Early Life Course Determinants of Young Adults' Gambling Behaviour

An Australian Longitudinal Study

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EXECUTIVE SUMMARY

CHAPTER 1: INTRODUCTION

Problem gambling represents a public concern as both a social and health issue. Available evidence shows problem gambling is associated with a range of psychological disorders, criminality, and disruption to families. While gambling itself may represent a pleasurable pursuit for the majority, for a proportion, gambling-related activities may assume many of the characteristics of an addiction and have the capacity to undermine individuals' mental and physical health, social relationships, financial independence, as well as the financial and psychological wellbeing of their families and/or friends. The objectives of this study are based on the need to increase our understanding of gambling behaviour, its antecedents, as well its influence on the health and wellbeing of gamblers and their families. One of the most important and unresolved issues in gambling research is whether the mental health and social/family correlates of gambling precede or follow gambling behaviour. This report focuses on this issue.

CHAPTER 2: STUDY DESIGN

We addressed the objectives of this study by analysing data from the Mater-University of Queensland Study of Pregnancy (MUSP), a prospective longitudinal study of maternal and child health that commenced in 1981-1983. Study mothers and their offspring have been followed up over six successive waves of data collection, subsequent to maternal enrolment during the prenatal period. The most recent wave of data collection took place between 2002 and 2004 (Phase 7, the 21-year follow-up). During this latest phase, a wealth of health, behavioural and socio-demographic data was collected from both mothers and study children (now young adults) and this was linked to data gathered on both mother and child across all phases of the study. The results in this report are based on this linked data. This chapter provides a detailed account of the study design and all measures used in analyses.

CHAPTER 3: FINDINGS ON YOUNG ADULT'S GAMBLING

Our results show that after adjustment for important confounders, a number of individual and family factors independently predicted gambling behaviour. Individual

predictors included being male, commencing smoking and alcohol use under the age of 15 years, and having externalising behaviour problems in adolescence. Family predictors included maternal incomplete high school education, maternal tobacco and alcohol use in childhood or adolescence, problems in mother-child communication, and mother being in a de facto relationship during the child's developing years.

CHAPTER 4: FINDINGS ON YOUNG ADULT GAMBLING EXPENDITURE

Around 4.4% of the sample reported spending $35 or more per week on gambling. Gender differences were observed in the amount of money expended by young adults on gambling activities. Almost twice as many males spent an average of $7 or more per week on gambling activities (27%) as females (14%). Gambling expenditure was predicted by a range of socio-demographic characteristics at 21 years including education, employment, income, and marital status. This contrasts with the socio-demographic characteristics of the family of origin (maternal age, parental employment, family income, and marital status), which appeared to be unrelated to gambling expenditure as the child reaches adulthood.

Substance use in young adulthood strongly predicted gambling expenditure. Greater numbers of cigarettes smoked per day, frequent use of cannabis, and use of other illicit substances were found to be associated with greater expenditure on gambling, as was abstaining from alcohol. The age that respondents began to use substances was also found to strongly predict gambling expenditure once young adulthood was reached. Overall, those who started smoking, using alcohol or using cannabis under the age of 15 years reported spending more money on gambling in young adulthood than those who commenced substance use at an older age or who had never used these substances. Those who reported that substance use at 21 years was adversely impacting on their lives were also more likely to spend greater amounts on gambling activities than other respondents. Maternal smoking at the time of the 21-year follow-up was also found to predict gambling expenditure of offspring, while maternal alcohol consumption appeared to be unrelated.

Some individual characteristics such as aggressive and delinquent behaviour measured at age 14 also predicted higher gambling expenditure. Higher spending was

also predicted by smoking and alcohol consumption during adolescence. Other individual and environmental factors measured at 21 years that were found to predict higher gambling expenditure were: antisocial behaviour, including aggressive and delinquent behaviours, endorsement of risk-taking beliefs and behaviours, and living in a neighbourhood characterised by numerous social problems. Conversely, young adults who attended church or engaged in religious practices such as meditation, prayer or rituals were found to spend less money on gambling activities.

A number of family related influences operating during the formative years were significantly associated with gambling expenditure among young adults. Maternal anxiety, smoking, and alcohol consumption during childhood were associated with higher spending on gambling activities in young adulthood, whereas, parenting style appeared to be unrelated to young adult gambling. During adolescence, changes in maternal marital status, problems in communication between mother and child, as well as maternal smoking and alcohol consumption predicted higher spending of offspring on gambling in young adulthood.

