	.160	1.71	[1.31, 2.24]	<.001	1.71	[1.33, 2.20]	<.001
IQ	1.003	[0.99, 1.01]	.475	0.99	[0.99, 1.01]	.430	0.99	[0.98, 1.0001]	.053
Low inhibitory control	1.10	[0.71, 1.73]	.666	0.68	[0.44, 1.05]	.084	0.78	[0.51, 1.19]	.252
Sensation seeking age 16 years	1.09	[1.06, 1.13]	<.001	1.08	[1.05, 1.11]	<.001	1.07	[1.03, 1.10]	<.001
Alcohol use at age 13 years	2.58	[1.86, 3.59]	<.001	1.74	[1.32, 2.30]	<.001	2.18	[1.72, 2.76]	<.001
Previous participation	1.18	[0.83, 1.69]	.361	0.91	[0.64, 1.29]	.588	0.97	[0.68, 1.38]	.862
Sport participation age 16 years									
No participation	0.97	[0.68, 1.39]	.886	0.71	[0.51, 0.99]	.044	0.92	[0.67, 1.25]	.584
Other participation	0.69	[0.51, 0.95]	.022	0.63	[0.47, 0.84]	.002	0.83	[0.62, 1.10]	.198

<sup>a</sup> n = 1,624 <sup>b</sup> n = 1,522 <sup>c</sup> n = 1,539

#### 4.3.6 Interaction effects

Follow-up analyses examined whether sensation seeking interacted with OA participation type. Models B and C were conducted again using high and low sensation seeking as an interaction term with OA participation type. This was conducted for analyses where OA participation type predicted alcohol use outcomes for model B (consume at least three units and at least six units monthly) and model C (alcohol use in past month and consume at least three units). Where interactions effects were significant, groups based on OA participation and high/low sensation seeking were compared within the model using a reference category of high sensation seekers who participated in sports.

60.8% of sports participants at 15 years of age were classified as high sensation seekers, compared to 51.8% of those in no OAs and 47.3% of those in other OAs. At 16 years of age, 60% of sport participants were classified as high sensation seekers, compared to 45% of those in no OAs and 50% of those in other OAs.

Interaction effects were found for model C. Low sensation seekers who participated in a sport were significantly less likely to report alcohol use in the past month than high sensation seekers in a sport (OR: 0.52, CI: 0.35 - 0.77,  $p < .001$ ). Compared to high sensation seekers in sports, low and high sensation seekers in other OAs (OR: 0.41, CI: 0.26 - 0.63,  $p < .001$ ; OR: 0.55, CI: 0.35 - 0.86,  $p < .01$ ; respectively), and low sensation seekers in no OAs (OR: 0.54, CI: 0.34 - 0.87,  $p = .011$ ) were less likely to report alcohol use in the past month. Those who did not participate in any OAs and had high sensation seeking were not more or less likely to

report alcohol use in the past month compared to high sensation seekers in a sport (OR: 0.80, CI: 0.48 - 1.35,  $p = .410$ ).

Low sensation seekers who participated in a sport were also significantly less likely to consume at least three units than high sensation seekers who participated in a sport (OR: 0.49, CI: 0.34 - 0.71,  $p < .001$ ). Compared to high sensation seekers who participated in a sport, low and high sensation seekers in other OAs (OR: 0.36, CI: 0.24 - 0.55,  $p < .001$ ; OR: 0.53, CI: 0.35 - 0.79,  $p = .002$ ; respectively), and low and high sensation seekers in no OAs (OR: 0.41, CI: 0.26 - 0.64,  $p < .001$ ; OR: 0.56, CI: 0.35 - 0.90,  $p = .016$ ; respectively) were less likely to consume at least three units.



#### 4.4 *General discussion*

This longitudinal study investigated the relationship between OA participation and reported alcohol use among a sample of British adolescents. Uniquely, this study investigated the role of sensation seeking on these relationships while controlling for confounding variables known to predict alcohol use, such as parental supervision, peer alcohol use and other individual-level factors. Different patterns of alcohol use were investigated at two different time points and captured a critical period when alcohol use increased within the sample.

Participation in a sport was associated with an increased likelihood of several alcohol use outcomes at 16 years of age. Those who participated in sports at 15 years of age were more likely than those who participated in other OAs and no OAs to consume at least three units on average and were more likely than those in other OAs to consume at least six units on a monthly basis. Those who participated in a sport at 16 years of age were also more likely to consume at least three units on average and were more likely to drink alcohol in the past month compared to those in other OAs.

A positive relationship between participation in sports and increased adolescent alcohol use is similar to findings from other populations (Barber et al., 2001; Denault et al., 2009; Eccles & Barber, 1999; McCaul et al., 2004; Peretti-Watel et al., 2002; Wichstrøm & Wichstrøm, 2009). Explanations of these relationships include rituals associated with sporting events (Glassman et al., 2007) and drinking as a reward for sports participation (O'Brien et al., 2007). Other studies have found that drinking in sports contexts may be related to social cohesion and not to sporting identity per se (Zhou et al., 2013).

Conversely, it has been suggested that the positive relationship between sports participation and alcohol use could be explained by individual-level self-selection factors (Fredricks & Eccles, 2006b; Larson, 2000), such as sensation seeking (Peretti-Watel, 2009). This study showed that after controlling for sensation seeking, there was a unique relationship between participation in sports and reported alcohol use at 16 years of age. Nevertheless, it still remained that sport participants were more likely to report alcohol use because a greater proportion of high sensation seekers participated in sports compared to those in other OAs and no OAs, leading to these positive relationships. When this was further examined, high sensation seekers who participated in a sport at 16 years of age were more likely to report alcohol use in the past month and consume at least three units compared to low sensation seekers in a sport. This shows that the positive relationship between sports and these alcohol use outcomes may be specific to high sensation seekers.

In contrast, there were no significant differences between high and low sensation seekers for those who participated in sports at 15 years of age. At 16 years of age, OA participation measured any participation outside of school, while at 15 years of age OA participation was limited to activities that occurred in the evenings and weekends, representing a more narrow definition of OAs. Sports participation might have differed in terms of where they took place, level of involvement and practices surrounding participation, leading to unique relationships with alcohol.

OAs such as sports are used to address risk-taking behaviours in communities because they occupy adolescents during their free time. This study found that high sensation seekers engaging in no OAs were not any more or less likely to report alcohol use in the past month than high sensation seekers who participated in sports.

In fact, high sensation seekers in sports were more likely than high sensation seekers in no OAs to consume at least three units at 16 years of age. It can be questioned whether encouraging those in no OAs to participate in sports would therefore safeguard against increases in alcohol use. Caution must be made about this conclusion however, because this sample does not fully represent individuals from low-income families or lower social class and they may show unique relationships between alcohol use and OA participation.

Findings from this study highlight the importance of sports on adolescent alcohol use. Not all the positive relationships observed in this study were explained by confounding variables and many questions still remain. For example, is alcohol use taking place in conjunction with sporting activities or simply facilitating networking between individuals who have access to alcohol? Joining a sport can increase a young person's social network and equally the likelihood of meeting someone who drinks or has access to alcohol (Wichstrøm & Wichstrøm, 2009). In contrast, young people may be segregated according to age in sports, limiting their ability to become friends with older peers who are more likely to drink alcohol (Wichstrøm & Wichstrøm, 2009). In this study it was not possible to determine the nature of sports participation and if participation was segregated by age.

Alcohol marketing and the alcohol industry's sponsorship of sports has been used to explain links between alcohol use and sports participation in older samples (Nelson & Wechsler, 2003). In UK universities, students who participated in a club and received alcohol industry sponsorship (personally or through a club/team) reported more problematic drinking than students in sports who do not receive

sponsorship (O'Brien et al., 2014). Alcohol sponsorship in sports and its impact on younger sports participants and spectators is less clear.

Community organisations such as sports clubs have been identified by The World Health Organisation as an important setting that may provide opportunities for policy interventions (WHO, 2010). Alcohol management practices of community sports clubs have been shown to be associated with increased alcohol use among adults in New Zealand (O'Brien & Kypri, 2008) and Australia (Kingsland et al., 2013). Future research is needed to understand if specific community sport contexts in the UK are associated with adolescent alcohol use and whether management practices might influence alcohol use among young age groups.

In other North American and other European studies, positive relationships between sports participation and alcohol use emerged at 18 years of age and continued into adulthood (Terry-McElrath & O'Malley, 2011; Wichstrøm & Wichstrøm, 2009). In this sample, alcohol use significantly increased between 15 and 16 years of age and a positive relationship between sports participation and alcohol use was observed at 16 years of age. Countries differ on alcohol use policies and this may impact alcohol availability for adolescents. The relationship between sports and alcohol use (particularly binge drinking) might be evident at an earlier age in British samples because of differences regarding alcohol use legislation and cultural norms surrounding underage drinking. It is also conceivable that these observed relationships may be long-lasting. Among adults, athlete populations and sport spectators have higher risks of high level of alcohol consumption and alcohol-related harm (Nelson & Wechsler, 2003; Sønderlund et al., 2013) and amongst adults in England, members of community sports clubs report more alcohol use than non-

members (Poortinga, 2007). Although parental monitoring and peer alcohol use were stronger and more consistent predictors of adolescent alcohol use, sports participation may be a risk-factor for binge drinking, alcohol-related harm and long-term alcohol use more practical and economical to target amongst adolescents.

This study was able to compare those who participated in a sport with those in no OAs and other OAs; however, it was not able to investigate different types of sporting activities in association with alcohol use. Previous studies have shown that those who participate in specific types of activities, such as team sports, are more likely to engage in alcohol use (McCaul et al., 2004; Peretti-Watel et al., 2002; Peretti-Watel et al., 2003; Wichstrøm & Wichstrøm, 2009). The relationships between sport participation and adolescent alcohol use may differ if participants engage in other OAs as well (Mays, DePadilla, et al., 2010); however, investigating combinations of OA participation types was beyond the scope of this thesis.

Furthermore, this study did not control for pubertal timing as a confounding factor. It has been suggested that early-developing adolescents will be taller and stronger leading to better sport performance compared to their similar aged peers (Wichstrøm & Wichstrøm, 2009). Early maturity may protect against sport drop-out but also protect against early alcohol intoxication amongst this at-risk group (Wichstrøm & Wichstrøm, 2009). It still remains that residual confounding (through unmeasured or poorly measured confounders) might explain the observed relationships and experimental studies or interventions are needed to confirm these results.

In conclusion, this study showed that 15 and 16 years of age is a critical time when alcohol use increases. Participation in a sport was associated with an increased

likelihood of alcohol use at 16 years of age even after controlling for important confounding variables. Amongst those involved in sports, high sensation seekers were more likely to report alcohol use in the past month and consume at least three units than low sensation seekers involved in sports. Future research should consider the extent to which individual-level factors or the contexts of OAs influences alcohol use. These results suggest a complex mix of individual characteristics, OA contexts and cultures is likely to contribute to increased alcohol use among sport participants. This raises important questions about the role and responsibility of sporting bodies to encourage healthy development among young people. Using sports as a platform to address increases in alcohol use observed during adolescence should be considered by public health interventions. Furthermore, if future studies find that young people who participate in team sports are more likely to report alcohol use in British samples this could also have implications for future interventions.

**5 Hazardous drinking and participation in organised activities among vulnerable young people: two cross-sectional studies of young offenders**

This chapter aims to investigate reported alcohol use, hazardous drinking and OA participation rates among a group of male, young offenders from Wales. Two cross-sectional studies are presented. The first study (study A), compared the reported alcohol use of young offenders and a national representative sample of Welsh male students. The second study (study B) investigated the relationship between OA participation and hazardous drinking among young offenders and a group of non-offenders matched on socioeconomic status, age and gender. The data presented in both studies were collected as part of a larger study investigating antisocial behaviour among young offenders<sup>4</sup>. The findings from study B have been published in a peer-reviewed journal (Hallingberg et al., 2014).

### *5.1 Introduction*

The majority of studies that have investigated the relationship between OA participation and reported alcohol use have been based on students recruited through schools. Much of what is known about UK children's health behaviours also stems from national, school based surveys such as the Health Behaviour and School-age Children (HBSC) survey and those conducted by the ONS. Children who do not attend mainstream schools constitute a population of young people who are less likely to be represented in national health surveys.

Young people who are characterised by disruptive, externalising or “challenging” behaviours account for a large percentage of students excluded from

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<sup>4</sup> The design for the original study was developed by Prof Stephanie van Goozen, Dr Katharine Bowen and Dr Joanne Morgan. Both Dr Bowen and Dr Morgan collected the data for the larger study. Data on participation in OAs had not been entered into a database previously. For the current study raw data on OA participation were entered into a database, cleaned by the author and linked to the pre-existing database developed by Dr Bowen and Dr Morgan. All the analyses presented in this chapter were conducted by the author.



school (Department of Education, 2013). These behaviours also predict early termination from education (Jimerson, Egeland, Sroufe, & Carlson, 2000) and contribute to attrition rates in studies (Peck et al., 2008). As such, these young people risk not being included in research and school-based research specifically. Externalising behaviours also predict lower participation in OAs such as sport (Fredricks & Eccles, 2006b) as well as increased alcohol use (Hawkins, Catalano, & Miller, 1992). It is therefore uncertain whether these young people, who are often missed in research, have comparable levels of alcohol use and OA participation.

At a national level, there are currently different methods for measuring young people's alcohol use in England and Wales. Although England produces annual reports on substance use among students as young as 11, Wales only collects data every four years on students under the age of 15 via the HBSC survey. Students in England and Wales report a higher percentage of early drunkenness compared to their European peers (WHO, 2009). These national averages are likely to exclude alcohol use among vulnerable groups, such as young offenders, who are often excluded from school (McAra & McVie, 2010). Offending populations report higher levels of alcohol use compared to the rest of the population (Lader, Singleton, & Meltzer, 2000), and young offenders in particular report more hazardous drinking than older offenders (Plant & Taylor, 2012). In England and Wales, alcohol dependence is the most common substance use disorder among prisoners (Jones & Hoffmann, 2006).

### *5.1.1 Alcohol use and participation in organised activities*

OAs provide opportunities for children to learn and develop (Busseri et al., 2006; Larson, 2000); however, some sport contexts are associated with poor health-related

outcomes such as increased alcohol use (Busseri et al., 2006; Eccles & Barber, 1999; Farb & Matjasko, 2011; Larson, 2000; Wichstrøm & Wichstrøm, 2009). Participation in sports has been associated with higher levels of alcohol use (McCaul et al., 2004; Peretti-Watel et al., 2002; Terry-McElrath & O'Malley, 2011) and an increase in alcohol use over time (Barber et al., 2001; Denault et al., 2009; Eccles & Barber, 1999; Mays, DePadilla, et al., 2010; Mays & Thompson, 2009), but findings have not been consistent (Barnes et al., 2007; Darling, 2005; Fredricks & Eccles, 2006b). The relationship between sport participation and alcohol use also varies according to the type of sport. It has been shown that team sports are associated with higher levels of alcohol use than other types of sport (McCaul et al., 2004; Peretti-Watel et al., 2002; Peretti-Watel et al., 2003; Wichstrøm & Wichstrøm, 2009).

In order to determine relationships between OA participation and alcohol use outcomes among less represented young people, several studies have been conducted within community settings consisting of more participants from ethnic minorities and lower socioeconomic households (Barnes et al., 2007; Gardner et al., 2009). Despite attempts to include more minority groups, it is not clear to what extent young offenders involved in the criminal justice system have been represented in past studies. Young offenders are a group of vulnerable young people who are likely to be excluded from mainstream services, face social exclusion and barriers to OA participation (Kelly, 2011). Offending populations report higher levels of alcohol use (Lader et al., 2000) and young offenders in particular report more hazardous drinking compared to older offenders (Plant & Taylor, 2012). Young offenders are therefore likely to have more hazardous drinking patterns compared to their non-offending peers. It is questionable whether the relationship between hazardous drinking and participation in sports is similar for young offender and non-offenders.

Sport has been recognised in the UK and internationally as a mechanism through which offending behaviour and crime can be addressed and reduced (Kelly, 2013). Sport-based interventions in England and Wales are currently supported by government departments, sporting bodies, and nongovernmental organisations (Kelly, 2013). It has been suggested that sport participation increases supervision, establishes appropriate social norms and curbs drinking through orientation towards success (Eccles et al., 2003; Mahoney et al., 2003; Wichstrøm & Wichstrøm, 2009). For young offenders this can offer unique benefits such as forming mentoring relationships and opportunities to socialise in safe spaces (Kelly, 2012; Kelly, 2013). On this basis, young offenders might also benefit from OA participation and engage less in hazardous drinking than young offenders who do not participate in OAs. Participation in a team sport might also show unique relationships with alcohol use compared to findings observed among student populations.

In order to first determine the extent to which vulnerable young people in Wales differ on reported alcohol use, a group of male young offenders were compared on their reported alcohol use to a group of Welsh, male students in study A. Study B was then conducted to investigate the relationship between participation in OAs and hazardous drinking among young offenders and a group of non-offenders matched on socioeconomic status, age and gender.

## 5.2 *Study A: Alcohol use among young offenders and a national sample of students*

The current study compared a sample of male young offenders and a sample of male students from the Welsh HBSC survey on reported alcohol use. The HBSC survey includes students 11 to 16 years of age and therefore a sub-group of young offenders that were under the age of 16 were used in this study<sup>5</sup>. Due to the differences in sample size between young offenders and HBSC participants, statistical analyses could not be conducted to test for significant differences between groups. The descriptive comparisons presented are therefore speculative. Nevertheless, it may provide some indication of the levels of alcohol use among those who are more likely to be excluded on national health surveys.

### 5.2.1 *Methods*

#### 5.2.1.1 *Sample*

##### 5.2.1.1.1 *Young offenders*

Ninety-three young offenders, mean age 16 years (SD = 1.02, range 13–18), were recruited from a local Youth Offending Team (YOT) by caseworkers who worked at the YOT. Each local authority in England and Wales has a YOT that is governed by the Youth Justice Board and reports to the Ministry of Justice. The main priority of a YOT is to prevent recidivism by identifying and meeting the needs of youngsters aged 10-17 years old. The current study is based on a larger study that recruited only young people who had offended and been convicted for an offence although YOTs also work with young people who are at risk of offending and have not been convicted of a crime. The eligibility criterion was that participant's behaviour resulted in any contact with the criminal justice system, whether a court conviction, a

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<sup>5</sup> All young offenders are presented in study B.

reprimand or final warning. There were very small numbers of young female offenders recruited, which is usual (Zheng & Cleveland, 2013); therefore, only male offenders were included in the analyses. Participants who had an estimated IQ score of less than 70, and therefore possible learning disabilities, were also excluded.

In total, 81 young offenders aged 13-18 years completed the questionnaire; however, to enable comparison to HBSC data those aged 13-16 were kept in the current analyses. This limited the sample to 42 young offenders but allowed for more meaningful comparisons since alcohol use increases with age (Peretti-Watel et al., 2002). The mean age for this subgroup of young offenders was 15.3 years (SD = 0.78, range: 13-16) and 69% were described as white British.

#### *5.2.1.1.2 Students*

The HBSC survey is a WHO collaborative cross-national school survey and collects data from 11-16 year old boys and girls about well-being and health behaviours (Roberts et al., 2009). The survey is cross-sectional, self-completed and uses a national representative sample. Data have been collected in England since 1983/1984 and in Wales since 1985/86. Countries can choose to stratify their samples by geography, ethnic group, and school type to ensure representation (Roberts et al., 2007). Cluster sampling is also used predominantly by school class (Roberts et al., 2007). For the current Welsh HBSC survey data, a random sample of 134 schools were selected and invited to participate. This random sample did not include 6th form colleges or special schools<sup>6</sup> (Ipsos MORI, 2011). The schools were stratified by Local Authority and the proportion of pupils eligible for free-school meals (Ipsos MORI, 2011). Questionnaires were delivered to schools and administered by

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<sup>6</sup> This included schools for excluded pupils, and those with special educational needs or disabilities.

teachers (Roberts et al., 2009). The data from all countries on the HBSC were cleaned, compiled into an international dataset and participants outside the target age group were excluded.

The survey was administered in the classroom to 9,194 second year pupils and for the purpose of this study, participants were limited to males between 13 and 16 years of age. This resulted in a subsample of 2,964 students with a mean age of 14.2 (SD = 0.99, range: 13-16). Of these, 98% attended a state school and 90.4% were white.

#### *5.2.1.2 Measures*

##### *5.2.1.2.1 Young offenders*

A self-completed questionnaire was developed to measure substance use among young offenders. The measure consisted of multiple choice questions regarding alcohol, tobacco and drug use. These questions were from a combination of substance use questionnaires used in longitudinal studies. Four questions were identified as similar to those used in the HBSC survey and used in the current study for comparison. These can be seen in Table 5.1 below.

##### *5.2.1.2.2 Students*

Four questions regarding past and recent alcohol use were investigated from the 2009/2010 HBSC data collection period. These questions were selected for the current study because they were comparable to questionnaire items answered by young offenders.

*Table 5.1 Comparisons of alcohol questionnaire items for young offenders and HBSC participants*

<b>Young offenders</b>	<b>HBSC</b>
<p>How many times have you been drunk in your life?</p> <p>Response categories: <i>Never, once, 2-3, 4-5, 6-7, 8-9, 10+</i></p>	<p>Have you ever had so much alcohol that you were really drunk?</p> <p>Response categories: <i>No never, yes once, 2-3 times, 4-10 times, More than 10 times</i></p>
<p>How old were you when you first started to drink alcohol (taking a few or more sips of alcohol on a more or less regular basis)?</p> <p>Response categories: <i>I never drink alcohol, 9 years or younger, 10-11 years, 12-13 years, 14-15 years, 16-17 years, 18 years or more</i></p>	<p>At what age did you first drink alcohol?</p> <p>Response categories: <i>Never, 11 years old or less, 12, 13, 14, 15, 16 +</i></p>
<p>How many times have you been drunk in the last 4 weeks?</p> <p>Response categories: <i>Never, once, 2-3, 4-5, 6-7, 8-9, 10+</i></p>	<p>On how many occasions (if any) have you been drunk in the last 30 days?</p> <p>Response categories: <i>Never, 1-2, 3-5, 6-9, 10-19, 20-39, 40+</i></p>
<p>How many times have you drunk alcohol in the past 4 weeks?</p> <p>Response categories: <i>Never, 1-4, 5-10, 11-20, More than 20 times</i></p>	<p>On how many occasions have you drunk alcohol in the past 30 days?</p> <p>Response categories: <i>Never, 1-2, 3-5, 6-9, 10-19, 20-39, 40+</i></p>

### 5.2.1.3 Procedure

For young offenders, interviews were conducted individually with each participant in a private room. Participants were given £5 store vouchers for every hour of their participation.