Due to the likelihood that many of the influences that predict gambling expenditure are inter-related, it is important to determine the independent risk of each of these factors. Analyses performed to determine the independent associations between these factors and gambling expenditure revealed that maternal depression and alcohol consumption during childhood, one or two changes of maternal partner between childhood and adulthood, as well as problems in mother-adolescent communication, maternal smoking at 14 years and commencing smoking under the age of 15 years were all independent risk factors for spending $35 or more per week on gambling in young adulthood. Interestingly, examination of the possible relationship between multiple exposures to risk and gambling expenditure revealed that there was no strong pattern in gambling expenditure according to level of exposure to a range of risk factors.

CHAPTER 5: FINDINGS ON YOUNG ADULT PROBLEM GAMBLING

Young adult gambling problems were assessed from the Canadian Problem Gambling Index. While 58.3% of the sample reported that they didn't gamble, 30.3% reported that they gambled but had no problems related to their gambling, and 11.3% reported one or more gambling-related problems. The most common problems reported were loss of control – betting more than the individual wanted to (20.7%) and betting more than could be afforded (17.1%). The most common adverse consequences from gambling were of a personal nature - gamblers felt guilty as a result of their gambling behaviour (10.8%) and felt people criticised them for their gambling behaviour (7.7%). Other consequences from gambling were reported by a relatively small proportion of the sample, including: financial problems (3.3%); health problems (2.1%); job related difficulties (1.1%); and problems with family or friends (0.3%).

Correlates of gambling problems in young adulthood were found to include: being male; having a higher income; substance use (including cigarettes, cannabis, and other illicit drugs). Interestingly, abstaining from alcohol use in adulthood predicted gambling problems. However, those who had started using alcohol, smoking, or using cannabis under the age of 15 years were more likely to be problem gamblers than those who started using these substances at a later age or not at all. Young adults who believed that substance use had impacted negatively on their lives were also more likely to have gambling-related problems, as were those who reported higher levels of aggressive, delinquent, and risk-taking behaviour. Engagement in religious activities such as prayer, meditation, and rituals appeared to protect young adults from gambling problems, but church attendance did not. Young adults who lived in a neighbourhood with more social problems were also more likely to be problem gamblers than those living in neighbourhoods with lower levels of social problems.

Early predictors of young adult gambling problems included: lower maternal education, maternal alcohol consumption in childhood; changes in marital status between childhood and adolescence; adolescent smoking; and adolescent aggressive and delinquent behaviour. Risk factors found to have an independent effect included: being male; the child's mother being in a de facto relationship at the time of adolescence; smoking up to 9 cigarettes per day in adolescence; and commencing smoking or

drinking prior to age 15 years. Young adults who had been exposed to 5 or more of these influences were found to be much more likely to have gambling problems.

CHAPTER 6: DISCUSSION

While many influences operating during the developing years were found to predict gambling problems, the translation of this knowledge to effective policy making is problematic. The propensity to gamble is likely to be affected by numerous individual, familial and social factors. The range of influences identified in this report as being independent risk factors for gambling problems raise difficulties for policy makers who seek to prevent problem gambling. Given that many of the factors predicting gambling problems are relatively weak predictors, it is unlikely that early interventions for those children or adolescents who display problem behaviour, start to use alcohol and other substances at an early age, tend to be risk-taking in either attitude or behaviour, or face difficulties from family circumstances will materially impact on rates of gambling problems.

CHAPTER 1: INTRODUCTION

Gambling and problem gambling

Sociologists suggest that gambling is a natural element of human society [1], that gambling fits easily with cultural values, virtues and lifestyles, and that more people will gamble as gambling becomes more accessible [2] and socially acceptable [3]. Smith and Abt [4] argue that gambling is a form of social interaction by which people can avoid the boredom of everyday life, take on new roles and enjoy the pleasure of the achievement. Economic theorists conceptualise gambling as a strategy for economic development [5,6]. However, these perspectives fail to explain why certain gambling activities are more popular or addictive than others, or why certain people never begin gambling while others gamble frequently and sometimes lose control of their gambling behaviour. The great majority of people who gamble do not lose control of their behaviours. However, for a small percentage of people, gambling becomes a serious behavioural disorder [2,7,8].