### 5.2.2 Results

Response categories for alcohol use questionnaire items were compared. Where possible, the responses categories were merged to enable comparisons on reported alcohol use between the two samples.

Figures 5.1 - 5.5 below shows comparisons on alcohol use questionnaire items between young offenders and HBSC participants. Responses to the question “how many times have you drunk alcohol in the past 4 weeks/30 days”, for young offenders (Figure 5.4) and HBSC participants (Figure 5.5), could not be meaningfully compared alongside each other and these figures are kept separate.

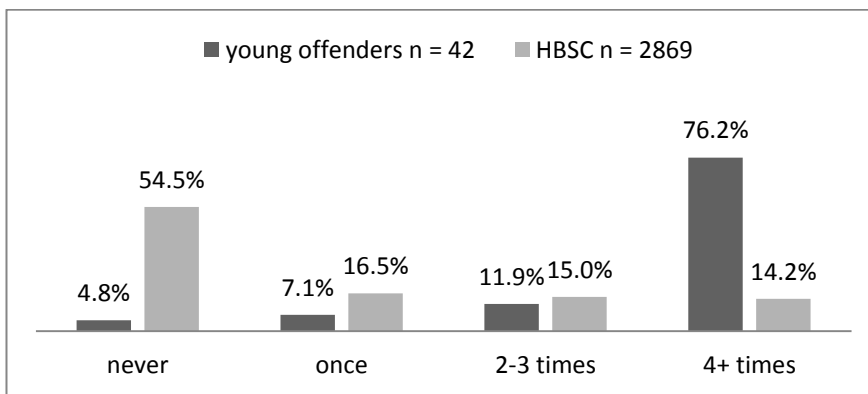
There are similarities as well as differences between young offenders and HBSC participants on reported alcohol use. A higher percentage of young offenders reported having been drunk (see Figure 5.1). While 54.5% of HBSC participants had not yet been drunk, only 4.8% of young offenders had never been drunk previously. A large percentage of young offenders (76.2%) not only had been drunk, but had been drunk at least 4 times in their life. These patterns could be due to the differences in how questions were asked in the surveys. In Table 5.1 it can be seen that the HBSC item stated “Have you ever had so much alcohol that you were really drunk?” whereas the questionnaire item for young offenders asked about occasions of drunkenness in their lifetime. Fewer students on the HBSC survey may have been really drunk and this may have led to more participants reporting “never”.

Figure 5.2 shows how old participants were when they first started to drink alcohol. 23.8% of young offenders reported drinking before the age of 11, compared to 14.6% of participants from HBSC survey. In total, 61.9% of young offenders reported drinking by 13 years of age compared to 51.4% of those in the HBSC



survey. Additionally, 28.2% of those in the HBSC survey reported never drinking alcohol, compared to 4.8% of offenders. Again, the questionnaire items for HBSC participants and young offenders differed slightly. HBSC participants were asked about their age when they first consumed alcohol while young offenders were asked about their age of initiation into drinking regularly, even if this was limited to a couple of sips. Compared to the HBSC item, the questionnaire item for young offenders was a more conservative measure of early drinking. Nevertheless, young offenders still reported higher percentages of early alcohol use.

*Figure 5.1 Responses to question: How many times have you been drunk in your life?*



*Figure 5.2 Responses to question: How old were you when you first started to drink alcohol?*

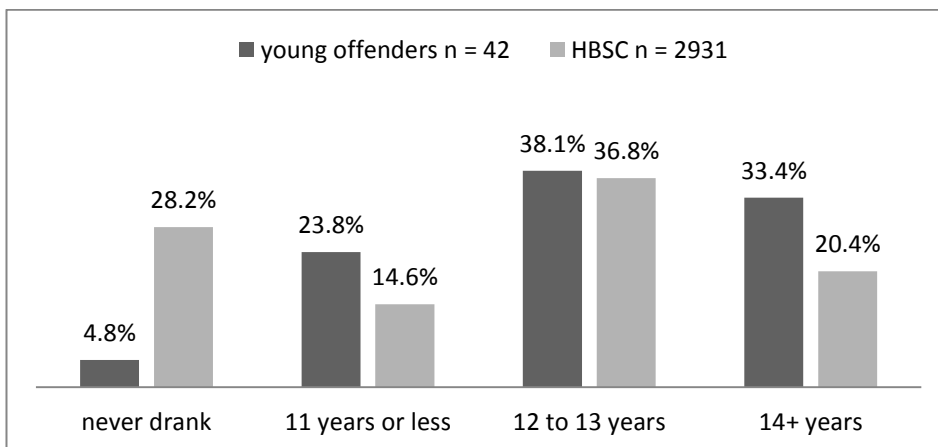
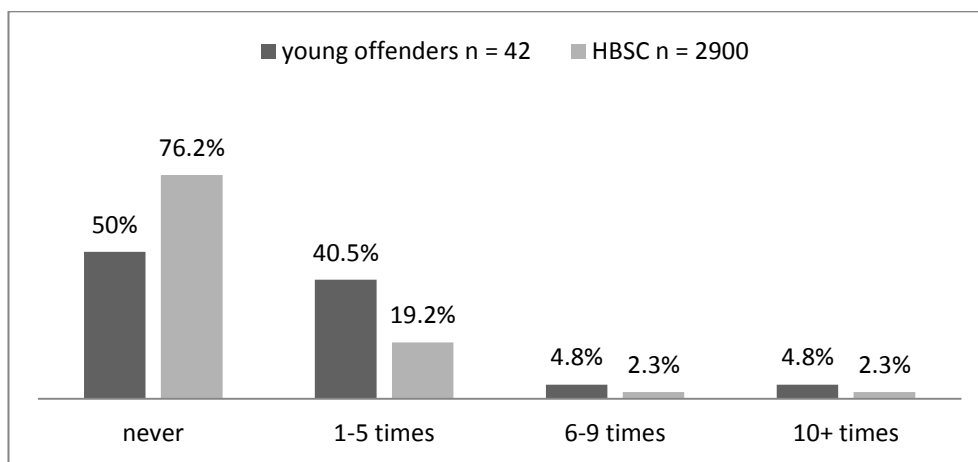


Figure 5.3 shows the percentages of young offenders and HBSC participants who reported the amount of times they were drunk in the past month. Only a small percentage of young offenders (9.6%) and HBSC participants (4.6%) reported being drunk at least 6 times. However, a greater percentage of HBSC participants reported not being drunk in the past 4 weeks (76.2%) compared to young offenders (50%).

*Figure 5.3 Responses to question: How many times have you been drunk in the last four weeks?*



Figures 5.4 and 5.5 show how often participants drank alcohol in the past four weeks/30 days. 42.9% of young offenders reported not drinking any alcohol in the past 4 weeks. A similar percentage (45.4%) of HBSC participants reported not drinking in the past 30 days. 2.9% of those from the HBSC survey reported drinking alcohol on 20 or more occasions, compared to 4.8% of young offenders. Beyond this, comparisons using collapsed categories could not be investigated.

Figure 5.4 Responses to question: How many times have you drunk alcohol in the past 4 weeks?

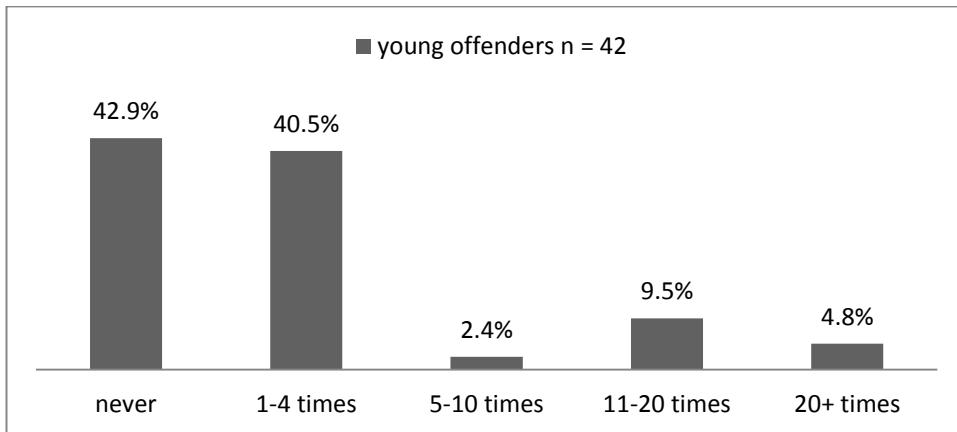
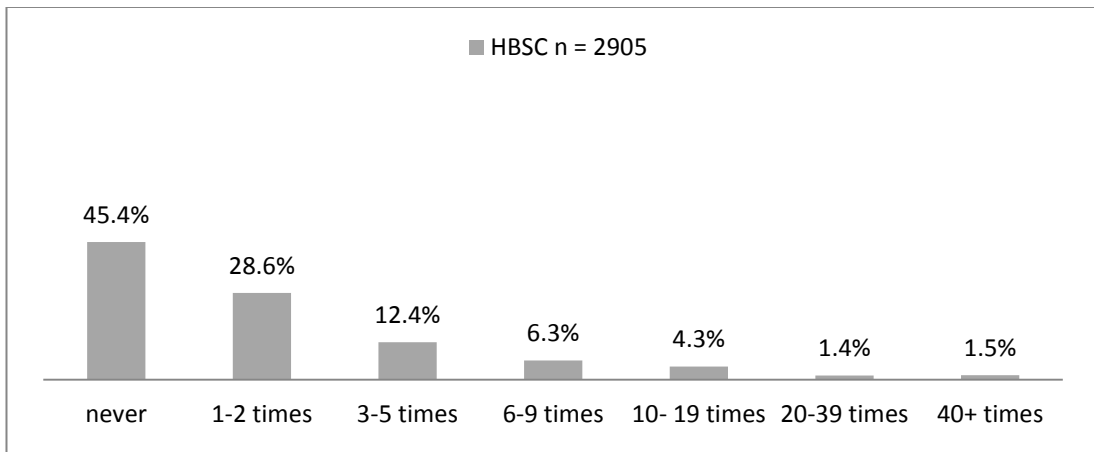


Figure 5.5 Responses to questions: On how many occasions have you drunk alcohol in the past 30 days?



### 5.2.3 Discussion

This study compared reported alcohol use between a sample of male, Welsh young offenders and a national representative sample of male Welsh students. Unfortunately, comparisons were limited due to the small number of young offenders and the number of questionnaire items from the two surveys which could be directly compared.

Of the four questionnaire items compared, a higher percentage of students from the HBSC survey reported no alcohol use. This was true for all questions except the last, which asked on how many occasions they had drunk alcohol in the past 30 days/4 weeks. On this question responses were similar between groups.

A higher percentage of young offenders reported being drunk in the past month as well as in their life. It is possible that young offenders differ in the epidemiology of their alcohol use compared to their peers. Research has shown that early initiation is a strong predictor of later alcohol misuse (DeWit et al., 2000). Young offenders reported higher percentages of early alcohol use and being drunk but it is not known to what extent this may contribute to long term alcohol use and dependency.

Although this study is small, it highlights the potential differences in alcohol use patterns between national samples and vulnerable groups such as young offenders. Young offenders are often excluded from school (McAra & McVie, 2010) and risk not being represented in national school surveys and research. Future research should aim to understand drinking behaviours of vulnerable young people in more detail, investigating different types of patterns such as initiation, frequency of drinking and binge drinking. Longitudinal studies would be able to show how this

develops over time, but recruiting vulnerable young people such as young offenders in research is often challenging and following these individuals longitudinally is likely to be time consuming and costly. Nevertheless, vulnerable young people's alcohol use is likely to be more hazardous compared to national averages.

### 5.3 *Study B: Hazardous drinking and organised activity participation among young offenders and non-offenders*

The aim of this study was to understand the relationship between OA participation and levels of hazardous drinking in a group of vulnerable adolescents previously under-represented in research. Young offenders were compared on these relationships to a group of non-offenders matched on age, gender and socioeconomic status. It was predicted that young offenders would show higher levels of hazardous drinking and lower levels of participation in OAs than non-offenders. It was also hypothesised that, within groups, participation in at least one OA would be associated with lower levels of hazardous drinking for both young offenders and non-offenders. Compared to participation in no OAs, however, participation in a team sport would be associated with a higher prevalence of hazardous drinking among non-offenders but lower levels of hazardous drinking among young offenders. The role of externalising behaviour in predicting participation was investigated to help understand these relationships.

#### 5.3.1 *Methods*

##### 5.3.1.1 *Participants*

###### 5.3.1.1.1 *Young offenders*

Detailed information about the young offenders and their recruitment can be found in study A. Ninety-three young offenders, mean age 16 years ( $SD = 1.02$ , range 13–18), were recruited from a local YOT by caseworkers who worked at the YOT. Only males were included in analyses and participants who had an estimated IQ score of less than 70, and therefore possible learning disabilities, were excluded.

#### 5.3.1.1.2 *Non-offenders*

Fifty-three non-offenders, mean age 15.1 years (SD = 1.3, range 13–18), were recruited from local schools in the catchment area of the YOT, ensuring that socioeconomic factors were similar across study groups<sup>7</sup>. They had no past or current contact with the criminal justice system.

#### 5.3.1.2 *Measures*

##### 5.3.1.2.1 *Organised activities*

Participation in OAs was measured by one question on the Youth Self Report (Achenbach & Rescorla, 2001), a two-part questionnaire measuring behavioural problems and competencies in youth aged 11 to 18 years.

Participants were asked to list up to three ‘organisations, clubs, teams, or groups’ they belonged to. Up to three different groups could be reported and all the activities reported were grouped into categories. Previous studies have made distinctions between “team” and “individual” sports (Peretti-Watel et al., 2002; McCaul et al., 2004; Wichstrøm & Wichstrøm, 2009). Clear definitions for these categories have not been explicitly stated in the existing literature; however, team sports for the purpose of this study are seen as physical activities that include working together with several team mates to achieve a goal. Those who listed football, rugby, hockey, cricket or basketball were categorised as participating in at least one team sport. Those who reported non-team activities (kickboxing, gym, swimming, fishing, snooker, skittles, pool, rowing, motorbikes, sign language,

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<sup>7</sup> Participant’s postcodes were used to provide an estimate of average weekly income (based on wages, salaries, self employment, benefits, pension and other sources). Information on average weekly incomes by postcode is readily available from the ONS ([www.neighbourhood.statistics.gov.uk](http://www.neighbourhood.statistics.gov.uk)) along with information on validation, quality assurance and accuracy.

computer club, music group, cadets and youth group) were categorised as doing other activities ('other OAs'). Although it can be argued that some individual activities, such as swimming, can also be classified as a team sport because participants may belong to a team of competitors, they are still activities that rely on one individual's performance. Non-sport activities may also require elements of team work, for example playing a musical instrument in a band. Previous studies have classified team sports as separate from individual sports as well as other types of OAs, including group activities (Denault & Poulin, 2009). Due to a limited number of individual sports and a large number of team sports reported between the two samples (see Figure 5.6), and the recurrent evidence that team sports specifically are positively associated with alcohol use (Peretti-Watel et al., 2002; McCaul et al., 2004; Wichstrøm & Wichstrøm, 2009), a small number of individual sports were classified as other OAs in the current study. Those who did not report any participation were categorised as doing "no OAs". These three groups were mutually exclusive. Those who reported at least one team activity were categorised as participating in a team sport even if they reported participation in other non-team activities. Participants were then described according to three binary variables, one for each activity category, which were the independent variables in subsequent analyses. Three-way comparisons between those who participated in sports, other OAs and no OAs have been conducted previously (Gardner et al., 2009). In the current study, team sports were more popular and the small number of other types of activities reported did not allow for comparison.



#### *5.3.1.2.2 Indicators of hazardous drinking*

Hazardous drinking was measured by the FAST (Hodgson, Alwyn, John, Thom, & Smith, 2002). The FAST assesses levels of hazardous drinking using four questions about frequency of bingeing and negative effects resulting from alcohol use in the past year. Scores on the FAST range from 0 to 16, with a score of 3 or more indicate hazardous drinking. The FAST has been shown to have good test-retest reliability ( $>0.80$ ), internal consistency (Cronbach's  $\alpha = 0.77$ ), specificity and sensitivity when identifying hazardous drinkers (Hodgson et al., 2002), and correlates with breadth alcohol concentration (Moore & Cusens, 2010) and other established alcohol measures in samples of young people (Bowring, Gouillou, Hellard, & Dietze, 2013). The FAST is also used to measure changes in drinking patterns (Brendryen et al., 2013; Moore et al., 2013).

#### *5.3.1.2.3 Externalising behaviour*

The Youth Self Report questionnaire (Achenbach & Rescorla, 2001) is a reliable and valid measure of emotional and behavioural functioning in the past 6 months, with 122 items, each rated on a three-point scale. The externalising scale is a hierarchical score drawn on delinquent and aggressive behaviour sub-scales. Raw scores on the externalizing scale were converted into t-scores and used in the current analyses. T-scores enable comparison across scales while also normalising the distribution. The reliability and validity of the Youth Self Report questionnaire is well established (Achenbach & Rescorla, 2001). The current 8-syndrome taxonomic model meets the criteria for a good fit to data from 30,243 youths in 23 societies (Ivanova et al., 2007).

#### 5.3.1.2.4 *IQ*

IQ was estimated by creating a scaled score for vocabulary and matrix reasoning sub-tests of the WASI (Wechsler, 1999), adjusted for the age of the participant. The scores were summed to create an IQ estimate.

#### 5.3.1.2.5 *Offending history*

The offence frequency rate was measured for young offenders by dividing the number of offences committed by the participant's age at assessment. Although data on young offenders' age at first offence was available to researchers from the YOT during the study and could have also been used as an indicator of past offending history, it is not clear whether this is recorded systematically across young people as the severity of first crime may influence whether or not a crime is first recorded. Young offenders tended to be older in age thus reflecting more opportunities to have committed a crime. By dividing the number of offences by their age, differences in offending due to age was addressed. Offence severity was measured by the Youth Justice Board Seriousness Scale<sup>8</sup>.

#### 5.3.1.3 *Procedure*

This study was approved by the School of Psychology's Research Ethics Committee (SREC) at Cardiff University. Information about the study, including the tasks, right to withdraw from the study at any time and the confidentiality of the data collected was provided. For offenders and non-offenders alike, both the young people and their parent/guardian were required to give consent before participation.

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<sup>8</sup> (for information on how offences are scored with the seriousness scale see <http://yjbpublications.justice.gov.uk/en-gb/Resources/Downloads/Asset.pdf>)

#### *5.3.1.3.1 Young offenders*

Young offenders were recruited by caseworkers who worked at the YOT and decided if it was appropriate for the young offenders to take part in the research. The eligibility criterion for young offenders is presented in Study A.

#### *5.3.1.3.2 Non-offenders*

Contacts within local schools provided summaries of the research to students. Those who expressed an interest to participate were given relevant information and consent forms. When participant and parent consent forms were received researchers arranged a time for the study to take place.

For both groups, interviews were conducted individually with each participant in a private room. Before testing they were informed about the study, the tasks within the study, their right to withdraw at any time and the confidentiality of the data collected.

The data presented in this study were collected as part of a larger study investigating antisocial behaviour among young offenders. The data collection therefore took longer because of the additional measures used. Participants were given £5 store vouchers for each hour of their participation.

### 5.3.2 Results

#### 5.3.2.1 Descriptive statistics

Most participants were white British (n = 99, 72%). Young offenders were, on average, one year older than non-offenders ( $t(140) = 4.80, p < .001$ ). Forty-eight (56.5%) young offenders and 31 (62%) of the non-offenders lived in an area where the average income was £520 or less a week and were thus considered to have low socioeconomic status. Table 5.2 shows differences between young offenders and non-offenders on estimated IQ, externalising behaviour scores and FAST scores as well as young offender's offending history.

Table 5.2 Description of measures for offenders and non-offenders

Measure	Group	N	Min	Max	Mean	SD	P-value
IQ -WASI	Offenders	70	70	124	87.3	10.5	$p = .055$
	Non-offenders	34	74	125	92.0	13.2	
Externalising YSR	Offenders	78	40	82	64.1	10.1	$p < .001$
	Non-offenders	43	34	77	53.8	10.3	
FAST score	Offenders	80	0	12	3.38	3.23	$p < .001$
	Non-offenders	48	0	8	1.54	2.01	
Number Offences	Offenders	84	1	52	12.2	10.8	-
Offence rate	Offenders	84	0.06	3.06	0.76	0.67	-
Offence Severity	Offenders	84	2	8	5.35	1.28	-

Non-offenders had moderately higher IQ scores compared to young offenders while young offenders had higher FAST and externalising behaviour scores. On average young offenders had committed 12 offences with a mean severity score of 5 (representing more serious offences as judged by Youth Justice Board, e.g. indictable firearms offences, threat or conspiracy to murder and indecent assault) and

an average mean offending rate of 0.76. For the analyses in this study the offence frequency rate was transformed with a log transformation in order to reduce skewness. For ease of interpretation the untransformed data are shown in table 5.2.

#### *5.3.2.2 Participation in organised activities*

Figure 5.6 shows the percentages of participation in various OAs. A range of activities were reported across different types of sports as well as groups and clubs. Team sports were the most popular form of OA for both groups with 15.3% of young offenders and 34.6% of non-offenders participating in football. Rugby was the second most popular with 25% of non-offenders reporting participation. Non-offenders reported more participation among different types of activities. There were no young offenders who participated in sporting activities such as basketball, cricket, hockey, going to the gym, rowing or groups such as cadets, sign language, computer clubs or music clubs.

Figure 5.6 Organised activities reported by participants (not mutually exclusive)

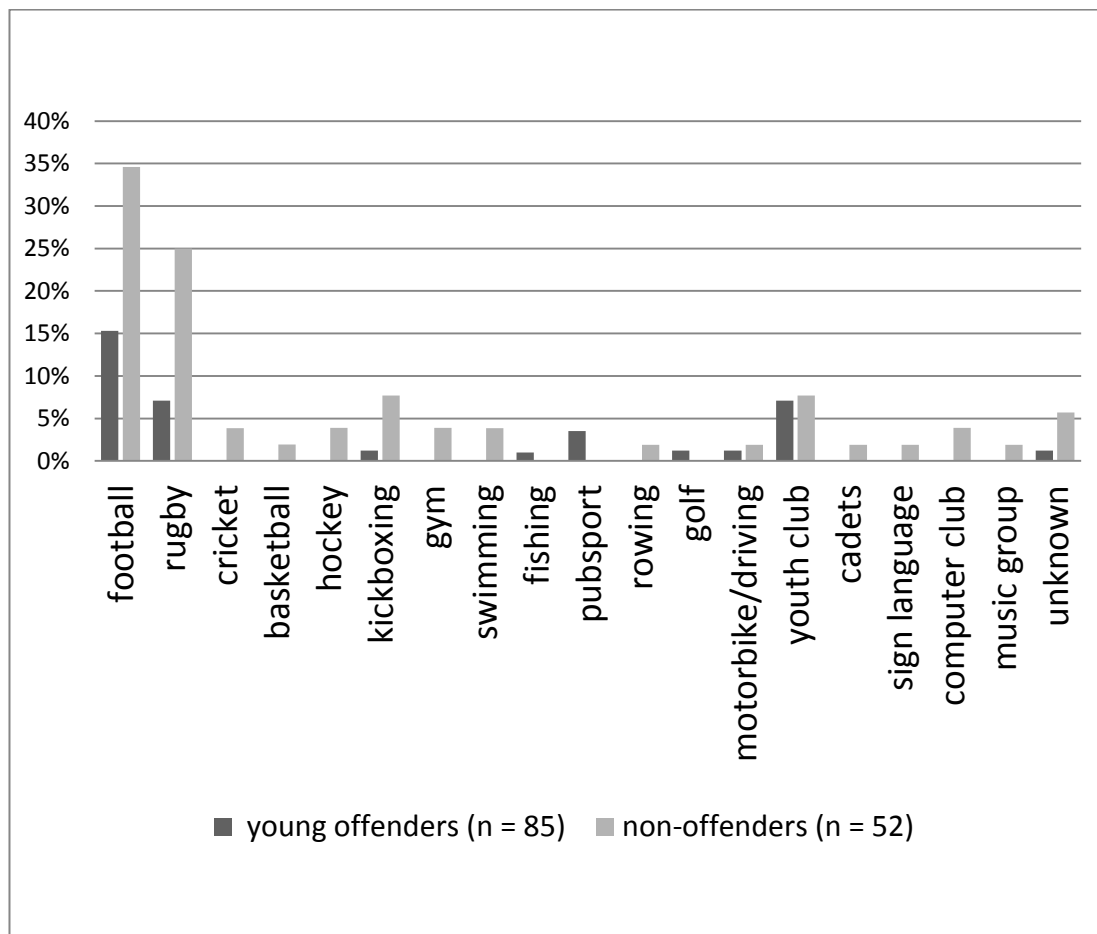
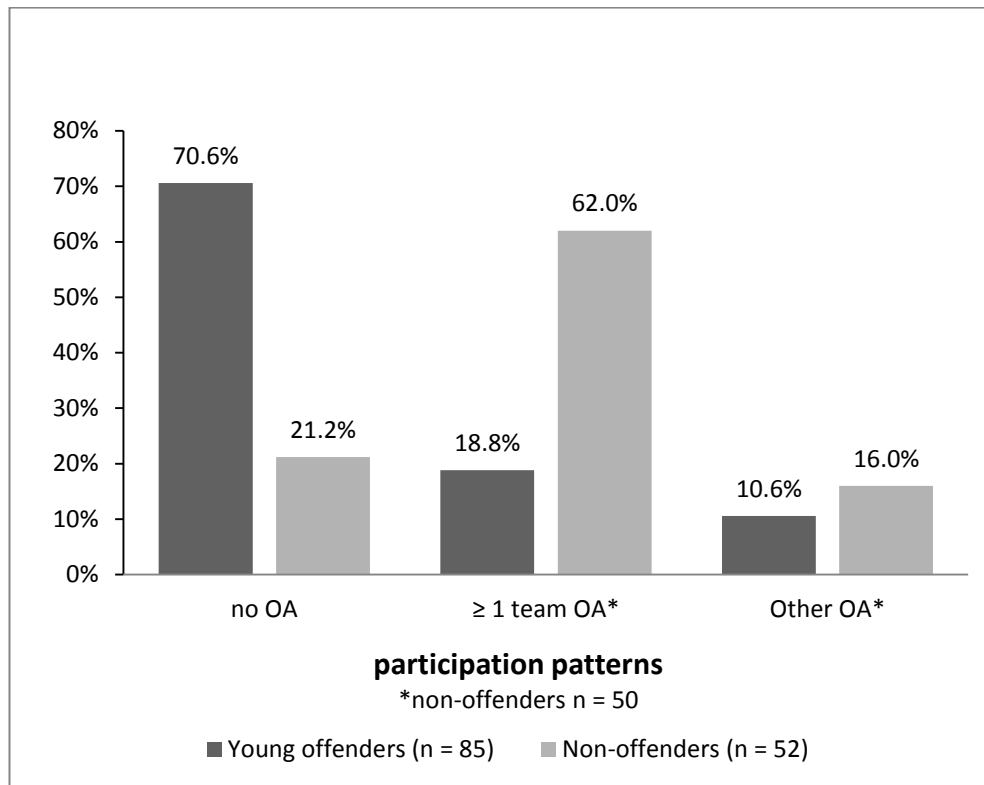


Figure 5.7 displays the percentage of young offenders and non-offenders who participated in no OAs, at least one team sport, or other activities. Sixteen (19%) offenders but nearly two-thirds of non-offenders (31, 62%) reported participation in team sports, whereas just nine (11%) young offenders and eight (16%) non-offenders participated in other activities. Two non-offenders listed an OA that could not be categorised because it was not clear what type of activity it was (represented above in Figure 5.6 as “unknown”). Although these two participants were known to be involved in an OA, they were not included in the analyses when specific types of OAs were investigated. Two (2%) young offenders and eight (16%) non-offenders

reported participation in a team sport and other non-team activities. Fewer young offenders than non-offenders participated in at least one OA ( $\chi^2 (1) = 31.6, p < .001$ ) and in at least one team sport ( $\chi^2 (1) = 23.8, p < .001$ ).

*Figure 5.7 Participation rates in organised activities for young offenders and non-offenders*



A logistic regression was used to test whether age, estimated IQ or externalising behaviour predicted OA participation outcomes (see table 5.3). For each model, age and IQ scores were entered first followed by scores on externalising behaviour which was entered as an interaction term with group (young offender or non-offender). None of these measures were associated with any OA participation or a team sport. A likelihood ratio chi-square test found that both models fit the data

better than an empty model ( $\chi^2(4) = 27.5, p < .001$ ;  $\chi^2(4) = 25.1, p < .001$ , respectively).

*Table 5.3 Predictors of participation patterns using logistic regression. Dichotomous outcomes compared participation in no OA to participation in (a) any OA (n = 99) and (b) team sport (n = 85)*

Independent variables	Participation in any OA			Participation in team sport		
	OR	95% CI	p	OR	95% CI	p
Age	0.68	0.44-1.03	.072	0.69	0.41-1.16	.160
IQ	1.01	0.97-1.04	.775	1.00	0.96-1.05	.846
Externalising behaviour						
Young offenders	0.97	0.92-1.01	.142	0.96	0.91-1.01	.134
Non-offenders	1.00	0.94-1.05	.864	0.99	0.94-1.06	.843

### 5.3.2.3 Hazardous drinking and participation in organised activities

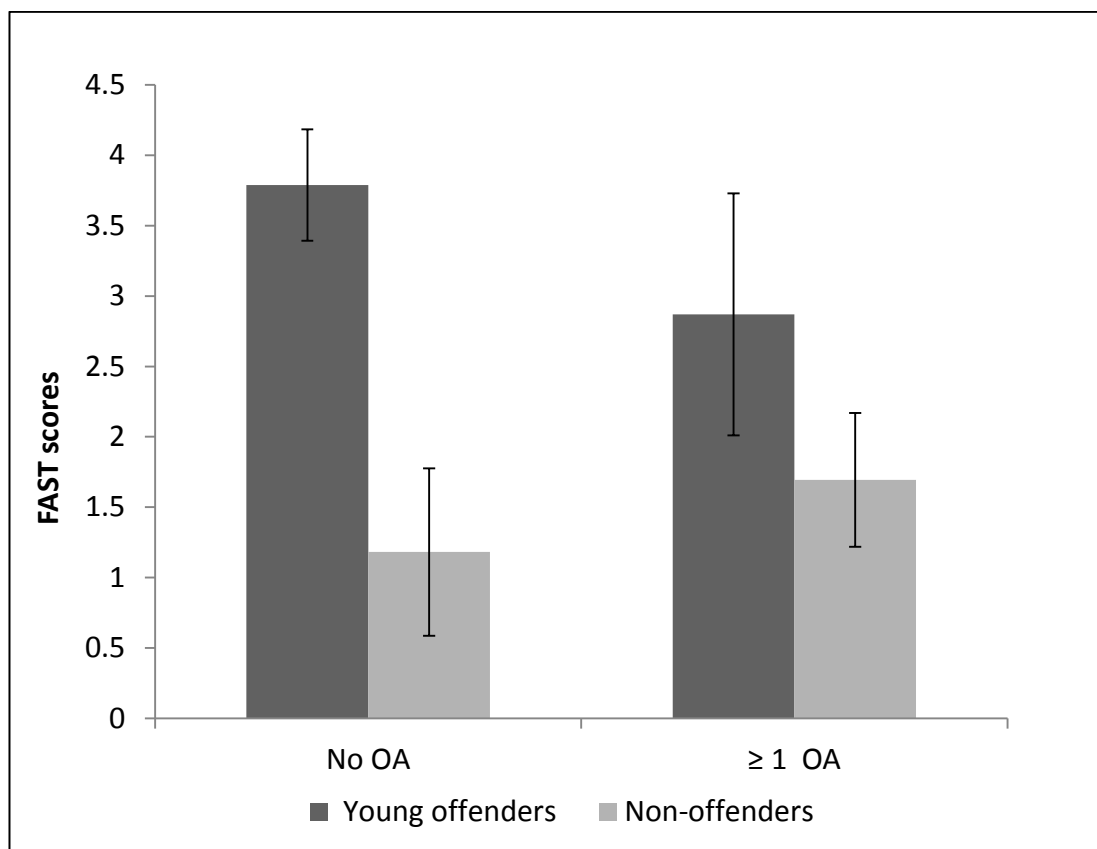
Hazardous drinking, indicated by a FAST score of 3 or more, was more common among young offenders (43, 54%) than non-offenders (13, 27%;  $\chi^2(1) = 8.7, p = .003$ ). A 2x2 ANOVA was used to test differences on mean FAST scores for young offenders and non-offenders depending on whether or not they participate in an OA<sup>9</sup>. No interaction effects between groups (young offenders/non-offenders) and OA participation were found ( $F(1, 118) = 1.39, p = 2.41$ ). Nor were there any significant differences on FAST scores between those in an OA (mean = 2.15, SD = 2.41) and those not in any OA (mean = 3.33, SD = 3.37;  $F(1, 118) = 0.11, p = .74$ ; see fig. 5.8). There was a significant main effect of group confirming that young offenders reported higher FAST scores (mean = 3.51, SD = 3.26) than non-offenders (mean = 1.57, SD = 2.02;  $F(1, 118) = 9.69, p = .002, \eta^2 = 0.073$ ).

<sup>9</sup> For all ANOVA tests, analyses were conducted with untransformed FAST scores, as reported here, as well as FAST scores transformed with a log function. Results did not differ from these changes and for ease of interpretation the untransformed FAST scores are reported.



Amongst young offenders, t-tests showed that those who engaged in an OA had significantly higher offending frequency (mean = 0.58, SD = 0.87) than those who did not (mean = 1.07, SD = 0.95,  $t(68) = 2.14, p = .036$ ); however, they did not differ on seriousness of past offences (mean = 5.36, SD = 1.56, mean = 5.31, SD = 1.19, respectively;  $t(68) = 0.151, p = .88$ ).

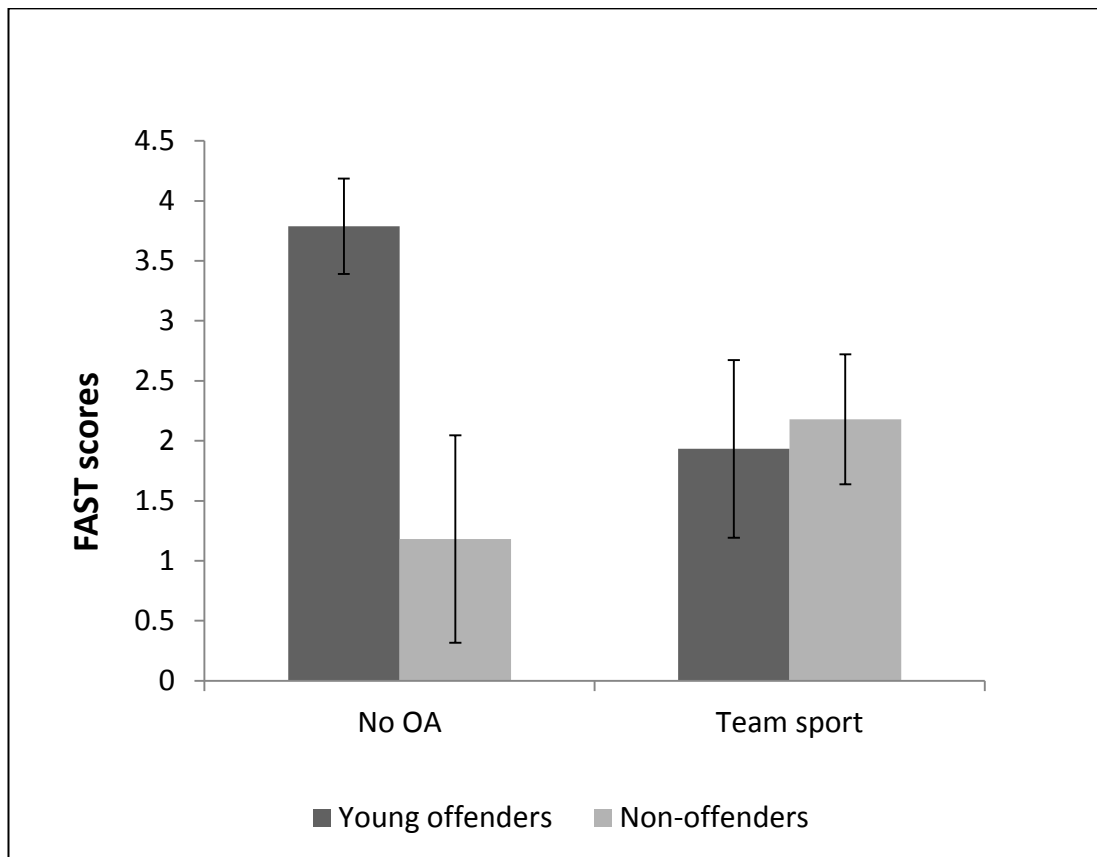
*Figure 5.8 Participation in no organised activities or at least one organised activity and mean FAST scores for young offenders and non-offenders*



The same approach was then taken with team sports more specifically. A  $2 \times 2$  ANOVA showed a significant interaction ( $F(1, 102) = 4.66, p = .033, \eta^2 = 0.041$ ; see Figure 5.9). FAST scores were significantly higher among young offenders (mean = 3.79, SD = 3.48) than non-offenders (mean = 1.18, SD = 1.66) for those in no OAs ( $t(61) = 2.42, p = .019$ ). There was no difference in FAST scores among

young offenders (mean = 1.93, SD = 2.15) and non-offenders (mean = 2.18, SD = 2.18) who participated in a team sport ( $t(41) = 0.35, p = .726$ ). Within the offender group, there was a trend towards those participating in a team sport having lower FAST scores (mean = 1.93, SD = 2.15) than those in no OAs (mean = 3.79, SD = 3.48;  $t(65) = 1.95, p = .055$ ). Within the non-offender group, there was no significant difference in FAST scores between those in a team sport (mean = 2.18, SD = 2.18) and those in no OAs (mean = 1.18, SD = 1.66;  $t(37) = 1.37, p = .18$ ). Seriousness of past offences did not differ between young offenders who participated in a team sport (mean = 5.8, SD = 1.32) and young offenders who participated in no OAs (mean = 5.31, SD = 1.19;  $t(61) = 1.35, p = .182$ ) but did marginally differ on offending frequency rates (mean = 1.12, SD = 0.99; mean = 0.58, SD = 0.87, respectively;  $t(61) = 2.00, p = .049$ ).

Figure 5.9 Participation in no organised activities or a team OA and mean FAST scores for young offenders and non-offenders



Further investigation showed that young offenders who participated in a team sport had significantly lower FAST scores (mean = 1.93, SD = 2.15) than young offenders in other types of OAs (mean = 4.63, SD = 2.83;  $t(21) = 2.56, p = .018$ ). Comparison of scores showed that this relationship was reversed among the non-offenders, although here, the higher group mean was below hazardous drinking levels (FAST score mean among team sport = 2.18, SD = 2.18; other OA FAST score invariably 0).

### 5.3.3 Discussion

This cross-sectional study provided insights into OA participation rates and indicators of hazardous drinking in a British sample of at-risk youth with low socioeconomic status. Young offenders in this study are particularly under-represented in other research; typically, such a group includes adolescents who are frequently excluded from school, involved in the criminal justice system from an early age and need additional support from numerous statutory agencies. This is the first study to assess systematically the relationship between OA participation and hazardous alcohol use in such a vulnerable cohort.

As predicted, young offenders participated in significantly fewer OAs than non-offenders and had significantly higher levels of hazardous drinking. For those who participated in no OAs, young offenders had significantly higher scores on hazardous drinking than non-offenders. Young offenders did not, however, differ from non-offenders in FAST scores if they participated in a team sport. These interactions were only found when participation in a team sport was compared to no OA participation, suggesting that these results were dependent on the type of OA investigated and that participation in an OA in itself was not associated with lower levels of hazardous drinking.

The relationship between participation in a team sport and drinking was in opposite directions in offender and non-offender groups. It has previously been shown that students who participate in sports (Barber et al., 2001; Denault et al., 2009; Eccles & Barber, 1999; Fredricks & Eccles, 2006a) and team sports (Barber et al., 2001; Denault et al., 2009; Eccles & Barber, 1999; Fredricks & Eccles, 2006a; McCaul et al., 2004; Peretti-Watel et al., 2002; Peretti-Watel et al., 2003; Wichstrøm

& Wichstrøm, 2009) report higher levels of alcohol use. In this study, there was an indication of this pattern amongst non-offenders but not young offenders. The apparent advantage for the offender groups is consistent with previous observations that show those who are worse-off benefit most from taking part in OAs (Diamond & Lee, 2011; Mahoney, 2000; Mahoney & Cairns, 1997).

Challenging behaviours have been shown to predict both alcohol use (Hawkins et al., 1992; Maslowsky & Schulenberg, 2013; Patrick & Schulenberg, 2010) and less participation in OAs (Fredricks & Eccles, 2006b). Measures of externalizing behaviour were not associated with participation in team sports, or indeed, any OA and cannot explain the observed relationships between OA participation and hazardous drinking. As adolescents get older they often reduce their OA participation and increase their alcohol use (Peretti-Watel et al., 2002). Age is therefore an important factor to consider. Although young offenders were moderately older than non-offenders, age was not found to be associated with OA participation.

Categorising participants based on their participation in a team sport did not capture the total amount of activities participated in or the diversity of activities engaged in; however, only eight non-offenders and two young offenders participated in a team sport as well as other types of OAs. Therefore, it is unlikely that grouping participants by their participation in a team sport was diminishing the importance of participation in different types of OAs. Due to the low participation rates of young offenders this study was not able to investigate level of participation (Peretti-Watel et al., 2003; Wichstrøm & Wichstrøm, 2009) and whether specific team sports or the amount of team sports (Busseri et al., 2006) were differently associated to hazardous

drinking. OA participation was assessed from a single item. Intensity (measured by frequency of participation, Bohnert et al., 2010) was not reported. Intensity would have been a good indicator of the amount of time young people spend in OAs, as frequent exposure is needed to experience any positive effects from OA participation (Bohnert et al., 2010) and more frequent participation is likely to be associated with an increase in adult supervision and less alcohol use. Additionally, the context of participation was not investigated even though school-sponsored sports have shown different relationships with alcohol use compared to sports not sponsored by schools (Moore & Werch, 2005).

This study only investigated OA participation among males and therefore these results cannot be generalised to females. Adolescent females participate less in sports compared to males (Darling, 2005; Denault & Poulin, 2009; Moore & Werch, 2005; Pate et al., 2000), and the role of OAs for young female offenders is an area that still needs to be explored. Female offenders may not have equal access to sporting activities that they enjoy (Kelly, 2011) resulting in lower levels of participation.

During recruitment, caseworkers in the YOT made referrals of the young people which they deemed appropriate to take part in the study to the researchers. This may have led to bias in recruitment and thus study findings; however, researchers also had access to a list of each caseworker's case load of the young people they worked with, allowing for a more systematic recruitment procedure because the researcher could contact the caseworker about each open case. Nevertheless, opportunities to participate in the study were dependent on caseworkers' judgements about the young offenders as well as the young offenders'

ability to secure parent/guardian consent. As such, the young offenders who participated in the study may be systematically different from young offenders who were either not approached or did not provide consent. There were substantial variations in the severity of offences and the number of offences committed by the young offenders who participated in this study, suggesting that the sample may have been suitably representative of young offenders. Unfortunately there is no information available on the total number of young offenders who were enrolled at the YOT during recruitment or how young offenders who participated might differ from young offenders who did not participate.

Cross-sectional relationships were investigated and it was not known how long participants had participated in OAs or how long they had been drinking alcohol. Although participation may influence alcohol use, alcohol use may also influence participation. It remains that other confounding variables and self-selection factors other than externalising behaviour may explain observed relationships (Peretti-Watel, 2009). Longitudinal studies or controlled interventions would have the ability to disentangle these relationships and the results reported here suggest that such studies might be feasible.