Terminology

At the outset it is necessary to clarify some terminology which will be used throughout this report. Several terms have been used in the literature to refer to those with gambling problems. This includes pathological gambling, problem gambling, compulsive gambling, at-risk, disordered and excessive. These terms are often used interchangeably, although they do not necessarily have the same meaning across different studies. In this report, problem gambling will refer to 'the situation when a person's gambling activity gives rise to harm to the individual player, and/or to his or her family, and may extend into the community' [9]. Additionally, problem gamblers tend to have minimal control over the amount of money they spend on gambling and have difficulty abstaining from gambling [10]. To be called a 'problem gambler' in this review of the literature, DSM-IV criteria on gambling do not necessarily have to be met (those meeting criteria are typically referred to as 'pathological gamblers'). However, some problem gamblers would meet the strict DSM-IV criteria.

Public health and social concerns about gambling

The adverse effects of uncontrolled gambling on individual gamblers, their families and often their entire social systems [11,12], form the basis of community and public health concerns about gambling.

Problem gambling and the individual

One of the strongest relationships consistently found in the literature associates problem gambling with some of the most common mental health disorders, such as depression, anxiety and substance use disorders [13-15]. There is also evidence of high rates of some personality disorders among problem gamblers [7,16,17], the most common being antisocial personality disorder [18,19].

Gambling problems correlate with depression, anxiety and suicide in both adolescents and adults [16,20-27]. The Queensland Household Gambling Survey (QHGS) 2003-04 found that 47% of problem gamblers report having felt seriously depressed in the previous year, with nearly as many having been under a doctor's care for stress-related issues. Seventeen percent of problem gamblers have seriously considered suicide because of their gambling [28]. These results are based on data provided by more than 30 000 people from all areas of Queensland.

Alcohol and drug abuse are perhaps the best-documented co-morbid diagnoses [13,20,21,29]. Among a large national sample from the United States, in a 2001-2002 survey, it was found that three quarters of pathological gamblers had an alcohol use disorder [7]. This rate was 38.1% for drug use disorder and 60% for nicotine dependence. Furthermore, the QHGS (2003-04) found that while only 18% of recreational gamblers report having gambled under the influence of drugs/alcohol, more than 50% of people in the moderate risk and problem gambling groups report having gambled under the influence of drugs and/or alcohol [28].

Problem gambling and the family

Involvement in gambling may create serious problems for family members. These may include conflict with the family [12,20], violence in the home [30], disruption of family relationships [31-33] and aggressive behaviour toward children [34]. Parental problem gambling is also associated with serious psychosocial maladjustment in their children.

Jacobs [35] reports that compulsive parental gambling is related to abuse of stimulant drugs, and overeating among offspring. Other studies support these findings and also indicate that children of problem gambler families are more likely to experience physical abuse than children in the general population [36]. The QHGS (2003-04) [28] reports that 28% of problem gamblers did not have enough time to look after their family interests due to gambling, and that 22% of problem gamblers report a break-up of an important relationship due to gambling. Similarly, a study of gambling behaviour in Central Queensland reports marriage and family breakdown for problem gamblers [37].

Problem gambling and society

Available evidence indicates that there is an association between problem gambling and crime [2,38-42]. Some studies report high levels of gambling-associated crimes [40] while others report lower levels: 18% of the QHGS (2003-04) [28] problem gambling group report having obtained money illegally to gamble. Criminal behaviours related to problem gambling include stealing, cheating, fraud and collusion. Social costs from problem gambling include income lost by gamblers who lose their jobs, costs related to enforcement and judiciary processes for those who commit crimes to support gambling habits and the requirement for family members or others to "bailout" problem gamblers [43].

Prevalence of gambling and problem gambling

Recent data from the QHGS (2003-04) [28] provide estimates of the prevalence of gambling in Queensland. In this survey people were classified into different gambling groups depending on their responses to questions from the Canadian Problem Gambling Index (CPGI). Non-gambling people were those who had not gambled in the past 12 months at the time of the survey. Recreational gamblers were those who did not report having experienced any adverse consequences from their gambling activity. Low risk gamblers were people who are unlikely to have experienced any adverse consequences from gambling, but may be at risk of experiencing problems. Moderate risk gamblers were those who may have experienced adverse consequences from gambling or may be at risk of problems occurring. Finally, problem gamblers were people who report having experienced adverse consequences from their gambling

and who may have lost control of their behaviour. The proportion of people in each gambling group can be seen in Table 1.1.

Table 1.1: Prevalence of different gambling behaviours in Queensland

Gambling group	Percentage
Non-gambling	19.73
Recreational	72.40
Low risk	5.34
Moderate risk	1.97
Problem gambling	0.55

Schofield and colleagues [37] investigated the gambling behaviours of people in Central Queensland using the South Oaks Gambling Screen. Over 90% of the population had engaged in some form of gambling activities in the past month. The prevalence of problem gambling was 1.8%.

More generally, research indicates that between 70 and 90% of adults have gambled at some time in their lives[10]. These rates are similar to those reported for adolescents [44], suggesting that gambling behaviour begins relatively early in life. It is believed that relaxation of gambling legalisation in most countries has been associated with an increase in gambling activity as well as problem gambling [10,45]. The Australian Federal Government Productivity Commission [10] exhaustively reviewed national and international research and estimated that around 2.1% of the adult Australian population have either moderate or severe problems with their gambling. In a critical analysis of prevalence rates of problem gambling across different countries Walker and Dickerson [46] indicate current problem gambling involves 1%-2% of the community.

Gambling and problem gambling: associated factors

There are two key questions that need to be addressed and to which the available literature provides only modest insight. The first of these questions relates to the characteristics of those who engage in gambling behaviour. The second concerns the characteristics that distinguish those who move from occasional gambling to more persistent gambling behaviour patterns. Available research in Australia and overseas

identifying a range of socio-demographic, familial, and psycho-behavioural factors related to gambling and problem gambling are outlined below.

Socio-demographic factors

Although gambling has been rapidly increasing in many countries such as the United States, the UK and Australia, surveys have shown that not everyone gambles and that some people gamble more than others. Socio-economic status (SES) appears to be associated with both participation in gambling activities, and gambling problems [47,48]. Adult and young gamblers appear to be mostly concentrated in low socio-economic strata in some Western countries [47-49] (but see Volberg & Steadman [50] for an opposing view). In Australia and Queensland in particular, there does not appear to be a strong association between socio-economic status and gambling problems though [51]. Additionally, problem gambling is associated with low education levels [28,50,52]. The relationship between employment status and gambling is less clear. Some researchers have found that problem gamblers are more likely to be employed [21] while other research has found that problem gamblers are more likely to be unemployed [20]. In Queensland, it was found that those heavily involved in gambling were more likely to be working full-time or self-employed [28]. However, because these studies are cross-sectional in nature it is not clear whether lower SES precedes or is a consequence of gambling behaviour.

Research consistently shows that males are more likely to be problem gamblers than females [7,21,22,28,51,53-56] and that problem gamblers are more likely to be unmarried [7,55,57]. In almost all surveys of Australian gambling, it has been found that the prevalence of gambling-related problems tends to be significantly higher in young adults (aged 18-25 years) than in all other age cohorts [10,29,51,55,58]. However, many young adults who are involved in gambling activities are also involved in a variety of deviant or problem behaviours such as drug use and delinquency [20,29]. The relationship between gambling and these problem behaviours might be explained via two different mechanisms. One hypothesis is that the link between these behaviours is explained by common antecedent factors [59,60]. In other words, these problem behaviours disappear or are considerably reduced once there is adjustment for the shared risk factors. An alternative

mechanism is that the relationship between gambling and other problem behaviours is at least partly independent of other background factors and one leads to the other.

Finally, there is a significant relationship between religion and frequency of participation in religious ceremonies and gambling [21,61-63]. It is suggested that the moral prohibition of gambling within some religions explains this relationship [64]. Most Protestant faiths (including Mormonism) discourage gambling, whereas Catholicism and Judaism do not reject gambling, nor do they view it as an unacceptable activity for faithful members [65]. It follows that religious affiliation may influence gambling behaviours. Of course religious beliefs might be related to other characteristics of an individual and it may be these other characteristics that lead to particular gambling outcomes.

Familial factors

Previous studies emphasise family environment as having a considerable impact on the offspring's gambling behaviour. The impact of the family on an individual's gambling might be a consequence of two main pathways. First, it may be that there is genetic basis for the transmission of gambling behaviour from parents to offspring. Overall, the evidence supporting this hypothesis is limited. Winters and Rich [66] investigated genetic influences on gambling behaviour for 155 young adult pairs of twins. Their results suggested an association between genetic characteristics and excessive gambling for some types of gambling, but mainly for males, with a very weak association for females. A study of gambling behaviour involving 3359 twin-pair members of the Vietnam Era Twin Registry [67] suggests that inherited factors explain a substantial proportion of the variance in patterns of gambling.