Finally, this study used the FAST alcohol screening tool to measure hazardous drinking. This is an indirect measure of alcohol use that focuses on negative consequences caused by drinking rather than different patterns of alcohol consumption. For example, the FAST cannot distinguish between binge drinking, drinking onset and patterns of recent drinking. It is not clear to what extent OA participation was associated with specific patterns or characteristics of alcohol use.

Despite these limitations, this study shows that the relationship between OA participation and hazardous drinking in smaller, atypical groups differs from that in the general population. In fact, on average young offenders who participated in a team sport reported non-hazardous drinking levels comparable to non-offenders in team sports. Young offenders who participate in team sports might show less hazardous alcohol use because of the physical demands of the sport, the wider social support gained from an increase in social capital, the influence of social group norms and positive social role modelling (Eccles et al., 2003; Mahoney et al., 2003; Wichstrøm & Wichstrøm, 2009). Young offenders participated in fewer OAs and as a whole, reported higher levels of hazardous drinking. Another explanation for this may be related to mood. Internalising symptoms have been shown to predict less participation in some types of OAs (Bohnert et al., 2007) and is associated with problematic alcohol use among adolescent samples (Saraceno, Munafo, Heron, Craddock & Van Den Bree, 2009). It is possible that lower mood among young offenders may lead to less OA participation and higher levels of hazardous drinking.

In conclusion, although young offenders were less likely to have participated in OAs, for them, participation in a team sport was associated with less hazardous drinking in this group. This suggests that vulnerable youths who might benefit most from sporting activities actually access them the least. Future research should identify the barriers to participation, whether environmental, social and/or psychological that vulnerable young people face and determine the characteristics of activities that they find attractive. This can support the development of more effective sport-based interventions for vulnerable young people. Steps should also be taken to evaluate such interventions, and the extent to which they impact vulnerable young people's alcohol use.



**6 Organised activity participation among vulnerable young people: Barriers to engagement and pathways for reducing alcohol use**

As discussed in Chapter two, there are several limitations in investigating a research topic using a single method. While quantitative analyses allow relationships among variables to be statistically tested, it fails to provide a deeper understanding of meanings and the complexities of a problem. Qualitative research can therefore be used in conjunction with quantitative methods to provide additional insights in to a problem (Ivankova et al., 2006). By using an explanatory mixed methods design, this thesis can further explore the quantitative results in previous chapters.

This thesis recognised that barriers to OA participation could take many shapes and that an obstacle to OA participation could act as a barrier in different ways; however, quantitative investigations of OA participation fail to achieve this level of understanding. For example, in Chapter three young people with conduct problems and low inhibitory control were less likely to participate in sports, but why these traits were associated with less participation was not apparent. Quantitative investigations in this thesis were limited to pre-selected variables and other possible determinants of OA participation, and their interaction with individual-level factors, were not investigated. It has been recommended that research should attempt to understand how individual-level factors impact OA participation in ecological conditions (Bohnert et al., 2010).

In Chapters four and five the relationship between OA participation and alcohol use was investigated and discrepant results emerged from these two studies. In Chapter four sport participants were more likely to report alcohol use at 16 years of age, while in Chapter five young offenders reported less hazardous drinking if they participated in a team sport. This suggests that sub-groups of young people may

show unique relationships between OA participation and alcohol use. These specific points of interest were explored within this qualitative study.

## *6.1 Introduction*

### *6.1.1 Barriers to organised activities among vulnerable young people*

Young people are not a homogenous group (Valentine, 1999) and adolescents who are at risk of unemployment, homelessness, failing school and becoming estranged from families risk social exclusion (Coles, 1997). Due to their vulnerable position in society, these groups of young people may face particular difficulties accessing the resources and services they need. A criticism of quantitative investigations of OA participation is that many studies fail to account for the young people who would like to participate in OAs but are unable to do so (Bohnert et al., 2010). Research has mainly focused on demographic determinants of participation such as income (Bohnert et al., 2010) but despite government efforts in some countries to make OAs more affordable, children from low income groups continue to show low OA participation levels (Dearing et al., 2009). This suggests there are other reasons for non-participation among certain groups. In chapter five, young offenders were significantly less likely to report participation in OAs compared to a group of non-offenders who were matched on factors such as income, a finding which points towards OA participation disparities among young people within the British population.

Socio-ecological models have been used as frameworks to examine barriers and facilitators of OA participation, mainly for sports participation (Eime et al., 2013; Vella et al., 2014). These investigations have included individual, interpersonal and community influences; however, they have failed to consider wider

barriers which may occur at higher levels, such as national laws and policies. Existing models may be based on studies using student populations and are less suited when applied to the context of vulnerable young people (Haudenhuyse, Theeboom, & Coalter, 2012). As such, little information exists on the factors that contribute to engaging at-risk youth in activities taking place outside of the school curriculum (Weiss, Little, & Bouffard, 2005).

An ecological framework that can conceptualise and organise the barriers to OA participation is McLeroy's et al. ecological model presented in Chapter one (McLeroy et al., 1988). This framework enables identification of barriers to OAs at multiple levels. OA participation can then be increased by intervening at the identified barriers at multiple levels.

From the literature surrounding OA participation there is scope for barriers to present at all levels of this framework. At the intrapersonal level characteristics such as externalising behaviour are associated with less participation in OAs (Fredricks & Eccles, 2006b) and can create difficulties for participation if this conflicts with creating a safe and welcoming environment for others (Kelly, 2011). Even within targeted programmes challenging young people may be excluded from participation due to their behaviour (Kelly, 2011).

Interpersonal process and primary groups, the second level of the framework, reflects formal and informal social networks. Interactions with other individuals in OA contexts may be difficult due to tensions among rival groups of young people and can heighten difficult behaviour in competitive settings (Kelly, 2011). Vulnerable young people may also be sensitive to figures of authority serving as

facilitators in OAs, such as sport coaches who should “...have authority, without being authoritarian” (Haudenhuyse et al., 2012, p. 444).

Institutional factors, or formal and informal rules of a social institution, may actively exclude vulnerable young people through policies regarding past criminal behaviour or lack of involvement in formal education. Community factors, such as relationships between OA providers and other community programmes are important because they enable services to be delivered more effectively, to access more funding in addition to providing opportunities to influence local political decision making (Kelly, 2013). Young people with complex needs in particular might benefit more from projects in partnership with specialist agencies (Kelly, 2011). Finally, state-funded projects and individuals from the public sector must work within budgets and risk-assessed contexts which may impact the extent and type of activities they are encouraged to pursue. As such, state and national laws at the Policy Level may impact the ability of organisations to facilitate participation by vulnerable young people

In summary, vulnerable young people may face unique barriers to OAs that present despite agents in communities aiming to facilitate their engagement. Using an ecological framework can help identify barriers presenting at multiple levels and can guide the development of targeted interventions that aim to increase OA participation among vulnerable groups.

#### *6.1.2 Using organised activities as an intervention among vulnerable groups*

Policy is moving increasingly towards using OAs, such as sport, to address youth crime, anti-social behaviour and substance use (Parker et al., 2013); however,

evidence for its effectiveness is lacking (Smith & Waddington, 2004). For example, studies using sports to improve outcomes for vulnerable young people have been limited to small samples making it difficult to understand the effective components of the intervention (Coakley, 2011; Parker et al., 2013). The studies draw on anecdotal reports of individuals (Smith & Waddington, 2004) and suffer from vague rationales, over ambitious objectives and lack understanding of the complex causes of delinquency (Coalter, 2001).

Evaluating the relationship between sports and outcomes with quantitative studies has been criticised because focus is placed on measuring outcomes and not exploring the processes involved in making sports or other OAs effective (Crabbe, 2007; Hartmann, 2003). In a review of sport and youth development, Coakley (2011) suggested that the impact of sport-based interventions on outcomes is dependent on the presence of enabling factors within these programmes, and sport per se may not have a beneficial impact on reducing young people's delinquency and substance use. From this perspective, the effectiveness of OAs is less specific to the type of OA activity per se but rather to the mechanisms and processes associated with OA participation.

Schemes used by the youth justice system such as Positive Futures, focus on the use of OA as a "hook" to lead at-risk young people back into education or training. Kelly (2013) evaluated the processes within this scheme and found activities enabled staff to develop supportive, mentoring relationships with young people which in turn helped them to address a range of health, welfare and educational issues. The programme facilitated young people's socialisation in a sanctioned, safe space where they did not risk attracting negative attention from

police. Finally, the programme in partnership with other community members reduced crime by shaping the way crime was locally managed (Kelly, 2013). Kelly's study investigated youth crime as an outcome; however, the programme's objective was to "have a positive influence on individual's substance misuse, physical activity and offending behaviour" (Concern, 2006, p. 10). How this project, or similar schemes in the UK, might impact substance use was not discussed.

A reason why sports are used as a diversionary activity to reduce substance use is based on the belief that sports provide alternative but equally enticing activities as they "create enjoyment and excitement, and thus provide an antidote to boredom" (Smith & Waddington, 2004, p. 284). Although sports or other activities capture these same dimensions of enjoyment it does not necessarily follow that they would replace substance use behaviour (Smith & Waddington, 2004). Crabbe (2000) argued that the "same emotions of excitement, euphoria, celebration, tension and fear are being used does not suddenly result in drugs no longer being seen as 'fun' or worthwhile" (p. 390). Critics of using sport-based interventions on this basis highlight studies from Western societies which show a positive relationship between sport and alcohol use (Smith & Waddington, 2004), but as shown in Chapter five, these relationships may not hold true for all young people.

In summary, OAs are used by local authorities and charities to tackle delinquency and substance use among disaffected youth; however there is little evidence to support their effectiveness. The processes that underlie why OAs might be effective in addressing alcohol use among vulnerable groups, and therefore the reasons for their use, are unclear. It is therefore necessary to understand how OAs might impact alcohol use, particularly among vulnerable young people.

### 6.1.3 *The current study*

This qualitative study aimed to understand the barriers to engaging vulnerable young people in OAs and how OAs may impact alcohol use among these groups. Local governments employ youth workers, mentors, community teams and charities to work with young people, particularly hard-to-reach groups. These practitioners often try to encourage young people to participate in OAs; however, it is evident that successful participation can be difficult despite this aid (Kelly, 2011, 2012, 2013). Practitioners have first-hand experience of the difficulties facing young people and are likely to understand the barriers that prevent vulnerable young people from engaging in OAs. From their relationships with young people they are also likely to have motives for engaging young people in OAs and beliefs about how OAs may impact alcohol use among the young people they work with. These questions were investigated via semi-structured interviews with practitioners who have experience working with vulnerable young people and facilitating their engagement in OAs. This study was conducted solely by the author, including recruitment, data collection, data transcription, data analyses and write-up.



## 6.2 *Methods*

### 6.2.1 *Participants*

This study was conducted with 15 individuals who worked closely with young people, and through their job role, encouraged and facilitated their participation into OAs. These individuals were deemed appropriate as they had the best knowledge of this experience (Bowen, 2008). All participants, five females and ten males, were white British and between the ages of 19 and 52. In total, participants worked in one of three different organisations and held different positions within these organisations (for example a youth worker and their manager). Due to the small number of these roles within these specialised services, the names and age of participants as well as the names of the specific projects have been kept anonymous. All three organisations worked closely with vulnerable young people in particular. In total, eight participants worked for the youth offending service (two females, six males), five participants were council-based youth workers (two females, three males) and two worked for a charity supporting young people leaving or about to leave statutory care (one male, one female). All participants worked in organisations located in South Wales.

### 6.2.2 *Recruitment*

Snowball sampling was used to recruit participants. Using this approach, participants are recruited via individuals who recommend people meeting the inclusion criteria of the study and who might be interested in participating (Sarantakos, 2005). Contacts of the researcher who worked with young people (and as a consequence were in contact with other individuals working with vulnerable young people) were contacted by letter providing details of the study. Copies of invitation letters and

information sheets for eligible participants were sent to contacts for distribution to individuals interested in taking part in the study. Contacts of the researcher reported back to the researcher providing details of interested individuals wishing to participate. Several individuals interested in participating contacted the researcher independently via email. Recruitment continued throughout the study until theoretical saturation was met, that is, it was found interviews provided no new information anymore (Bowen, 2008).

### *6.2.3 Procedure*

Before setting up an interview date, the researcher checked that eligible participants met certain inclusion criteria. Participants were eligible to participate if they were 18 years of age or over and worked with vulnerable young people in South Wales. For the purposes of this was described as young people who were 18 years of age or younger and who were either at risk of offending, or not in education, training or employment. Individuals were not interviewed if they were younger than 18 years of age and did not work with the young people described above. Individuals who worked with vulnerable young people but did not have experience facilitating or supporting their participation in structured activities were excluded.

If individuals met the inclusion criteria a suitable time and place to be interviewed was arranged with the interviewee. Participants were reminded that they could terminate the interview and withdraw from the study at any time without giving a reason. They were also reminded that they could refuse to answer any question without being asked to give a reason and that any identifying information (including people, places and specific organisations/activities) provided during the interview would be anonymised. Before the interview began, participants were asked

if they had any questions before signing a consent form. The designated time for the interview was 60 minutes however several of the interviews continued beyond the allocated time. In all cases where the interview overran the interviewees were asked if they would like to stop the interview or cut it short, although no one exercised this option.

All interviews took place between November 2013 and February 2014. Interviews were held at the interviewee's place of work during work hours in meeting rooms. Two participants worked with an organisation without a location base and these interviews were arranged at places which suited the interviewees. Dictaphones were used to record the interview. After the interview participants were given debrief forms.

#### *6.2.3.1 The interview schedule*

Semi-structured, one-to-one interviews of between 35 to 80 minutes long were conducted with each participant. While methods of interviewing are flexible, yield high response rates, are easy to administer, and are capable of handling complexity and recording spontaneous answers (Alasuutari, Bickman, & Brannen, 2008), face to face interviews allow for optimal communication and enables the researcher to use a variety of measurements (Alasuutari et al., 2008).

One-to-one interviews were chosen because several interviewees worked within the same project. While group interviews would have allowed for observing group interactions (Frey & Fontana, 1991) and a greater range of perspectives from participants in a shorter amount of time (Berg, 2004); it was important to be able to explore all the challenges participants faced, even if this related to relationships with colleagues. In a group interview, hierarchy and statuses within groups may lead

lower status individuals to contribute less or present a misrepresentation of their views (Reed & Payton, 1997). By using one-to-one interviews participants could express their opinions more freely about these experiences.

Semi-structured interviews are “conducted on the basis of a loose structure consisting of open ended questions that define the area to be explored... and from which the interviewer or interviewee may diverge in order to pursue an idea in more detail” (Britten, 1995, p. 251). As discussed above, this study aimed to further explore results in previous chapters and this approach facilitated this investigation yet also enabled participants to select and elaborate on issues unforeseen by the interviewer.

#### *6.2.3.2 Semi-structured interview topics*

The first section of the interview covered participants’ job roles and the organisation they worked for. Participants were also asked to describe the young people they worked with and why they were deemed vulnerable.

The second section explored the challenges participants faced when they tried to engage young people into OAs. Following questions on barriers to engaging young people in OAs, participants were then prompted with cue cards to explore and help develop discussion of different types of challenges. Prompts are often used in interviewing to make it easier for respondents to answer questions and to help them discuss their response (Sarantakos, 2005). The items presented on the cards drew on past literature which had identified possible challenges for facilitating participation. These items were as follows: national laws/policies, money, time of activities, rules/structure of activities, the young person’s social network, the young person, location of activities and other. Participants were asked if the items were important,

and discussions continued surrounding if and how they presented as a challenge to them. The cards were presented at the end of the section to allow the participant to provide free-recall of the challenges first before exploring other areas of challenges.

The final section of the interview explored participants' views of the young people's alcohol use. Their beliefs and opinions on using OAs to address alcohol use were explored and the reasons for these views. A copy of the interview questions and interview protocol can be found in Appendix F.

Two pilot interviews were conducted with two participants. As a result, the interview schedule was only minimally refined and therefore the pilot interview transcripts were included in analysis.

#### *6.2.4 The researcher position*

In the case of semi-structured interviews, a researcher can influence the types of questions asked, how information is presented to the researcher and how it is interpreted. Many of the participants felt deeply dedicated to the people they worked with, rather than the organisations or projects they worked for and were keen to talk about their experiences. It is likely however, that those interviewed wished to present themselves in a particular light and their accounts of their experiences may reflect this. At the start of the interview the researcher reminded interviewees that their information would not be linked to the identity of the organisation<sup>10</sup>, or any individuals they worked with in an effort to reassure participants about anonymity. The participant reported a wide range of challenges and because the researcher was independent of their organisation it is likely that these were an accurate reflection of their experience.

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<sup>10</sup> For those who worked for Youth Offending Teams and local councils, the name of the local youth offending team and the name of the councils are not disclosed.

### 6.2.5 *Ethical considerations*

Ethical approval for this study was given by the School of Dentistry Ethics Committee at Cardiff University. Prior to interviews, interviewees were given information sheets. Participants were reminded again that their participation was voluntary, they could stop the interview at any time without giving a reason, they could choose to not answer questions and any names of individuals or organisations would be anonymous. Identifying information of the interviewee, and also individuals or organisations named during the interview was removed during transcription. All interviews were stored on a password-protected university computer and deleted from the recording device after the interview took place.

The interview questions drew on the participant's work experience. As such, the study did not investigate sensitive information about participants and was not intrusive. No elements of the study were identified to cause physical or psychological harm. Nevertheless, were interviewees to become upset for any reason during the interview, processes were in place to stop the interview immediately. In this event, the interviewer would provide contact details to the participant of the project supervisor who would then refer them accordingly. If participants provided any information requiring the researcher to break confidentiality, the researcher would inform the project supervisor who would then refer as appropriate.

### 6.2.6 *Data analysis*

Interviews were transcribed verbatim by the researcher and analysed using thematic analysis (Braun & Clarke, 2006). Thematic analysis is defined as a method for identifying, analysing and reporting patterns (themes) within data (Braun & Clarke, 2006, p. 79). It can be used with a realist method by capturing reports of experiences

and the reality of participants, is more accessible for analyses of early-career qualitative researchers and does not require “the detailed theoretical and technological knowledge of approaches, such as grounded theory and DA” (Braun & Clarke, 2006, p. 81).

Braun & Clarke describe thematic analysis as a six-step process:

- 1) Familiarisation with data (read through and transcribe the data, search for meanings and patterns, take notes or start developing ideas for coding)
- 2) Generation of initial codes (organise data into meaningful groups systematically across the data set)
- 3) Search for themes (sort the different codes into potential themes to create candidate themes and sub-themes)
- 4) Review themes (refine candidate themes to create clear distinctions between themes and coherence as well as meaning within themes, generate a thematic map of analysis)
- 5) Define and name themes (refine themes to present in analysis, describe the essence of each theme and what it captures. Identify what is of interest and why by generating a story of the analysis and a clear name for each theme)
- 6) Produce the report (provide a concise, coherent, logical non-repetitive and interesting account of the data and proficient evidence of themes with data extracts, providing an argument in relation to the research question).

Thematic analysis is not tied to any pre-existing theoretical framework and is suitable for the mix-methods approach used in this thesis. Themes in the analysis were identified in a theoretical process, coding for the specific research questions (Braun & Clarke, 2006). Finally, the data were analysed at a semantic level (Boyatzis, 1998). Themes were identified within the explicit or surface meanings of the data and nothing beyond what the participant said. Approaching the data in this way meant the data were first described (organised into codes showing patterns of

semantic content) and then interpreted (theorising the shape of the patterns and their significance).



## 6.3 Results

### 6.3.1 Barriers to organised activity participation

Key themes from the interviews were developed relevant to the first research question which explored the important barriers to engaging vulnerable young people in OAs.

These key themes were:

1. Risk Management
2. Resources (subthemes: Transport, Time, Money)
3. Group differences (subthemes: Abilities, Interests)
4. Colleagues
5. Social Situations (subthemes: Mixing with other groups, Stereotypes, Interpersonal skills)
6. Social Support (subthemes: Peer pressure, Low family support)
7. Distractions (subthemes: Friends, Technology, Cannabis)
8. The Young person (subthemes: ADHD, Willingness, Perseverance, Self-doubt, Vulnerability, Physical fitness)

#### 6.3.1.1 Risk management

Concerns of safety and managing risk acted as a barrier to engaging some young people in OAs. Participants explained that the young people had “wild” and “big” ideas about the activities they wanted to participate in, yet because of the health and safety regulations of the organisations they worked with, the workers could not facilitate the young people’s participation in these more “risky” activities.

[Male, worker with children leaving care] “The boys always wanted to do some kind of paint balling or kind of petrol driving go-karts and then there’s all these conversations about risks and stuff like that.”

Several of these organisations were funded by the local council and limits were placed on the types of activities staff could offer young people. Maintaining health and safety standards presented as a challenge as the staff were not insured or qualified to deliver certain activities. Due to funding and other reasons, these organisations were only able to engage young people in activities that they could themselves deliver meaning that workers required the correct qualifications.

[Male, manager youth worker] “We’re all council employees, where everything we do should be adequately risk assessed and the necessary precaution should be taken if necessary.... here we’re limited by what we were able to do from a physical point of view through not having the correct insurances, the correct coaching certificates so you wouldn’t be able to run an activity safely. Obviously with the extended use of litigation in our society now a days, the local authority would just have a point of view of we’re not going to offer it. If we’re not offering it, than we can’t get sued.”

#### *6.3.1.2 Resources*

Challenges were encountered while trying to engage young people in OAs as the organisation did not have adequate resources. These resources were categorised into three sub-categories; transport, time and money. Although these are separate sub-themes, they were also related to one another.

##### *6.3.1.2.1 Transport*

Several of the organisations did not have the facilities, equipment or training to deliver activities. This meant that they facilitated young people’s participation in an activity at a different location. Supporting young people’s access to activities was difficult depending on where the activity was located in relation to the young person. Individuals who lived in some areas faced difficulties because of available transport.

[Male, worker with children leaving care] “...If we were in a big city maybe there would have been more things to hook [young person] into. Um, so that was a bit of a

gap....So there might be more stuff in [bigger town] but even less than in [place] surrounding it and transport wasn't great so."

Some organisations did not have a location base, or discouraged young people from attending the location base of the organisation. As such, job roles required mobility and considerable time was spent picking up young people and transporting them to and from activities. The number of young people who could attend was limited to the availability of transportation and staff had to be selective of which young person could participate.

[Male, youth offending team] "Basically we're taxi drivers. So if we need to pick up four kids for an activity that's an hour long, we need to be driving for an hour before and an hour after. ... It's a big thing. Logistic... you only have so many seats in your car so you can only take so many, a certain number of children so you have to go through that selection and you say well you know, we'll leave him out of this one because he's been a bit rowdy the last few, we'll give it to somebody else who's been good or somebody new. We try to engage new ones as much as possible."

#### *6.3.1.2.2 Time*

Barriers presented due to the times activities were held. This was a particular issue for individuals working with young offenders who had been convicted of a crime and were wearing a tag. These individuals could not access evening activities as they required special permission from court for an extended curfew.

[Male, youth offending team] "We had a young person who joined a five a side football team down in the [place], but it was from half past seven to half past eight or half past eight to half past nine because that's when they are. That's when most people have finished their job and they go down there. So we had problems getting his tag lifted for that."

Individuals who worked office hours Monday to Friday with young people in school also encountered challenges as activities were held within a small window of opportunity. Difficulties were met catering to the needs of all the young people within a short period.

[Male, youth offending team] "...there's quite a small window when it can happen... we see all our caseloads after, or the majority of them, after half three when they get back from school, so everything happens within a two hour period."

This wasn't expressed as a difficulty however for the individuals who worked with young people during the day as they were not in education, employment or training. Nevertheless, many of the workers did not work on a weekend when other activities were available.

[Male, youth offending team] "So, we're trying to steer them into like, their local communities. 'You like football? There you go, there's five teams there in your neighbourhood, just go there.' But they need someone to take them by the hand usually. But the thing is like, I don't work on a Saturday, so that becomes a barrier."

#### *6.3.1.2.3 Money*

Money presented as a barrier in several ways. Activities incurred costs, and all the organisations relied on external funding to pay for the activities involving young people. Council-funded organisations had recently faced funding cuts reducing the amount and the type of activities offered to the young people.

[Male, youth worker] "Yeah it would be nice to do it [activity] more often but it's what the budget allows."

One individual explained that the financial cuts made facilitating participation more difficult as it limited the types of activities they could engage the young people in. The activities drawing the young people to the service were those activities that were novel and different, but they also tended to be more expensive.

[Male, youth offending team] "A good part of the engagement with young people [was] saying we do this and we do that you know, whatever the activity is that they might not have done before. The less of them that we can get funded, the harder it is to use that as a sort of cue to engage the young people."

Participants also expressed concern that because they were externally funded they felt under pressure to justify their service.

[Female, worker with children leaving care] “There may be at a higher level, a service level and a political level, for the managers who are around, keeping the service going and having money umm, being seen as a valuable service. Actually, yeah, getting people to recognise um the benefits of the project.”

Individuals who worked with young offenders faced scrutiny for the activities they engaged young people in. Due to funding cuts and the costs of certain activities, workers expressed concern that they were perceived as “rewarding” young people for bad behaviour. This was specific to activities that were rare and provided unique experiences, such as white water rafting and going away to adventure camps. These also tended to be more expensive.

[Male, youth offending team] “... costs and things ... I think that that effects opportunities and it effects opportunities in real ways. I remember being in court having a private discussion with a prosecutor ... and she was utterly, utterly outraged that we were taking young people ... on an outdoor activity running in conjunction with the Police and the army in the [outdoor location] and the prosecutor was that this was a good thing that good young people would give their eye teeth and that we were just cherry picking young offenders to go to the [outdoor location] in a wet April and that that was somehow, they were taking it from good people. And that was her genuine point of view.”

### *6.3.1.3 Group differences*

A number of interviewees were in a position to spend one-on-one time with young people while several projects worked with groups of young people at once. The latter created challenges when encouraging participation among young people who were described as different from each other. Two major aspects of individual differences were identified as a difficulty: abilities and interests.

#### *6.3.1.3.1 Abilities*

The level of certain skills required by young people to participate varied amongst individuals. This was identified as a problem when staff tried to engage a group of young people together in a single activity.

[Male, youth offending team] “It’s just such a wide range of cards, one kid’s not the same as the next. We’ve got about six kids in at the minute, and like they are so different and you can see they have all different levels in their cognitive ability ... you got somebody else who can do it perfect, brilliantly, and then you got somebody else who takes a bit more time.”

#### *6.3.1.3.2 Interests*

Young people also had different interests and workers found difficulty in engaging young people in activities that everyone enjoyed.

[Female, youth worker] “Some of the kids absolutely loved it but not everybody was interested in arts and crafts.”

Often this was raised and related to the number of staff that were present because more staff could lead to more supervision in additional activities of interest to other young people.

[Male, youth offending team] “...you only got three staff ... you haven’t got the staff there so everyone can do what they want to do, its impossible because we got to do something that’s practical for the whole group.”

#### *6.3.1.4 Colleagues*

Some interviewees expressed an opinion that colleagues could act as a barrier to facilitating participation because the methods they used when working with the young people. When these methods differed from their own held opinions they

expressed disagreement with the alternative approach. Several interviewees thought their colleagues were lazy and weren't capable of engaging with the young people.

[Female, youth worker] "The manager at the time was a little bit lazy with planning so we'd come up with these big ideas and I'd come and I'd be like 'Yes, lets do it' and he'd be like 'Nah, I think we're just going to do arts and crafts today' so, I was like 'oh, ok'."

#### *6.3.1.5 Social situations*

Barriers to facilitating participation also arose in social situations. The difficulties emerged as three separate issues and were categorised into the following themes: mixing with other groups, interpersonal skills and stereotypes.

##### *6.3.1.5.1 Mixing with other groups*

Interviewees expressed challenges if it was necessary for the young people to be in public or with groups of other people. This was mainly due to worries of inappropriate behaviour in public among those who worked for the youth offending team.

[Female, youth offending team] "When we've gone to organisations that are doing the activities sometimes they say, 'Can we mix you with other groups?' and we always say no because um the boys language is very colourful um, we're used to it. Um, obviously we don't condone it but there's a certain amount that we accept, but the general public wouldn't."

Concerns were also raised about increasing opportunities for the young people to offend through mixing them with others in activities due to rivalry existing between groups of young people from other groups or organisations.

[Female, youth offending team] "...there might be issues regarding territory and area codes and stuff like that."

#### *6.3.1.5.2 Interpersonal skills*

Staff explained that in addition to the young people's behaviour in public, they also expressed difficulties when the young people interacted one-on-one with individuals at activities. This led to challenges when engaging them in activities that involved a leader, a teacher or coach because authority was a sensitive issue for the young people.

[Female, worker with young people leaving care] "They'd be very sensitive to people who they perceive to be judging them, telling them what to do... if the person running an activity, if they perceived them to be judgemental, snobby, whatever they came up with then they'd be like 'uh' [disgusted]."

#### *6.3.1.5.3 Stereotypes*

For those who worked in youth offending teams, negative attitudes from other organisations to the young people were highlighted as a barrier. Workers explained that because others were aware that the young people were troublesome, they felt they were often discriminated against and could not participate in activities at other locations.

[Female, youth offending team] "We had an incident where we took two young people swimming, and um, the life guard spotted that they had a tag on and within five minutes I was pulled in because they were going to chuck the kids out because they were splashing another group of kids and my response was, well, 'there's everyone splashing everyone, are you chucking everyone out then?' But it was because you could see, you know, that they were young people who were in trouble, or usually in trouble."

#### *6.3.1.6 Social support*

Many practitioners explained that people within the young person's social network acted as a barrier as they influenced a young person's decision to participate. In contrast to barriers that could be changed and addressed, social support was an issue



because it could not be changed. Interviewees could not or were not in a position to influence a young person's social network. Two sub-themes were identified that contributed to this: peer-pressure and low familial support.

#### *6.3.1.6.1 Peer pressure*

Young people's friends were described as an important influence on the young person's participation. Workers believed that the young people faced peer pressure from their friends not to engage in activities or were challenged about their participation. Workers explained that many of the young people came from families with very little support and as a result their friends were very central to their lives. Therefore, what the young people's friends said or did was argued to be very influential on young peoples' involvement in activities.

[Male, youth worker] "...and then their mates turn up and then its 'ugh wait – what you doin that for? That's a load of bullocks, wuh' and then it's like 'oh yeah right, I might lose my credibility with my mates' ... going back to that family thing, with all those massive broken families the link with their mates is sometimes their only family. So nothing is going to, well it's going to take a lot, to threaten that."

#### *6.3.1.6.2 Low family support*

Staff expressed difficulties engaging and maintaining young people's participation in activities because of the lack of support from young person's families. This support included emotional support such as encouragement and approval; as well as more practical and basic support such as helping the young person get up in the mornings and providing them with food.

[Female, youth offending team] "Well if the parents, or carers, whoever it is, are not encouraging them, or are taking the mick out of the fact that they are going to do sports or a drama group or whatever they want to do, it's just not nice. ... if their loved ones aren't telling them that they're doing a good job eventually they're just going to eventually give up. You know, they might enjoy it. If they love it I think

you've got a better chance, but if you got somebody who's just starting off it's difficult. So, you need that support.”

#### *6.3.1.7 Distractions*

Engaging young people in activities was difficult if young people had more appealing activities they could participate in. These sources of alternative entertainment were developed into subthemes of friends, technology and cannabis.

##### *6.3.1.7.1 Friends*

As described above, some workers believed that many of the young people faced peer pressure to not engage in activities, and the young people's friends were described as an important role in their life. Many interviewees explained that young people were often hard to engage in activities if the young people's friends were not participating in them arguing that the young people would rather hang out with their friends than engage in a constructive activity on their own.

[Male, youth offending team] “...with ice skating, with go karting, with rock climbing... no, not interested and all they're interested in doing is hanging out with mates... instead of coming rock climbing, hanging out with mates will be standing on a street corner having a fag and doing nothing but that's, they're with their peers, so that's more interesting than trying anything that they've not done before.”

##### *6.3.1.7.2 Technology*

Many interviewees also expressed a strong dislike towards technology such as social networking sites and video games. They felt the young people wasted a lot of time on these activities as they were easy sources of entertainment, did not lead to any particular set of skills, and could often create more difficulties for the young people. For example, they explained that Facebook enabled the young people to bully others and they also felt that many of the young people were lazy and physically unfit because they preferred to play video games.

[Male, youth offending team] “ ... [XboX] destroys a lot of motivation to get up and do anything. Xbox’s and modern technology, they just, they can sit there vegetating, playing on these horrendous games that don’t have any benefit, no education, no fitness, no nothing, that they’d rather do that than anything else.”

#### *6.3.1.7.3 Cannabis*

All interviewees pointed out that smoking cannabis was a specific problematic activity. Several explained that the young people would often rather smoke cannabis instead of participating in activities. They also believed this to be a problem because in their view, it impacted negatively on their motivation to engage in other activities.

[Male, youth offending team] “It’s like all the kids smoke weed that come here. That’s a massive obstacle, a challenge. That the kids can’t, but won’t overcome to get into the sports. The fact they just want to get stoned. You know so, that’s a massive obstacle.”

#### *6.3.1.8 Young person*

A significant number of challenges were faced by workers that they attributed to the young person. These characteristics of the young person were categorised into five sub-themes: ADHD, commitment, drive, self-doubt, vulnerability and physical fitness.

##### *6.3.1.8.1 ADHD*

ADHD emerged as a challenge because of the way activities were run. For example, workers felt that young people with ADHD needed to have their activities structured and planned in advanced. If the young person’s schedule was disrupted, they found it difficult to process subsequent changes to schedules.

[Female, youth offending team] “...specially working with such young people with ADHD ... they need to have things structured. They need to know what they’re doing that day... So then, something changes and then you have another difficulty

there because they have to process the change. They don't do that very well. So that's another big difficulty.”

ADHD was also expressed as a barrier in activities because of the way the activity was delivered. For example, several workers explained that activities needed to be quick-paced in order sustain their attention and engagement.

[Male, youth offending team] “...if they find the activity a bit boring, you know, there needs to be a pace to it.... Just to keep their interest because you know, if they're waiting around too long... they kind of go [bored] by the time it's their turn you know.”

#### *6.3.1.8.2 Willingness*

Many interviewees explained they were often confronted with a stark refusal to participate when they tried to encourage young people in an activity. Many young people would often not cooperate or were negative about the activity, and very reluctant to try it.

[Female, youth offending team] “I find it difficult when a young person is not willing to give something a go, and if no matter what you say, because they're quite black and white if they're not willing to give it a go they won't listen to any reason and they sometimes they won't budge.”

#### *6.3.1.8.3 Perseverance*

Young people were described as having difficulties maintaining their interest and participation in activities. In contrast to willingness, this was specific to a sustained effort over time, rather than initial engagement. Several workers explained this as an “investment” where they had to commit effort, but for many reasons (several quoted as other sources of entertainment) they felt the young people chose not to put in the effort, gave up easily and opted for easier sources of entertainment.

[Male, youth worker] "... they're not used to investing in something to get something out of it long term... kids have never learnt that they have to invest X to get Y... That's like, a fundamental. But that is a fundamental these kids have never learnt."

#### *6.3.1.8.4 Self-doubt*

Many of the young people were described as having unsupportive backgrounds. Some interviewees believed that due to this situation young people often lacked the self-confidence and self-esteem required to engage in activities. This was particularly important if the young person was engaging in an activity that was new and in a different environment.

[Male, worker with children leaving care] "... young people who've had like parents around and have taken them from a young age to structured activities and they're used to all that, these young people have grown up feeling rejected, neglected, ostracised, so they wouldn't like going to groups of new people. That would be very intimidating for them. So I guess their own self-esteem, self-worth."

#### *6.3.1.8.5 Vulnerability*

Several interviewees described that the young people were very concerned with how other's viewed them and how they were perceived. This presented as a challenge when workers tried to engage them in activities as the young people were often afraid of "standing out". For example, young people were afraid to do participate in activities if there was the possibility of making a mistake in front of others.

[Female, worker with children leaving care] "Apprehension about putting yourself out there I guess really and fearing that you might be humiliated because for a lot of the kids we work with that kind of humiliation was you know, that was a really awful thing to fail, that something would be humiliating and humiliation was intolerable."

#### 6.3.1.8.6 *Physical fitness*

Physical fitness levels of the young people also presented as a challenge to the some interviewees. Two organisations tried to regularly engage the young people in activities requiring the young person to be physically active. Many of the young people were described as having sedentary and unhealthy lifestyles and this impacted on what they were actually able to do during the activity.

[Male, youth offending team] “We did boxing for a while... its amazing how unfit a lot, and inactive a lot of the teenagers are. Just, me and the other guys in the team were running circles around 14 years olds that don't have the stamina to do half an hour circuit training.”

### *6.3.2 Participation in organised activities and alcohol use*

Interviewees were asked for their thoughts and opinions on using organised activities to address young people's alcohol use. During the interviews it emerged that interviewees' opinions varied about young people's alcohol use. This was important to the investigation because it influenced how effective organised activities were seen and highlighted limitations on their ability to address issues surrounding alcohol use. Therefore, themes were developed around perceived alcohol use in addition to beliefs about how participation in organised activities might influence alcohol use.

Themes developed included:

1. Views of alcohol use (Subthemes: non-problematic, cannabis worse, normal and problematic)
2. Ambiguity
3. Doubt
4. Mechanisms (Subthemes: time-spending, social norms, platforms, positive feelings, physical activity commitment)

#### *6.3.2.1 Views of alcohol use*

Interviewees varied on their opinions about young people's alcohol use. Although many recognised that any underage alcohol use was not good, it did not necessarily mean they viewed it as a problem that needed to be addressed. These differing opinions resulted in sub-themes and were identified as non-problematic use, cannabis worse, normal use and problematic use.

##### *6.3.2.1.1 Non-problematic*

Some individuals believed that young people's alcohol use was not problematic or a cause for concern. Those who believed this often worked with young people who

were younger in age. They described the young people's alcohol use as limited to early experimentation and not a regular occurrence.

[Male, youth offending team] "...generally speaking with 12, 13, 14 year olds, there's very few of them that we work with, that you know, have an alcohol issue. They've all tried it to some point. A family party, but it doesn't come up as being... alcohol use isn't a real issue."

Several of the workers who did not see alcohol as a problem stated that alcohol was consumed infrequently and limited to weekend binge drinking. They also described that for these young people, alcohol was not used abusively.

[Male, youth offending team] "If there are issues around alcohol it tends to be with 16-17 year olds, um binge drinking, I'm not aware of any that are alcoholics, so on the whole it's not an issue at all."

Several individuals who believed that the young people's alcohol use was not problematic reported that "their" young people drank less than other similar-aged young people. In comparison to the young people they worked with, they thought young people from middle-class backgrounds drank more.

[Male, youth worker] "We got outreach workers ... who work a lot with kids over the park ... and there's a lot of middle class kids who go there, hang out there, and I think they probably drink more than our kids."

#### 6.3.2.1.2 *Cannabis worse*

All interviewees stated that cannabis was problematic among the young people they worked with. Many of them specifically outlined that alcohol use was not a problem, and the real problem was cannabis use instead.

[Male, youth worker] "I mean, smoking is bigger than drinking. Cannabis is bigger than drinking to be honest."



In contrast to alcohol use, several individuals described that the young people's cannabis use occurred daily and across all age groups.

[Male, youth offending team] "But cannabis is the main one. It's everywhere. 12, 13, 14 it doesn't matter what age. It's just, it's a night out."

#### *6.3.2.1.3 Normal*

Several individuals described the young people's alcohol use as normal. In contrast to seeing this as non-problematic, the young people's alcohol use was described as a form of accepted behaviour and was not any less or more than their peers in society. This belief was supported by drawing on the experience of other young people drinking in public and explained by that drunken behaviour during adolescence is normal.

[Female, youth worker] "I think it was very normal for their age. None of them stood out as having an issue with alcohol ... it was just what you'd expect sometimes."

#### *6.3.2.1.4 Problematic*

Finally, a group of individuals highlighted that the young people's alcohol use was problematic, or a cause for concern. In contrast to the other views, these interviewees described binge drinking as a problem, however, the reasons these individuals viewed alcohol use as problematic was not due to the amount they consumed. Instead, these beliefs were justified by the consequences that emerged from the young people's drinking and not their drinking pattern per se. They reasoned that these young people were in less-favourable circumstances to be drinking alcohol compared to others and faced harmful consequences from drinking because of this.

[Female, worker with children in care] “I think there would be quite extreme consequences for these young people in many areas of their lives, one money, health quite seriously affected, being kind of hospitalised and um you know being extremely um vulnerable and at risk from being yeah, very drunk in places where it’s not safe to be drunk, ...with people who it’s not safe to be incapacitated around I guess. Yeah, so I think it is a problem.”

One individual highlighted that due to their poor diet they were more at risk for being effected by alcohol.

[Female, youth worker] “The thing is a lot of them like they won’t eat all day and then they get drunk even quicker and it’s just really worrying.”

Concern was also raised regarding the individuals’ involvement in violence and offending behaviour when they become intoxicated.

[Male, youth worker] “...people that are finding themselves in very difficult social situations that lead to violence, um, we got you know sort of lots of clients who are very habitual offenders. The one common denominator is alcohol. They will get locked up when they’re drunk...”

#### 6.3.2.2 *Ambiguity*

Some individuals revealed that they had conflicting beliefs on the relationship between young people’s participation in organised activities and alcohol use. On the one hand they explained that participation in a sport lead young people to be more conscious of their health behaviour; on the other hand however, they acknowledged a drinking culture within sports, and that young people’s alcohol use could increase through sports participation.

[Male, worker with children leaving care] “It might be that if you were playing for a regular team sport than you might not get shit-faced the night before when you got a game the next day, but then you might get shit-faced after the game.”

Two individuals highlighted that although there is this complex relationship, it depends on the level of competition and commitment with which young people participate that helps determine to what extent alcohol and sports are related.

[Male, youth offending team] "... alcohol and rugby sort of go hand in hand but if you're seriously into rugby... it sort of challenges the elite athlete against somebody who is just playing it for the enjoyment of playing it."

#### 6.3.2.3 *Doubt*

Several workers expressed doubt over the impact that participation in activities could have on the young people they worked with. Most of these individuals worked with the young people erratically and not on a regular basis. Several highlighted that the impact of participation in activities was limited to the time spent at the activities itself or the hours that they were with people from the organisation.

[Female, youth worker] "Obviously the day to day stuff that we do is not going to stop them, as soon as like the centre is closed, from like going out and having a drink."

They explained that when the young people were not engaging in the project or OAs, there were many things that could influence the young person's alcohol use. These factors and other problems in their lives were viewed as significant and not something participation in an activity could influence.

[Male, youth offending team] "They've had a wealth of problems and I don't think an activity would have impacted that much on their particular circumstances at that time."

#### 6.3.2.4 *Mechanisms*

Many interviewees believed that participation in OAs could impact alcohol use and gave several reasons as to why they believed this. These explanations were described

as “mechanisms” and categorised into six different sub-themes: time spending, social norms, platforms, positive feelings and physical activity commitment.

#### *6.3.2.4.1 Time spending*

Participating in OAs was often seen as a positive way to spend time as it replaced the time young people might spend engaging in other unhealthy and harmful behaviours.

[Male, youth worker] “... if we’re up a mountain, then we can’t be in a pub.”

Some individuals felt the young people did not have much with which to occupy themselves with, or found they often had nothing to do. Engaging them in activities was a method to occupy them and give them something to do so they wouldn’t revert to alcohol use.

[Male, worker with children leaving care] “...it made sense, because what else were they going to do?... it was to occupy them, to keep them busy.”

#### *6.3.2.4.2 Social norms*

Engaging vulnerable young people in OAs with other non-vulnerable young people was believed to reduce alcohol use. Some workers were of the opinion that if the young people participated in OAs with other young people who drank less alcohol this could “rub-off” on them because of what the young people perceived to be normal.

[male, worker with children leaving care] “I guess the hope was that the other people in these places weren’t as, just didn’t want to get wasted all the time but wanted to do other stuff. Or maybe that would positively rub off on them.”

One individual believed that this was due to the fact that the young people wanted to fit in, and if the group around them drank less than they would conform to this behaviour so that they wouldn't be the odd-one out.

[Female, youth offending team] "If they're in a group who don't drink or only drink on a social um night, and they're doing it in a sensible manner... it's prosocial modelling really. If they're seeing that everyone is only having two pints of lager, instead of twelve, well they're not going to do the twelve because they're the odd one out."

#### *6.3.2.4.3 Platform*

Some interviewees explained that participating in OAs with young people created opportunities for them to interact with the young people. In this way, OAs provided a "platform" to build relationships with the young person, and communicate in a more meaningful and effective way about substance use.

[Male, youth offending team] "While they're engaged in other activities they open up a bit more, um, and it just gives us a platform to talk about alcohol or cannabis or any other substance misuse and to try to get them, give them a better understanding of how it might be affecting them."

#### *6.3.2.4.4 Positive feelings*

Several interviewees felt participating in OAs reduced young people's alcohol use because of its impact on negative feelings. They reasoned that negative feelings, such as low self-esteem, were contributing to alcohol use. By addressing these feelings through OAs, and improving self-esteem and life satisfaction, OAs could decrease alcohol use.

[Female, worker with children leaving care] "I can't see any other way of doing it with that group of young people. You could educate them until your blue in the face about the dangers of it [alcohol] and stuff but they don't care because their life is shit

so they got no reasons to care about whether they're damaging their body or their mind but I suppose if you can add something in that does increase a sense of satisfaction in life than, yeah, I think it does."

#### *6.3.2.4.5 Physical activity commitment*

Participation in sports was identified as a way to impact the health of the young people. Workers explained that any type of substance use, whether it be alcohol or cannabis use, was not conducive to participation in sport activities because of the physical demands of participation. Participation in an activity at a competitive level or to increase physical strength would lead to increased motivation and commitment, leading the young person to make sacrifices and healthier lifestyle choices.

[Male, youth offending team] "And the ones who have got involved in sport... often it's got a clear benefit not to be drinking, ... not to be drinking before a match or a fight so it creates a more critical force that I shouldn't be drinking, I should be you know following a healthier lifestyle."

## 6.4 Discussion

This qualitative study aimed to follow up results from previous chapters in order to understand their meaning in context. Two inquiries were of focus. The first was to identify barriers to engaging vulnerable young people in OAs. The second aim was to explore how OAs might address vulnerable young people's alcohol use.

### 6.4.1 Barriers to organised activity participation

#### 6.4.1.1 Multi-level barriers to participation

Many different types of barriers were identified highlighting the need for an interdisciplinary approach to this area of research. At the intrapersonal level several themes related to the young person's characteristics, such as ADHD and low motivation were identified. At the interpersonal level, social networks were shown to be important as family and peer opinions of participation were perceived to have strong influences on vulnerable young people's perceptions of OAs. Barriers at the community level emerged where there were difficulties between those who worked in organisations and the relationships they had with OA providers and other services. Institutional level factors were mainly concerned with rules governing how council employees worked and issues surrounding health and safety policies.

#### 6.4.1.2 Individual-level factors in context

This study showed how individual-level factors presented as barriers in their ecological context. For example, workers explained that young people with ADHD impacted the type of activities offered and how they were delivered. Activities needed to be fast-paced and were less suited if the young people spent a large amount of time waiting for their turn to participate. Interpersonal skills led to difficulties if individuals delivering the activity were perceived as too authoritarian.

Antisocial behaviour also presented as a challenge when activities took place in public and community settings. Bad language and inappropriate behaviour in public was often a concern, as were increases in opportunities for young people to offend.

Compared to those who access OAs without the facilitation of local agents in communities and organisations, unique challenges to OA participation for vulnerable young people were identified. As such, there may be a need to deliver activities differently for these young people. For example, the role of coaches in sport-based interventions, and to what extent they act as a sports coach or a youth worker, has been debated (Fraser-Thomas, Côté, & Deakin, 2005; Haudenhuyse et al., 2012). Robins (1990) suggested it would be more effective for youth workers to learn sporting skills than sport coaches to learn skills for youth work. In discussing the value of sport-based programmes, Coalter & Taylor (2009) argued that programs which adopt a street/youth worker approach rather than sports-centred approach tend to be more effective in creating added value through sports participation. Nevertheless, both can be seen as equally important. As highlighted in this study, lack of knowledge about facilitating sport activities and the absence of appropriate qualifications acted as a barrier to providing constructive physical activities. On the other hand, sport-based activities required a unique delivery with coaches not seen to be too authoritative. Providers and facilitators of OAs therefore need to be aware and prepared for challenging behaviours that might go hand in hand with working with vulnerable young people and require unique approaches with tailored goals.

Many of the barriers which presented at the individual-level had complex relationships with those at other levels. Due to young people's personal characteristics, such as lack of motivation, engagement in activities was difficult. For



those who worked in YOTs, workers attracted young people to participate in OAs by offering them OAs that were seen as exciting alternatives to the unstructured activities they otherwise engaged in during their free time. These OAs were often novel and unique activities, such as white-water rafting and activities at adventure parks. However, they required additional resources because they were more expensive. In this way, funding cuts to services presented as a barrier.

Although a significant barrier to engagement was related to the unwillingness among the young people, it was evident that they did voice opinions about the types of activities they wanted to pursue. These suggestions were met with concern by staff because of health and safety regulations, particularly if staff were not trained to deliver an activity safely and needed extra resources to deliver that activity. This was also presented as an issue even if there were “safe” facilities that provided these opportunities for the public. Concern was raised about young people’s participation in these contexts because of their challenging behaviour which raises the question whether these young people were really being facilitated into activities that they enjoyed. Young people without challenging behaviours may be treated differently in this regard and have more opportunities to participate in these type of OAs.

#### *6.4.1.3 Relationships between barriers*

Resources such as money presented a barrier and were related to perceived stereotypes of the young people. This was more specific for young offenders where funding shortages impacted the type of activities seen as acceptable. These organisations were externally funded and staff faced pressure to show positive outcomes in order to receive further funding, an observation also found in other studies (Coalter, 2010; Kelly, 2012). Kelly (2012) stated that “operational

insecurity” within programmes of the youth justice system led programmes to focus on crime and risk factors in order to receive funding which in turn may lead to processes of “defining deviance up” and wider exclusionary process among vulnerable young people. This emphasises the importance of having defined aims and outcomes for staff and that the reasons for engaging young people in OAs are made clear.

Offering unique but expensive activities to retain young people’s participation may keep them engaged in the project and prevent the occurrence of other risky-behaviours. What is not clear, however, is whether this acts solely as an occupation of free time or if it is contributing to any long term benefits. It also questions what is seen as an important outcome from participation. For example, does positive development from participation include receiving opportunities that normally wouldn’t present even if these are a one-off? If long-term, outcomes are the aim behind facilitating OA participation, it’s questionable whether providing young people with rare opportunities to participate is effective, especially if participation without the help of the organisation is unlikely to continue associated costs and obstacles to delivery. It is also possible that by exposing young people to novel and exciting activities, but not addressing the causes of their vulnerability, may have a detrimental effects and do more harm than good.

Perceived stereotypes of the young people were also linked to relationships between the organisations and external OAs. Individuals from the Youth Offending Service explained that the young people faced discrimination because of their affiliation with the service, leading the organisation to act as a barrier. It is therefore

questionable whether the young people would face the same barriers had they approached the OAs independently and not through the organisation.

#### *6.4.1.4 Power to change barriers*

Several of the barriers that presented could be addressed by increasing resources, such as funding for activities, increased staff and better transport. In this study working with larger numbers of young people created difficulties when trying to accommodate everyone's level of skill and interests. It supports previous research on sport-based interventions which suggest smaller groups provide more flexible and supportive contexts to achieve social objectives (Andrews & Andrews, 2003; Haudenhuyse et al., 2012). However, a number of barriers presented that were more difficult to address because they were challenges that staff had little or no control over. This mainly reflected the wider aspects of vulnerable young people's lives.

Vulnerable young people's social networks, such as parents and friends, were sometimes described as unsupportive of the young person's participation in OAs. For young people who were insecure or had less familial support, this was described as a barrier to participation. For those who worked one on one with vulnerable young people, challenges were met because the young person's friends were not involved in the project. Peer influences also presented as a challenge in settings where groups of vulnerable young people were together and had a fear of standing out in front of others. This finding supports evidence that adolescence is a sensitive period for peer and social influences (Blakemore & Mills, 2014).

Greater challenges to do with low family support and home life were in part the reasons why the young person was in contact with these organisations to begin with; however, staff did not always have the ability or resources to shape these wider

influences. For example, some organisations only worked with the young person, and if familial support from the home environment was lacking this remained a challenge to participation. Therefore, the ability of organisations to increase OA participation was also limited by the extent to which they could impact on the forces that led the young people to be vulnerable in the first place. This limitation has been highlighted in other studies that argue interventions such as sports-based interventions are not effective because they do not address the wider societal influences of social vulnerability, poverty and crime (Haudenhuyse et al., 2012; Kelly, 2012). For example, sport-based coaching mechanisms have been described as “...mechanisms that will not further reinforce processes of social vulnerability within a certain sport setting, and can as such not be viewed as sufficient to reverse such processes. Reversing social vulnerability would require more radical structural changes to a societal level” (Haudenhuyse et al., 2012, p. 450). However, Hartmann & Kwak (2011) argued that an “interventionist approach” to sport-based interventions can deliver transformative change by empowering youth in these contexts. Several interviewees saw the limitations of their work. This is described in relationship to alcohol use in more detail below.

#### *6.4.2 Organised activities and alcohol use*

When participants were asked how OAs might impact vulnerable young people’s alcohol use, it became apparent that opinions of young people’s alcohol use varied. Those who worked with vulnerable young people who were younger in age did not think alcohol use was a problem because their use was believed to be infrequent. Some reasoned that alcohol use was normal behaviour and others explained that alcohol use was particularly harmful for the young people they worked with because

of their vulnerable situations. For example, where and who they drank with might increase their risk for harm compared to other young people who were not seen as vulnerable. It highlights that alcohol use is often viewed as a cause for concern due to how much or how often people drink and not necessarily based on the immediate or negative consequences it has, particularly for more vulnerable people in society.

Addressing alcohol use might be seen as a waste of effort when there are more prominent health risks as well as legal consequences stemming from other more established forms of substance use. For example, all the individuals interviewed stated that cannabis was a problem for the young people. This was not limited to older age groups, and occurred across all organisations. Cannabis use was described as daily and other than health effects, led to problems with the police. Staff also felt it impacted the young persons' motivation, and made it more difficult for them to engage with other young people in OAs. If alcohol was only used on the weekends it is understandable why cannabis would be seen as more problematic as it impacted on their health, criminal behaviour, occurred more frequently and prevented staff within organisations from doing their job effectively.

#### *6.4.2.1 Impact on alcohol use*

Mechanisms which explained how OAs might impact on alcohol use were also discussed by participants in this study. Although some of these mechanisms had direct effects on alcohol use (such as time spending) others influenced alcohol use indirectly (such as providing platforms for discussion on substance use). It was identified that characteristics of the organisations and how they worked with young people might be related to which mechanisms were allowed to develop.

For example, some individuals expressed doubts over whether facilitating participation in OAs could have an impact on a young person's alcohol use and this reflected limitations of the organisations. Irregular contact with young people and inconsistent participation in OAs may have made it difficult to develop relationships with the young people. Impacts of OAs on alcohol use would therefore be limited to their role as a diversionary activity, in that young people who were spending time in the activity could not be simultaneously drinking alcohol. When the OA finished and the young people were not in the context of the organisation or an OA, some individuals highlighted that other factors could easily erase or undo the efforts made during that short period of time. These factors were the ones organisations had little control over.

Individuals who, through their job role, were able to develop relationships with the young people did not face this problem. They were able to offer more continuous support during the week in contrast to many individuals interviewed who could only be reached between 9am - 5pm, Monday-Friday. This was surprising because many youth programmes highlight the importance of developing relationships with young people in order to achieve positive outcomes (Fraser-Thomas et al., 2005; Hartmann & Kwauk, 2011; Kelly, 2013). Constrained working hours and funding may impact on opportunities to develop meaningful relationships with the young people. If alcohol use is not seen as a priority by the individuals within organisations, efforts may have little impact beyond occupying the time of young people.

Many of those interviewed expressed that the young people could be hard to engage because they were being separated from their peers; however not all the

organisations offered activities for the young people as well as their friends. Therefore, creating safe places and opportunities where young people can socialise with their friends, and not separate from them, may be a method to address these barriers. Facilities for OAs in communities such as leisure centres and sports facilities are currently facing closure and funding cuts, or are privatised for profit (Hartmann & Kwauk, 2011). As such, places for young people to socialise and engage in constructive activities may be increasingly difficult for young people with limited recourses. Young people who are at-risk of offending may be targeted by police if they group in numbers and it is therefore important that they have safe spaces to meet and socialise with their peers and engage in enjoyable activities (Kelly, 2013).

There was also marked ambiguity about how sports might impact alcohol use. Many of the individuals interviewed recognised that while sports were beneficial for health, they were also conscious that alcohol use was central to involvement in some types of sports. This reflects the arguments in existing literature for and against using sport-based interventions to target alcohol use (Smith & Waddington, 2004); however, it can be questioned whether these relationships and mechanisms of change would be the same for all individuals, particularly for vulnerable young people. For example, one mechanism related to social norms was identified as a theme. Through participating in OAs young people's alcohol use might be reduced because of the low levels of peer use in that OA context, particularly if they have high willingness to "fit in". On the other hand, this might be met with difficulty to engagement if the young people are not among their friends and fear "standing out". Increased levels of support would be necessary in these

situations to help vulnerable young people integrate into OA settings that may seem unfamiliar and daunting to them.

#### *6.4.3 Limitations and conclusion*

This study suffered from several limitations. Interviews were arranged with those who worked for organisations and as part of their job role, tried to engage young people in OAs. The challenges encountered when engaging young people in activities thus reflect difficulties of organisations that were successfully engaging young people and continued to receive funding. As such, these individuals may be more inclined to feel that challenges were due to the young persons' characteristics rather than their own limitations. Interviewing the young people involved in these organisations and exploring their views may have highlighted more barriers related to the employees of the organisations. Adminstrating anonymous questionnaires to the young people being helped by these organisations would also have provided better insight into their actual levels of alcohol use. Opinions of alcohol use provided in this study may be related to the quality of relationships individuals had with the young people and how much they knew about their drinking behaviours. It may be that because alcohol use was limited to weekends for many young people, the level and consequences from this use was not seen by staff who worked with them during the week.

Individuals who were interviewed for this study worked for organisations that were still running and receiving funding. These are services that may have been able to show effective engagement in OAs for a large number of young people in the organisation or facilitated their participation into education or employment. The barriers experienced by those who work in organisations who were not in a position



to meet these outcomes and stopped receiving funding are therefore likely to be different.

These organisations worked with young people many of which were deemed as vulnerable; however, it is not known to what extent these young people represent the most socially excluded young people in society. Incarcerated young people and those not in contact with any organisation (e.g. homeless youth) may have slipped through the net and would not be in contact with those interviewed.

In conclusion, this study further explored findings from previous chapters and brought them into context. Using an ecological framework, the barriers that prevent engaging vulnerable young people into OAs were identified at multiple levels and were found to have complex relationships with each other. Mechanisms explaining how OAs might impact alcohol use were also identified. The structure of organisations and how they worked with young people were found to be important for these mechanisms. Opinions of young people's alcohol use were also related to whether or not OAs were seen as tools to address alcohol use

## **7 Discussion**

This mixed methods thesis applied psychological theories of adolescent risk-taking behaviour to the investigation of OA participation and alcohol use among British adolescents. It aimed to identify participation rates and individual-level determinants of OA participation among different adolescent groups. It also investigated relationships between OA participation and alcohol use among these groups. This chapter reflects and integrates the qualitative and quantitative findings from Chapters three to six to generate a comprehensive answer to the research questions. It begins by outlining the studies and discussing their main findings. This Chapter then discusses the strengths and weaknesses of this thesis followed by suggestions for future research. Finally, the implications of these findings are discussed and a conclusion is provided.

### *7.1 Overview of thesis findings*

As discussed in Chapter one, alcohol use is a health behaviour that contributes to many negative consequences and preventing harmful alcohol use is an international public health priority (WHO, 2014). Alcohol use often begins in adolescence (Hellandsjø Bu et al., 2002), predicts long-term alcohol use (DeWit et al., 2000; Kraus et al., 2000) and British adolescents report higher levels of alcohol use than their European peers (WHO, 2009). Developing interventions to prevent the emergence of harmful alcohol use and reduce existing levels of adolescent alcohol use is therefore an important objective in the UK.

Although sport participants are often believed to enjoy healthier lifestyles, studies from several populations show that those who participate in sport organisations report more hazardous drinking (Kingsland et al., 2013; O'Brien et al., 2007; O'Brien et al., 2014; Poortinga, 2007) and community organisations have been

identified as an important setting for policy interventions to reduce harmful alcohol use (WHO, 2010). Involvement in OAs is argued to be a normal experience for many young people (Bohnert et al., 2010; Mahoney et al., 2006) and OAs may have the ability to shape young people's health behaviours for a number of reasons including increased adult supervision, social support and personal development (Eccles et al., 2003). However, the majority of research investigating relationships between OA participation and alcohol use outcomes has been conducted on North American student populations leading to results that may be specific to socio-economic and cultural contexts. Previous studies have also treated OA participants and non-OA participants, as well as sport and non-sport participants, as homogenous groups (Bohnert et al., 2010; Gardner et al., 2009). This thesis argued that individual-level factors important for risk-taking behaviours could help clarify relationships between OA participation and alcohol use outcomes and inform how OAs could be targeted for alcohol use interventions. Two research questions aimed to understand: (1) who participates in OAs (including determinants of OA participation and differences in OA participation among adolescent groups) and (2) what is the relationship between OA participation and adolescent alcohol use among British adolescents?

In order to investigate these research questions a mixed method explanatory research design was used. This consisted of two longitudinal studies and one cross-sectional study followed by a qualitative study that aimed to explore selected quantitative findings in context. The first longitudinal study presented in Chapter three examined predictors of OA participation in childhood and adolescence, focusing on the role of individual-level factors associated with risk-taking behaviours. Low inhibitory control predicted less participation in sports during childhood while conduct problems predicted less participation in sports during

childhood and adolescence. Individuals with greater sensation seeking were more likely to participate in sports, special groups and any OA in childhood as well as sports and breadth of activities in adolescence. Importantly, these groups were compared to individuals who did not participate in any OAs, rather than just “everyone else” (Bohnert et al., 2010). This study showed the importance of individual-level characteristics associated with OA participation patterns and potential barriers to OA participation.

Chapter four examined longitudinal relationships between OA participation and adolescent alcohol use and the role of individual-level factors associated with risk-taking behaviours. After controlling for a range of confounding variables, sports participants at 15 years of age were more likely to consume three or more units on average at 16 years of age than participants in other OAs and no OAs. Sport participants were also more likely to consume six or more units once a month compared to those who participated in other OAs. Participants who participated in sports at 16 years of age were more likely to consume three or more units on average than participants in other OAs and no OAs and were also more likely to have drunk alcohol in the past month compared to participants in other OAs.

These relationships were also dependent on levels of sensation seeking. At age 16, sport participants with high sensation seeking were more likely than sport participants with low sensation seeking to report alcohol use in the past month. Sport participants with high sensation seeking were also more likely to consume three or more units on average than sport participants with low sensation seeking as well as high and low sensation seekers in other OAs and no OAs. These findings highlighted

that individual-level characteristics, such as sensation seeking, contribute to increased likelihood of alcohol use within OA contexts.

The longitudinal studies presented in Chapters three and four were more representative of young people from higher income households and families of higher social class. Chapter five therefore aimed to investigate the research questions among young people represented less in previous chapters and research in general and presented two cross-sectional studies. Study A compared reported alcohol use among a group of Welsh offenders to a representative sample of male, Welsh students similar in age. Where questionnaire items could be compared, a higher percentage of young offenders reported past month and lifetime drunkenness. Study B compared levels of hazardous drinking and OA participation among a group of male young offenders and a matched group of male non-offenders. Young offenders reported lower OA participation rates and more hazardous drinking compared to non-offenders. Compared to non-offenders, young offenders who participated in no OAs reported more hazardous drinking; however, no differences were found between young offenders and non-offenders who participated in team sports. This chapter demonstrates that young offenders who do not participate in team sports report more hazardous levels of alcohol use compared to their non-offending peers.

Chapter six presented a qualitative study which aimed to explore these findings further. Since young offenders were shown to participate less in OAs in Chapter five, it was of interest to explore the barriers for OA participation among vulnerable young people and if individual-level factors highlighted in chapter three were also important in these contexts. As chapter four and five showed conflicting relationships regarding sports participation and indicators of adolescent drinking

patterns, the qualitative study also aimed to examine how OAs might impact alcohol use for vulnerable young people. Semi-structured interviews were conducted with individuals who work with young people and through their job role, facilitate vulnerable young people's participation in OA contexts. Findings showed that a range of barriers presented across multiple levels of an ecological framework. Challenging behaviours, environmental contexts as well as rules of the organisation were important and sometimes acted as unique barriers for these groups. Mechanisms by which OAs might impact vulnerable young people's alcohol use were also identified and were similar to those posited in the literature review; however, doubt was raised about the effectiveness of OAs in addressing alcohol use due to many other adverse circumstances in vulnerable young people's lives.

The quantitative studies presented in this thesis informed the qualitative study which was conducted separately as an individual study. The following section presents an overview of the major findings from this thesis and integrates these points together. Findings concerning participation in OAs, including determinants and differences between groups are discussed first. This section then goes on to discuss findings regarding adolescent alcohol use and relationships with OA participation.

## *7.2 Understanding who participates in organised activities*

### *7.2.1 Quantitative findings*

Previous studies have shown that participation rates in OAs among North American student populations vary between 30-40% (Darling, 2005; Fredricks & Eccles, 2006a; Mahoney et al., 2006). A striking observation from this thesis was the range of OA participation rates among groups of adolescents. In chapters four and five OA

participation rates were highest at eight years of age with 80% participating in sports or special groups. By adolescence OA participation had decreased to 50% at 15 years of age and 71% at 16 years of age. Differences in OA participation rates at 15 and 16 years of age are likely to reflect differences in questionnaire items and the ranges of options provided for responses.

While these percentages may be over-representative of higher income groups, they were also similar to participation rates provided in Chapter five. For example, 79% of male non-offenders reported participation in OAs. In contrast however, only 30% of young-offenders reported OA participation. These results highlight stark differences between these groups even though they were recruited from similar locations and the majority of participants had low socioeconomic status. Barriers to OAs have often been attributed to economic difficulties and neighbourhood contexts (Dearing et al., 2009); however, these results indicated that there are additional factors important for OA participation.

Chapter three was informative because it identified other possible determinants of OA participation located at the individual-level, particularly low inhibitory control, conduct problems and sensation seeking. Individual-level factors were also more consistent predictors of OA participation compared to demographic factors and significantly improved model fit. In Chapter five externalising behaviour was not associated with any OA participation or a team sport for young offenders and non-offenders although young offenders had significantly higher levels of externalising behaviour compared to non-offenders.

Importantly, all analyses compared participants in sports (team sports were investigated in Chapter five) to those who did not participate in any OAs. This new



approach revealed that individual-level factors had unique relationships with sports participation compared to participation in other types of OAs and those who participated in no OAs (Bohnert et al., 2010; Gardner et al., 2009). Not only do these findings highlight potential barriers for young people based on their individual-level characteristics, they showed that comparing sport participants to non-sport participants, or OA participants to non-OA participants, can contribute to misleading relationships when investigating alcohol use outcomes.

### 7.2.2 *Qualitative findings*

Although quantitative analyses were able to identify individual-level factors, it was still unclear why these were important for OA participation. The qualitative study aimed to examine these findings further by exploring the difficulties to engaging vulnerable young people into OAs as experienced by those who worked closely with them. Practitioners highlighted that alongside other barriers at higher levels, various characteristics and behaviours of the young people presented as challenges to OA participation.

Interestingly, some identified themes in Chapter six were similar to important individual-characteristics identified in Chapter three. ADHD (which is associated with inhibitory control difficulties) presented as a challenge if the OA in question was not quick-paced, involved waiting and periods of inactivity. Issues were highlighted surrounding sensitivity to individuals in authority and hostility between groups in OAs. Challenges were also faced when integrating young people into OAs that contained other members of the public because of concerns of inappropriate behaviour. This was particularly true for those who worked with young offenders. Issues surrounding risk-assessments and health and safety from doing more

physically active and dangerous activities were identified as an important theme. How this relates to participant's levels of sensation seeking is unclear, but does point towards higher-level barriers in organisations and these may impact the type of OAs vulnerable young people with high sensation seeking can access.

### *7.2.3 Integration and interpretation of findings*

Although this thesis did not set out to test whether OA participation was an indicator of social exclusion, results showed that less OA participation occurred within certain groups of young people such as offenders and those with challenging behaviour. OAs have been used to improve social inclusion among young offenders and vulnerable groups; however, it is still a contested concept and the processes that underline these motivations are usually not well outlined in theory or defined in practice (Kelly, 2011).

Results from this thesis showed that individual-level factors were equally strong determinants of OA participation as income and other demographic factors. This is not to say that income is not important for OA participation, but there is likely a complex relationship between poverty, environmental contexts, child development and OA opportunities. In addition to economic barriers, the accessibility and inclusiveness of OAs in communities need to be considered if OA participation is to be improved.

At the individual-level, participation in OAs can provide opportunities for young people to develop social, intellectual and physical skills as well as experiences in overcoming challenges (Eccles et al., 2003). The skills learnt in OA contexts may transfer to other domains of life and impact proximal risk-factors for social exclusion and offending behaviour (Hoffmann, 2006; Parker et al., 2013). At the interpersonal

level, OAs offer increased opportunities for young people to develop a sense of agency in communities, provide a sense of belonging as well as establish supportive networks that may offer help concurrently and in the future (Eccles et al., 2003). For vulnerable young people who lack supportive environments, OA participation may act as a buffer against their disadvantages and might aid resilience in the face of adversities (Mahoney, 2000; Mahoney & Cairns, 1997). Power et al (2009) stated that disparities in OA participation<sup>11</sup> can exasperate inequalities. In the UK for example, schools that report lower levels of participation in out-of-learning contexts are more likely to be among schools with higher levels of free school meals eligibility and minority ethnic groups (Power et al., 2009). In addition, participation may be “banned” by educational institutions for children with behavioural and emotional difficulties (Power et al., 2009).

From a psychological perspective of adolescent risk-taking, OAs might act as supervised contexts that can guide and support the development of young people’s risk-taking tendencies. For example, OAs might allow young people to experience novel and exciting environments that could satisfy reward-seeking behaviours which naturally increase during adolescence. OAs that incorporate adult supervision and promote skill development may also provide learning opportunities that can strengthen the development of higher cognitive processes related to self-regulation. However, unequal opportunities to access and engagement in OAs during youth might lead to further disadvantages in health and development, particularly for those who would benefit most from OA participation.

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<sup>11</sup> These are termed “out-of-learning contexts” in reports by Sally et al (2009) and Taylor et al (2009). This would include OA contexts but also other educational activities that occur as one-offs or as part of the school curriculum and can be seen as broader measure of participation.

As shown in Chapter three, OA participation in childhood predicted later OA participation and highlights the importance of early engagement in OAs. Encouraging children to participate in OAs through education settings might normalise and foster participation during childhood and contribute to lasting OA engagement over the course of adolescence. This may also indirectly reduce health, education and developmental inequalities in the short and long term.

### *7.3 Participation in organised activities and alcohol use*

#### *7.3.1 Quantitative findings*

Similar to OA participation rates, young people varied in reported alcohol use and indicators of harmful drinking across the chapters. Within the ALSPAC sample, 65% of participants at a mean age of 15 years and 78% of participants at a mean age of 16 years reported drinking alcohol in the past month. This was higher compared to Welsh students from the HBSC study (55%) and young offenders (57%) in Chapter five. Participants were older in Chapter four compared to those represented in Study A in Chapter five and this might explain these differences. Study B showed that young offenders reported much higher levels of hazardous drinking compared to matched non-offenders, but these results could not be compared to ALSPAC participants.

These findings demonstrate that alcohol use is initiated in adolescence but the extent to which this behaviour presents varies among young people. For example, 80% of ALSPAC adolescents reported alcohol use in the past month at 16 years of age, but only 34% reported heavy episodic drinking at least once a month. Since many of the immediate and long term consequences occur as a result of more harmful alcohol use such as heavy episodic drinking (WHO, 2014), interventions for

adolescent alcohol use should address early patterns of binge drinking specifically. Young offenders were identified as a group who reported particularly hazardous drinking levels in adolescence and higher rates of early alcohol use. This highlights how subgroups within the population less represented in national surveys may have significantly higher levels of alcohol use.

Different relationships also emerged between OA participation and alcohol use among adolescents in Chapter four and five. In Chapter four, sport participants were more likely to report specific alcohol use outcomes compared to those in no OAs or other OAs. In Chapter five non-offenders who participated in team sports reported higher mean FAST scores than non-offenders in other OAs, although this could not be statistically tested for significance. These relationships show that sport participation was associated with alcohol-related outcomes among groups of adolescents that are more frequently represented in research. This relationship was not evident however among young offenders, who reported lower FAST scores in association with participation in a team sport.

### *7.3.2 Qualitative findings*

The qualitative study aimed to explore how OA participation might impact alcohol use among vulnerable groups, such as young offenders studied in Chapter five. Mechanisms similar to those previously discussed in the literature were identified. In contrast to the previous literature however, there was more emphasis on OAs as a setting by which young people could form meaningful relationships with positive role models. This in turn created opportunities to directly influence alcohol use through opportunities for discussion with the young people. Instead of unique mechanisms being identified, their ability to shape alcohol use among vulnerable

young people may stem from addressing underlying adverse situations in vulnerable young people's lives. However, it is not clear to what extent these mechanisms stemmed from their experience or from the beliefs of the organisation they worked for.

It is of interest to note however, that not everyone believed that OAs had positive impacts on vulnerable young people's alcohol use. This was partly due to the fact that alcohol wasn't always seen as an important issue that needed to be addressed. This observation illustrates the complexity of vulnerable young people's situations, and the importance of identifying multiple factors that contribute to negative health outcomes. For example, other more immediate priorities such as homelessness and illegal drug use might pose greater risks for offending behaviour and health than binge drinking. Consuming alcohol is a common risk-taking behaviour that emerges during adolescence and alcohol it is not an illegal substance. Nevertheless, alcohol use (and not necessarily alcohol abuse) may contribute to the complexity of problems contributing to its vulnerability.

Programmes which aim to engage young people in organised activities in order to decrease substance use and offending behaviour have been criticised because they fail to appreciate the multi-level determinants of offending behaviour and the complex day-to-day challenges vulnerable young people may face (Kelly, 2011). While basic needs would be important to address first and foremost, increased feelings of belonging and social capital gained through OA participation cannot be underestimated among such vulnerable cohorts. OAs might have a positive impact on vulnerable young people if they aren't seen as burdensome (either through time, money and increased effort) or as unsociable and unavailable to them.

### 7.3.3 *Integration and interpretation*

These findings show that OA participation patterns are associated with adolescents' alcohol use and the nature of these relationships may not be the same for all young people. For example, participation in specific kinds of sports may increase the risk of alcohol use among adolescents except vulnerable young people where participation in a team sport may be a protective factor against harmful alcohol use. This suggestion is speculative however, as it is based on cross-sectional findings in Chapter five.

From the evidence provided in this thesis, sport participation was the most popular form of OA participated in and sport settings were also shown to have unique relationships with alcohol use. Due to their popularity and prominence in many young people's lives, sports settings would be an influential and far-reaching community setting to target increases in adolescent alcohol use. In older British samples sport participants have been shown to report higher levels of alcohol use (Poortinga, 2007). Targeting sport participants' alcohol use when these behaviours begin to emerge during adolescence, particularly binge drinking, would be influential time for an intervention delivery.

Although participation in sport is important for alcohol use during adolescence, the reasons are not clear (Kwan et al., 2014). Chapter three highlighted the relevance of sensation seeking in determining these relationships. Sensation seeking is normally seen as a negative risk factor, but sensation seeking is also argued to be important for learning and development during adolescence (Blakemore & Mills, 2014; Casey et al., 2008; Laviola et al., 2003; Spear, 2000). While interventions in sport settings may not decrease levels of sensation seeking, they may

be able to impact on other important factors at the individual-level that contribute to risk-taking behaviours. For example, sport contexts may be able to shape impulsivity control (Wang et al., 2013), which is important risk-taking behaviours (Nigg et al., 2006). It is not yet clear if, and to what extent, self-regulatory behaviours gained through OA participation translate into other non-OA settings and lead to a reduction in risk-taking behaviours.

#### *7.4 Strengths, limitations and future research*

This thesis provided a deeper understanding and novel insights into OA participation and alcohol use among British adolescents. Chapter five in particular is unique because it focused on young offenders, a group of young people who often truant from school (McAra & McVie, 2010) and therefore less represented in studies previously conducted. The studies presented in Chapter five were cross-sectional and do not imply causality. If young people with less challenging behaviour face fewer barriers to OA participation, for similar reasons they may also report less hazardous drinking. Similarly, longitudinal investigations in Chapters three and four were at best only able to infer temporal order and confounding variables not included in models may explain observed relationships. Additionally, studies in Chapter five were not able to investigate the role of sensation seeking and inhibitory control and how they contribute to relationships among young offenders is still unexplored.

This study employed new methods of analysing OA participation to the investigation of alcohol use outcomes. Previously this had only been applied to investigating outcomes of aggression and delinquency (Gardner et al., 2009). In doing this, participants in sports were compared to participants in other OAs and those in no OAs which proved to be important for alcohol use outcomes as sport



participants showed unique relationships with alcohol use in Chapter four and five. It is still not clear why, as shown in Chapter four, sport participations predicted increases in alcohol use. While this study showed that sensation seeking may help explain some of these relationships, this is not the only plausible mechanism.

Future research should explore why sport contexts in adolescence contribute to an increased risk for alcohol use. Barber et al (2001) highlighted the impact of social identity and the role of peers for adolescent alcohol use. For example, “Jocks”, or students who participate in school sports, reported more alcohol use (Barber et al., 2001) and more friends who drink regularly (Eccles & Barber, 1999). Barber et al. (2001) suggested that social identities and the influence of “high school popular crowd culture” might explain why certain groups of young people, such as sport participants, are more at risk for adolescent alcohol use. They argued that adolescents conform to group norms and this crowd-based identity formation may be supportive for identity formation and transitioning into adulthood (Barber et al., 2001). Kelly et al (2014) suggested that targeting social and cultural norms associated with drinking might impact adult sport participants, but this thesis shows this may be particularly effective for adolescents during their heightened sensitivity to social influences (Blakemore & Mills, 2014).

A limitation to this thesis is that it did not explore the impact of peers (although in Chapter four peer alcohol use was included in the model). Adolescence is an important time for peer influences and risk-taking increases in the presence of peers (Blakemore & Mills, 2014; Steinberg, 2004). It may be that some individuals are more susceptible to peer influences. If OAs are able to shape inhibitory control and decrease risk-taking behaviours (and future research would need to test this), it is

questionable whether this effect would be erased in the presence of peers. As shown in Chapter six, peer influences acted a significant barrier to engaging vulnerable young people in OAs and could limit the effectiveness of any progress made through OA participation. Wichstrøm and Wichstrøm (2009) suggested that sport participation facilitates social networking and Zhou et al. (2013) also highlighted that drinking among sport participants may facilitate team bonding. Future research should examine whether alcohol use among sport groups occurs as a result of the sport context, or indirectly leads to networking and bonding outside of sport contexts.

Although this thesis applied new methods to measuring OA participation in order to account for youth heterogeneity, it simplified the dynamic context of OA participation. Feldman and Matjasko (2005) have argued that treating OAs as a variable in quantitative analyses does not address the heterogeneity of participation. Quantitative investigations of participation can only capture features of OA participation such as duration, intensity and frequency (Bohnert et al., 2010) but not the processes that which emerge from OA participation (and this may be unique for different OAs; Coakley, 2011). This thesis also presented a static picture of OA participation, particularly in Chapter five. It has been highlighted that OA participation may correspond to changes in alcohol use overtime (Kwan et al., 2014) and bidirectional links have been identified previously (Busseri et al., 2006; A. S. Denault et al., 2009). Unfortunately this could not be investigated in the present longitudinal study because measures of OAs and alcohol use were collected at different intervals and unsystematically.

Bi-directional effects may also lead to individual-level changes resulting from OA participation. For example, it is not known if sensation seeking changes from experiences of reward. If this does occur, then OA participation might lead to increases in sensation seeking and also increases in risk-taking behaviours. This would have particularly important implications for organisations that use novel and exciting activities to recruit and sustain vulnerable young people's engagement in organisations in order to reduce offending and risk-taking behaviours. Experiences of "positive" risk-taking in OA contexts might create a new threshold for future experiences to elicit the same feeling of reward. If participation in these OA contexts can't be sustained, this may increase risk-taking behaviours among vulnerable groups and cause unintended harm.

This thesis enabled the investigation of the research questions through a variety of methods, allowing for different questions to be asked and answered. Quantitative analyses allowed relationships to be statistically tested and qualitative studies provided a deeper understanding of meanings and the complexities of the problem. By combining these methods, additional insights to the problem were provided (Creswell & Plano Clark, 2011; Ivankova et al., 2006). In an explanatory mixed methods design there are no established rules that dictate the use of qualitative investigations, and their focus, following results from the quantitative studies (Ivankova et al., 2006). As such, there were multiple ways in which this mixed methods design could have been carried out, and other findings from the quantitative results could have been explored further.

As discussed in Chapter six, interviews were conducted with practitioners that worked with young people but no interactions took place with the vulnerable

young people themselves. This may have led to increased emphasis on barriers related to the individual characteristics of the young people and their challenging behaviours and less about the employees themselves or the OA contexts as experienced by the young people. By interviewing the young people barriers to engagement would have been identified that might relate to the employees or OA contexts. It would have also allowed the young people to express why they did not want to participate in OAs.

### *7.5 Implications*

This thesis shows that OA participation is a feature of many British young people's lives; however, these activities are not normally considered when investigating risk-taking behaviours. OAs are set in community contexts and may shape young people's development and behaviour. Contexts such as schools are important because they may facilitate OA participation (Power et al., 2009), but OA participation is not limited to school settings. It highlights the importance of how children and adolescents spend their free time within their communities and the importance of learning and growth that occurs in these various contexts.

The Welsh government has stated that young people's play (structure and unstructured) can mitigate the negative impact of poverty on children's lives and can reduce inequalities (Welsh Government, 2014a). Understanding more about access to OAs and their availability is important for understanding how they can be used to benefit young people. Wales has taken steps to secure this by recently creating legislation for young people's right to play, including access to various recreational activities (Welsh Government, 2012). As of July 2014, Local Education Authorities in Wales are now required to collect and report information on the sufficiency of

play opportunities (Welsh Government, 2014b). This is particularly useful as regional and structural variations in provision of OAs have been attributed to access to local authority facilities (Taylor et al., 2009). Future investigations of risk-taking behaviours at a population level should consider the extent to which young people participate in supervised OA contexts in their free time. By collecting data on young people's risk-taking behaviours, their OA participation and linking this to information provided by LEAs, associated health and wellbeing outcomes can be documented and inform policies.

In addition, this thesis highlights potential inequalities in OA participation, some of which might present due to challenges at the individual-level. Chapter three showed that some individual-level factors were associated with sport participation. These findings question the inclusiveness of sports for young people who vary in their capabilities and the importance of how sport activities are delivered for young people.

Sport contexts were found to be particularly important for adolescent alcohol use, but this depended on the group of young people investigated. Older populations in the UK who are involved in sport contexts report more alcohol use (Poortinga, 2007), and this thesis found that in Britain these relationships begin to emerge during adolescence. Heavy episodic drinking that often accompanies sport participation and sporting events may also contribute to increases in violence (Sønderlund et al., 2013). If successful preventative steps were taken to decrease heavy episodic drinking among sport groups in adolescence this might not just reduce long term alcohol use patterns but also incidences of violence, injuries and assaults.

Some individuals however might reduce their alcohol use following participation in a sport. Participation in a team sport may decrease alcohol use if the social norm amongst the team is to drink less (Hoffmann, 2006). This may seem contradictory to the discussion above; however, vulnerable young people may engage in such hazardous levels of alcohol use that by reducing their use to levels seen normally in sport contexts may be a significant improvement.

As shown in this thesis, OA participation has unique relationships with alcohol use depending on the adolescent group in question. As such interventions that use OA settings to target alcohol use should consider how these groups differ and how this can contribute to unique mechanisms to reduce alcohol use. For example, OAs targeted for interventions in school settings might wish to focus on reducing alcohol use among sport participants, particularly those with high sensation seeking, either by changing policies related to alcohol use or through social norms within sport teams. For young offenders, the intervention in itself may be to facilitate their engagement in OAs of interest within communities and supporting formation of relationships with prosocial peers and adults.

## *7.6 Conclusion*

In conclusion, this thesis presents findings from an investigation of OA participation and associated alcohol use among British adolescents. It illustrated the prominence of OA participation in many young people's lives but also differences in OA participation rates among adolescents and potential barriers to OA participation for individuals often less represented in research. This thesis showed the importance of sport contexts in particular, and confirmed that similar to other populations, young sport participants were more likely to report adolescent alcohol use. Individual-level

characteristics such as sensation seeking were important for these relationships with high sensation seekers in sports more likely than low sensation seekers to report alcohol use outcomes. These findings support the development of alcohol use interventions in OA sport contexts and policies that aim to reduce inequalities surrounding OA participation. Future research should aim to understand why sport contexts contribute to increases in adolescent alcohol use and if lifting barriers to OA participation for vulnerable young people reduces inequalities in health, education and development.

## 8 References

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## 9 Appendix A - Questionnaire Items

Questionnaire items from the Intensity sub-scale of Arnett's Sensation Seeking Scale  
Arnett, J. (1994). Sensation seeking: A new conceptualization and a new scale. *Personality and Individual Differences*, 16(2), 289-296.

1. When the water is very cold, I prefer not to swim even if it is a hot day. (reversed)
2. When I listen to music, I like it to be loud.
3. I stay away from movies that are said to be frightening or highly suspenseful. (reversed)
4. If I were to go to an amusement park, I would prefer to ride the rollercoaster or other fast rides.
5. I would never like to gamble with money, even if I could afford it. (reversed)
6. I like a movie where there are a lot of explosions and car chases.
7. I think it's fun and exciting to perform or speak before a group\*
8. It would be interesting to see a car accident happen.
9. I like the feeling of standing next to the edge on a high place and looking down.
10. I can see how it must be exciting to be in a battle during a war.

\*altered from original questionnaire item to make it more age-appropriate

Items used for conduct disorder in adolescence, taken from the Edinburgh Study of Youth Transitions in Crime.

Smith, D. J., & McVie, S. (2003). Theory and method in the Edinburgh study of youth transitions and crime. *British Journal of Criminology*, 43, 169-195

How often in passed year have you...

1. Written or sprayed paint on property that did not belong to you?
2. Stolen something from a shop or store?
3. Sold an illegal drug to someone?
4. Broken into a car or van to try and steal something out of it?
5. Hit, spat or thrown stones at someone they know?
6. Broken into a house or building to try and steal something?
7. Hit, kicked, or punched someone else on purpose with the intention of really hurting them?
8. Deliberately damaged or destroyed property that did not belong to you?
9. Stolen any money or property that someone was holding, carrying or wearing at the time?
10. Hit or picked on someone because of their race or skin colour?
11. Set fire or tried to set fire to something on purpose?
12. Carried a knife or other weapon with you for protection or in case it was needed in a fight?
13. Been rowdy or rude in a public place so that people complained or you got in trouble?

## 10 Appendix B – Investigation of missing data in Chapter 3

*Table B1 Results from univariate logistic regressions used to predict those who have outcome information (n = 6,415) of participants eligible to participate at KW (n=10,301; mean age of 11.7 years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>p</b>
Previous participation age 8	7,136	4.0	1	1.15	[1.003, 1.31]	.045
Age	7,157	1.2	1	0.78	[0.50, 1.22]	.279
Female	10,301	0.87	1	1.04	[0.96, 1.13]	.351
White	9,559	21.4	1	1.61	[1.32, 1.98]	<.001
Mother's social class (I)	8,210	52.5	4			
II				0.75	[0.61, 0.93]	.009
III (non-manual)				0.65	[0.52, 0.80]	<.001
III (manual)				0.48	[0.38, 0.63]	<.001
IV & V				0.52	[0.41, 0.67]	<.001
Weekly income (£400+)	6,664	22.5	3			
<£199				0.70	[0.58, 0.84]	<.001
£200-£299				0.75	[0.57, 0.88]	<.001
£300-£399				0.87	[0.67, 1.01]	.066
Adults in household	7,632	4.0	1	1.15	[1.001, 1.32]	.047
IQ	6,812	90.9	1	1.02	[1.01, 1.02]	<.001
Conduct problems	7,041	0.6	1	0.89	[0.67, 1.19]	.442
Sensation seeking	6,515	6.1	1	0.98	[0.97, 0.99]	.013
Low inhibitory Control	6,510	0.7	1	0.92	[0.76, 1.12]	.408



*Table B2 Results from univariate logistic regressions used to predict those with outcome information (n = 5,135) of participants eligible to participate at TF3 (n =10,034; mean age of 15.5. years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>p</b>
Previous participation age 11	5,933	109.4	1	1.96	[1.73, 2.22]	<.001
Age	5,247	327.9	1	0.04	[.024, .050]	<.001
Female	10,034	41.9	1	1.30	[1.20, 1.40]	<.001
White	9,080	8.0	1	1.33	[1.09, 1.62]	.005
Mother's social class (I)	7,746	110.9	4			
II				0.77	[0.63, 0.94]	.012
III (non-manual)				0.57	[0.47, 0.70]	<.001
III (manual)				0.46	[0.36, 0.59]	<.001
IV & V				0.40	[0.31, 0.50]	<.001
Weekly income (£400+)	6,092	82.2	3			
<£199				0.48	[0.40, 0.57]	<.001
£200-£299				0.71	[0.61, 0.83]	<.001
£300-£399				0.72	[0.63, 0.83]	<.001
Adults in household	6,949	14.9	1	1.29	[1.13, 1.46]	<.001
IQ	4,720	7.90	1	1.06	[1.02, 1.10]	.005
Antisocial activities	5,120	0.20	1	1.50	[0.25, 8.97]	.659
Sensation seeking	5,594	0.03	1	1.00	[0.98, 1.01]	.871
Low Inhibitory control	6,352	2.40	1	0.87	[0.72, 1.04]	.120

*Table B3 Results from univariate logistic regressions used to predict those who are included in analyses (n=2557) of those who have information on outcome variables at KW (n = 6415; mean age 11.7 years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>p</b>
Previous participation age 8	5,352	82.8	1	1.94	[1.68, 2.23]	<.001
Age	6,415	23.8	1	0.24	[0.14, 0.43]	<.001
Female	6,415	10.0	1	1.18	[1.06, 1.30]	.002
White	6,150	17.2	1	1.90	[1.40, 2.58]	.001
Mother's social class (I)	5,393	45.9	4			
II				0.75	[0.60, 0.94]	.013
III (non-manual)				0.71	[0.57, 0.89]	.003
III (manual)				0.58	[0.42, 0.78]	<.001
IV & V				0.43	[0.33, 0.57]	<.001
Weekly income (£400+)	5,037	114.7	3			
<£199				0.36	[0.30, 0.44]	<.001
£200-£299				0.62	[0.53, 0.73]	<.001
£300-£399				0.80	[0.69, 0.92]	.002
Adults in household	5,776	10.5	1	1.25	[1.09, 1.42]	.001
IQ	4,985	64.6	1	1.01	[1.01, 1.02]	<.001
Conduct problems	6,352	9.93	1	0.73	[0.59, 0.89]	.002
Sensation seeking	5,044	2.10	1	0.99	[0.98, 1.003]	.149
Low inhibitory Control	4,845	2.92	1	0.84	[0.69, 1.03]	.087

*Table B4 Results from univariate logistic regressions used to predict those who are included in the analyses (n = 2147) of participants who have information on outcome variables at TF3 (n = 5135; mean age 15.5 years ).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>p</b>
Previous participation age 11	3,926	8.90	1	1.28	[1.09,1.51]	.003
Age	5,135	144.6	1	0.25	[0.20, 0.31]	<.001
Female	5,135	0.60	1	0.96	[0.86, 1.07]	.451
White	4,898	17.1	1	1.93	[1.41, 2.63]	<.001
Mother's social class (I)	4,374	27.2	4			
II				0.80	[0.63, 1.01]	.065
III (non-manual)				0.73	[0.58, 0.92]	.009
III (manual)				0.47	[0.34, 0.66]	<.001
IV & V				0.59	[0.43, 0.79]	<.001
Weekly income (£400+)	3,946	63.2	3			
<£199				0.42	[0.33, 0.54]	<.001
£200-£299				0.65	[0.54, 0.78]	<.001
£300-£399				0.82	[0.70, 0.97]	.019
Adults in household	4,459	3.40	1	1.16	[0.99, 1.36]	.064
IQ	4,700	72.6	1	1.02	[1.02, 1.02]	<.001
Antisocial activities	5,115	0.70	1	0.96	[0.85, 1.07]	.415
Sensation seeking	4,454	0.20	1	1.002	[0.99, 1.02]	.669
Low inhibitory control	4,391	0.21	1	0.95	[0.77, 1.18]	.644

## **11 Appendix C – Correlation of predictor variables in Chapter 3**

Table C1 Correlation matrix of predictors in childhood  $n = 2557$

	1	2	3	4	5	6	7	8	9	10
1. Previous participation	-									
2. Age	0.006	-								
3. Female	0.060**	-0.013	-							
4. White	0.012	0.017	-0.031	-						
5. Social Class	0.114***	-0.008	-0.006	-0.032	-					
6. Income	0.141***	0.019	-0.0003	-0.001	0.327***	-				
7. Adults in household	0.021	-0.022	0.008	0.008	0.034	0.187***	-			
8. Estimated IQ	0.117***	-0.018	-0.014	-0.028	0.263***	0.208***	0.037	-		
9. Conduct Problems	-0.015	0.008	-0.017	-0.004	-0.032	-0.053**	0.001	-0.102***	-	
10. Sensation seeking	0.043*	0.037	-0.256***	0.012	0.020	0.022	-0.007	-0.012	0.107***	-
11. Low Inhibitory control	-0.023	0.042	-0.041*	0.028	-0.024	0.011	-0.062**	-0.029	0.002	0.014

\* $p < 0.5$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; all correlations represent Spearman's  $r_s$

Table C2 Correlation matrix of predictors in adolescence  $n = 2147$

	1	2	3	4	5	6	7	8	9	10
1. Previous participation	-									
2. Age	-0.014	-								
3. Female	-0.015	-0.003	-							
4. White	0.034	-0.001	-0.013	-						
5. Social Class	0.088***	-0.007	-0.054*	-0.019	-					
6. Income	0.126***	-0.010	-0.025	0.006	0.314***	-				
7. Adults in household	0.025	0.032	-0.016	0.002	0.039	0.192***	-			
8. Estimated IQ	0.063**	-0.029	-0.070**	-0.052*	0.301***	0.224***	0.023	-		
9. Conduct Problems	0.027	0.008	-0.151***	-0.045*	-0.008	-0.056**	-0.037	-0.060**	-	
10. Sensation seeking	0.059**	-0.016	-0.289***	-0.014	0.012	0.025	0.031	0.005	0.256***	-
11. Low Inhibitory control	-0.049*	-0.019	-0.034	0.031	-0.024	0.012	-0.025	-0.049*	0.006	0.012

\* $p < 0.5$ , \*\* $p < 0.01$ , \*\*\*  $p < 0.001$ ; all correlations represent Spearman's  $r_s$

## **12 Appendix D – Investigation of missing data in Chapter 4**

*Table D1 Results from univariate logistic regressions used to predict those who have outcome information on alcohol use (n = 5,100) of those eligible to participate at TF3 (n = 10,034, mean age of 15.5 years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>P</b>
Age	5,247	7.9	1	0.58	[0.39, 0.85]	.005
Female	1,0034	57.8	1	1.36	[1.25, 1.47]	<.001
White	9,080	5.9	1	1.28	[1.05, 1.56]	.015
Mother's social class (I)	7,746	113.5	4			
II				0.76	[0.62, 0.94]	.009
III (non-manual)				0.57	[0.47, 0.70]	<.001
III (manual)				0.45	[0.35, 0.58]	<.001
IV & V				0.39	[0.31, 0.49]	<.001
Weekly income (£400+)	6,092	72.8	3			
<£199				0.52	[0.43, 0.61]	<.001
£200-£299				0.70	[0.60, 0.81]	<.001
£300-£399				0.720	[0.63, 0.82]	<.001
High parental supervision	5,131	2.0	1	0.77	[0.53, 1.11]	.161
High peer alcohol use	5,098	1.1	1	1.25	[0.83, 1.87]	.288
Conduct problems	5,120	3.1	1	0.70	[0.48, 1.04]	.077
Estimated IQ	5,025	56.1	1	1.05	[1.04, 1.07]	<.001
Low inhibitory control	6,352	3.0	1	0.85	[0.71, 1.02]	.083
Sensation seeking age 13 years	5,594	0.2	1	0.99	[0.98, 1.01]	.644
Alcohol use age 13 years	5,773	0.1	1	0.98	[0.86, 1.11]	.729
Previous Participation age 11 years	5,933	110.0	1	1.96	[1.73, 2.23]	<.001
Sport participation	5,135	2.7	2			
No participation				0.70	[0.46, 1.07]	.104
Other participation				0.80	[0.45, 1.42]	.446



*Table D2 Results from univariate logistic regressions used to predict those with outcome information on alcohol use (n = 4,855) of participants eligible to participate at CCS (n = 9,510, mean age 16.7 years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>P</b>
Age	4,901	1.6	1	0.49	[0.17, 1.46]	.201
Female	9,510	280.9	1	2.01	[1.86, 2.19]	<.001
White	8,825	9.7	1	1.38	[1.13, 1.69]	.002
Mother's social class (I)	7,591	131.4	4			
II				0.59	[0.48, 0.72]	<.001
III (non-manual)				0.43	[0.35, 0.53]	<.001
III (manual)				0.32	[0.25, 0.41]	<.001
IV & V				0.35	[0.28, 0.45]	<.001
Weekly income (£400+)	6,207	119.6	3			
<£199				0.46	[0.38, 0.54]	<.001
£200-£299				0.61	[0.52, 0.70]	<.001
£300-£399				0.63	[0.55, 0.72]	<.001
High parental supervision	4,990	19.5	1	1.31	[1.16, 1.48]	<.001
High peer alcohol use	4,958	15.2	1	0.77	[0.67, 0.88]	<.001
Conduct problems	4,979	47.4	1	0.65	[0.57, 0.73]	<.001
Estimated IQ	4,849	137.6	1	1.02	[1.02, 1.04]	<.001
Low inhibitory control	6,175	0.4	1	0.94	[0.79, 1.13]	.512
Sensation seeking age 16 years	4,754	0.3	1	0.99	[0.93, 1.04]	.599
Alcohol use age 13 years	5,600	27.4	1	0.74	[0.66, 0.83]	<.001
Previous participation age 11 years	6,012	31.6	1	1.42	[1.26, 1.61]	<.001
Sport participation	5,144	8.3	2			
No participation				0.87	[0.76, 1.01]	.064
Other participation				1.12	[0.95, 1.32]	.180

*Table D3 Results from univariate logistic regressions used to predict those who are included in analyses (n = 2,316) of those who have outcome information on alcohol use at TF3 (n = 5,100; mean age 15.5 years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>P</b>
Age	5100	212.5	1	0.20	[0.17, 0.25]	<.001
Female	5100	1.23	1	0.94	[0.84, 1.05]	.267
White	4854	17.3	1	1.90	[1.40, 2.57]	<.001
Mother's social class (I)	4323	34.8	4			
II				0.83	[0.65, 1.06]	.144
III (non-manual)				0.73	[0.57, 0.92]	.009
III (manual)				0.48	[0.35, 0.67]	<.001
IV & V				0.53	[0.39, 0.72]	<.001
Weekly income (£400+)	3902	75.3	3			
<£199				0.40	[0.32, 0.60]	<.001
£200-£299				0.62	[0.51, 0.74]	<.001
£300-£399				0.79	[0.67, 0.93]	.006
High parental supervision	5013	3.24	1	1.11	[0.99, 1.24]	.072
High peer alcohol use	4997	0.82	1	0.95	[0.84, 1.07]	.366
Conduct problems	5014	0.35	1	0.97	[0.87, 1.08]	.555
Estimated IQ	4898	76.5	1	1.02	[1.02, 1.02]	.001
Low inhibitory control	4314	0.08	1	0.97	[0.78, 1.20]	.774
Sensation seeking age 13 years	4374	0.13	1	1.00	[0.99, 1.02]	.718
Alcohol use age 13 years	4480	0.11	1	1.02	[0.91, 1.15]	.744
Previous participation age 11 years	3873	12.2	1	1.35	[1.14, 1.59]	<.001
Sport participation age 15 years	5015	13.0	2			
No participation				0.80	[0.71, 0.90]	<.001
Other participation				0.92	[0.78, 1.09]	.330

*Table D4 Results from univariate logistic regressions used to predict those who are included in analyses (n = 4,855) of those who have outcome information on alcohol use at CCS (n = 1,624; mean age 16.7 years).*

<b>Predictors</b>	<b>n</b>	<b>X<sup>2</sup></b>	<b>df</b>	<b>OR</b>	<b>95% CI</b>	<b>P</b>
Age	4855	2.3	1	1.21	[0.95, 1.55]	.129
Female	4855	6.09	1	0.86	[0.76, 0.97]	.014
White	4661	9.6	1	1.74	[1.22, 2.46]	.002
Mother's social class (I)	4129	25.3	4			
II				0.96	[0.76, 1.21]	.727
III (non-manual)				0.80	[0.63, 1.004]	.054
III (manual)				0.68	[0.49, 0.96]	.029
IV & V				0.56	[0.41, 0.76]	<.001
Weekly income (£400+)	3788	59.7	3			
<£199				0.46	[0.36, 0.60]	<.001
£200-£299				0.59	[0.49, 0.72]	<.001
£300-£399				0.71	[0.60, 0.85]	<.001
High parental supervision	3510	5.7	1	1.18	[1.03, 1.34]	.017
High peer alcohol use	3497	1.36	1	0.92	[0.80, 1.06]	.243
Conduct problems	3508	0.11	1	0.98	[0.86, 1.12]	.736
Estimated IQ	3468	30.5	1	1.01	[1.01,1.02]	<.001
Low inhibitory control	3696	0.03	1	1.02	[0.81, 1.29]	.859
Sensation seeking age 16 years	4717	13.7	1	1.03	[1.01, 1.04]	<.001
Alcohol use age 13 years	3670	0.74	1	0.94	[0.82, 1.08]	.391
Previous participation age 11 years	3778	38.4	1	1.70	[1.44, 2.02]	<.001
Sport participation age 16 years	3976	37.1	2			
No participation				0.62	[0.53, 0.72]	<.001
Other participation				0.89	[0.76, 1.04]	.132

## 13 Appendix E – Correlations of predictors variables in Chapter 4

*Table E1 Correlation matrix for predictors in Model A (n = 2,316)*

	1	2	3	4	5	6	
1 Age	-						
2 Gender	-0.005	-					
3 White	-0.008	-0.011	-				
4 Income	-0.007	-0.021	0.003	-			
5 Social class	-0.006	-0.044*	-0.021	0.323***	-		
6 Supervision	0.008	0.037	0.027	0.020	-0.003	-	
7 Peer alcohol use	0.104***	0.020	-0.013	0.030	0.010	-0.199***	
8 Conduct problems	0.007	-0.151***	-0.041*	-0.045*	-0.004	-0.310***	0.26
9 IQ	-0.022	-0.074***	-0.043*	.215***	0.302***	0.036	0.0
10 Low IC	-0.024	-0.036	0.034	0.022	-0.011	0.040	-0.
11 SS age 13	0.024	-0.291***	-0.018	0.026	-0.013	-0.172***	0.17
12 Past Alcohol use	0.059**	0.015	-0.034	0.030	0.003	-0.182***	0.28
13 Any OA age 11	-0.025	-0.007	0.050	0.126***	0.089***	0.017	0.07
14 Any OA age 15	-0.063**	0.001	0.025	0.095***	0.062**	0.037	-0.0

P < .001\*\*\* p < .01\*\* p < .05\*; correlations represent Spearman's  $r_s$

Correlation matrix continued.

	8	9	10	11	12	13
8 CP	-					
9 IQ	-0.065**	-				
10 Low IC	0.008	-0.030	-			
11 SS age 13	0.252***	0.001	0.012	-		
12 Past Alcohol use	0.190***	0.010	-0.043*	0.211***	-	
13 Any OA age 11	0.020	0.066**	-0.053*	0.050*	-0.005	-
14 Any OA age 15	-0.045	0.095***	-0.023	0.019	-0.070**	0.196***

Table E2 Correlation matrix for predictors in Model C (n = 1,624)

	1	2	3	4	5	6	7
1 Age	-						
2 Gender	-0.085**	-					
3 White	0.013	-0.028	-				
4 Income	0.009	-0.036	0.036	-			
5 Social class	-0.012	-0.029	-0.052	0.336***	-		
6 Supervision	-0.019	0.014	0.007	-0.010	-0.019	-	
7 Peer alcohol use	-0.014	0.026	0.006	0.057*	0.010	-0.211***	-
8 Conduct problems	0.024	-0.127***	-0.024	-0.024	-0.018	-0.313***	0.272***
9 IQ	0.008	-0.103***	-0.041	0.197***	0.300***	0.016	0.022
10 Low IC	0.040	-0.048	0.038	0.035	-0.015	0.015	-0.019
11 SS age 16	0.022	-0.360***	-0.027	0.053*	-0.005	-0.177***	0.118***
12 Past Alcohol use	0.005	0.018	-0.023	0.043*	0.002	-0.178***	0.285***
13 Any OA age 11	0.027	-0.030	0.026	0.165***	0.125***	0.028	0.072**
14 Any OA age 16	0.009	-0.062	0.017	0.141***	0.109***	0.030	-0.006

P< .001\*\*\* p<.01\*\* p<.05\*; correlations represent Spearman's r

Correlation matrix continued.

	8	9	10	11	12	13
8 CP	-					
9 IQ	-0.045	-				
10 Low IC	0.017	-0.030	-			
11 SS age 16	0.230***	0.067**	0.019	-		
12 Past Alcohol use	0.186***	0.045	-0.057*	0.107***	-	
13 Any OA age 11	0.040	0.093***	-0.043	0.075**	-0.008	-
14 Any OA age 16	0.006	0.162***	-0.037	0.105***	-0.048	.236***

## 14 Appendix F – Interview questions and protocol

### **Interview : Vulnerable youth and their participation in structured activities**

#### **INTRODUCTION**

*Thank you for agreeing to be interviewed. Before we start I would just like to remind you that your participation is entirely voluntary. You may stop this interview at any time or choose not to answer certain questions throughout the interview. The interview itself should last no more than 1 hour. All the information that you provide will be anonymous.*

*My research focuses on young people's participation in organised activities. These are activities which are often supervised by adults and help the development of different skills. Sports and special groups such as a drama club or scouts are all examples of organised activities. I'm interested in the types of activities they participate in as well as how these activities might be associated with health behaviours.*

*I'm interviewing you because I would like to hear about your work with young people, particularly those who are at-risk of offending and below the age of 18. I'd like to ask you questions that draw on your experience working with this group. Please don't feel like your answers should reflect those of your organisation/service. What you say will not be linked to the identification of [the organisation] and there are no right or wrong answers.*

*Do you have any questions before we start?*

## **a) JOB CONTEXT**

*The first set of questions I have is about your work and who you work with.*

1. *Can you tell me a little about what (the organisation) is and what it does?*  
[what the organisation/group does and it's aims. Is it based at the centre, or does it do outreach work outside its offices? Does it do anything else? How does it work with vulnerable young people?]
  
2. *How would you describe the young people you come into contact with at (the organisation)?*  
[Who do you end up working with?/ what walks of life?/ Is there usually a defined group?  
-Are they vulnerable/at-risk of offending? What ages? How do they get in contact with (the organisation)? ]
  
3. *What is your job role in (the organisation)?*  
[manager? Team leader? What are your day to day activities?]

## **b) ORGANISED ACTIVITIES**

Like I mentioned at the start, organised activities are activities that are supervised by adults and help young people to develop different skills. There can be many different kinds of activities, such as different types of sports, interest groups and clubs.

4. *Does (the organisation) try to engage young people into organised activities as one of it's key aims/ objectives?*  
[what are they? Can you tell me more about these objectives? If not, or not as much as they would like: why don't you engage children in organised activities? – skip to question 8]
  
5. *What types of organised activities do you engage young people in?*  
[How often? Where (there or outside centre)? What kind? Are they one-off or recurrent? Who works with the young people in trying to engage them?]
  
6. *Why does (the organisation) try to engage young people in activities?*  
[Is this your own personal view or the view of the organisations?]

7. *How does (the organisation) facilitate participation?*  
Alternatively: *What do you find particularly useful that (the organisation) does to engage young people in organised activities?*  
[Cover costs/transport/holds activities themselves/organises for someone to come in? Is this for initial one-off engagement/recurrent engagement]

**c) BARRIERS**

I'd like you to think about your job role in (the organisation) and what you do day to day.

8. *When you try to engage the young people who are vulnerable, at-risk of offending or who have offended in the past in organised activities, what kind of challenges do you often face?*  
[Follow up: Are these challenges dependent on specific to types of activities or certain groups of young people?  
If no challenges: Is it ALWAYS easy to engage them? Why? ]
9. *Which challenges do you find the most difficult?*  
[why are these the most challenging? Their frequency? Impact on participation? Difficulty in solving?]
10. *Are there other challenges that you don't encounter in your job role but you think (the organisation) faces when trying to engage these young people into activities?*  
[Why are these challenges?]
11. *I have on cards here different types of challenges which might arise when trying to engage vulnerable young people, those who have offended or are at risk of offending into activities. Could you put them in order according to how much of a challenge they are to you?*  
[each one: why are these (the most/least) challenging]

**d) HEALTH BEHAVIOURS**



*I'm interested in some of the health behaviours of the young people you work with, such as their alcohol use.*

*12. From your work with young people, have you been able to gain a picture about their alcohol use?*

*13. Can you tell me about their alcohol use? What is it like?*

[more than average/less, a lot/ a little, frequent/infrequent, what do they drink, when do they drink, why do they drink? Are there any groups in particular who drink more? What is their alcohol use like?]

*14. What do you think about their alcohol use?*

[normal/good/bad, excessive, not a problem, normal. Why do you think it is/isn't a problem? Why?]