Alternatively, it is argued that the influence of the family on gambling behaviour can be explained by social learning theory [68,69]. In relation to children, social learning theory posits that individuals are more likely to imitate and model those they respect, such as parents, siblings and peers. According to this theory, individuals learn, replicate and preserve behaviours that are visible and are reinforced [70]. This theory is supported by a wealth of evidence related to the development of substance disorders and deviant behaviour. For example, in examining parental influence on adolescent substance use, McDermott [71] and Li and colleagues [72] found that adolescent perceptions of parental

consumption of drugs and parental attitude towards drugs was significantly associated with adolescent drug behaviour.

Given the available literature documenting patterns of substance use and abuse, it is plausible that one of the precipitating factors for adolescent gambling behaviour is exposure to, observation of, and/or modelling of the behaviours of family members or friends. Thus children, who observe parents or siblings gambling at home, are more likely to manifest similar behaviour. Several studies have examined the relationship between parental and child gambling activity. Problem gamblers are significantly more likely to have a parent who gambles excessively than non-problem gamblers [29,33,35,58,73-77]. Specifically, in Queensland it was found that problem gamblers were more likely (37%) to have someone in their immediate family who has had a gambling problem than non-gamblers (9%) [28]. Most studies which have suggested an association between parent and child gambling behaviour have relied on the retrospective report of the children. Prospective studies that control for other environmental and individual factors are needed to discern the temporal association of these variables.

Theories of problem gambling

Although demographic factors can explain which groups of people are more likely to gamble than others, these theories cannot explain why some people gamble more than others or what factors contribute to behaviour maintenance in gambling [78]. Several theories have been proposed to explain how problem gambling behaviours develop and are maintained. These include personality, psychoanalytic, addiction-based, biological or medical, learning, and cognitive theories.

Personality theory

Personality theorists postulate that certain personality traits act as a risk for developing problem gambling. The strongest evidence exists for impulsivity and sensation-seeking, however this is only for certain forms of gambling [79]. Impulsivity can be defined as spontaneous behaviour where one acts without thought or self-control. Some studies have found that problem gamblers have higher levels of impulsivity than non-gamblers [80-83]. Through use of a longitudinal study, Vitaro and colleagues [80] established that impulse control deficits precede later gambling problems, rather than

the reverse. Similarly, several studies have found higher sensation-seeking among problem gamblers [22,84,85]. However, the personality profiles of different gamblers are quite different, making it impossible to generalize to the profile of a problem gambler [79].

Psychoanalytic theory

Psychodynamic approaches focus on intrapsychic processes associated with attempts to deal with unresolved conflicts, but see gambling as an impulse disorder along the lines of addictions and perversions [86]. Few endorse this theory today.

Addiction-based theory

Some consider problem gambling as an addiction rather than an impulse control disorder. Both have a high state of arousal, enable one to escape problems, and have similar symptoms such as cravings, tolerance, and withdrawal [87]. However there are also differences between the two: problem gambling involves psychological dependence, whereas substance addiction involves physiological dependence.

Biological/medical theory

Under this theory gambling problems are caused by a biological predisposition, and gambling problems are considered a disease, which is outside of the individual's conscious control [79]. Several biological factors have been linked to problem gambling, including hemispheric dysregulation, dysfunctional neurotransmitters and physiological arousal [79]. Of particular interest, Comings and colleagues [88] report that a variant of the dopamine D2 receptor gene (DRD2), which has been associated with other addictive behaviours (e.g. alcoholism), was found in 51% of problem gamblers compared with only 26% of the normal population. The effect of this gene was more closely associated with gambling than any other addiction [88]. However, there is insufficient evidence to substantiate the bio-genetic basis of problem gambling as this gene is not found in all affected people, and it is not certain whether alteration of dopamine metabolites in the brain precede or follow problem gambling. Furthermore, this model fails to account for the continuum of gambling problems, and thus it is currently used only in conjunction with other theories.

Learning theory

Learning theorists view gambling as a learned behaviour which is maintained by an intermittent schedule of reinforcement. This means that rewards are provided infrequently, and after a varying number of responses [78]. Reinforcers include money which is won [89] and excitement provided by the gambling situation [90]. Negative reinforcement can also occur because aversive states (e.g. anxiety, depression) are reduced due to escaping from problems and by the excitement of the game [91,92].

Cognitive theory

Legalized gambling is constructed in such a manner that the odds are not in favour of the gambler, and thus one can expect to lose money. However, gamblers continue to believe they can win money from gambling [93]. This suggests that excessive gambling is maintained by false or irrational beliefs regarding the probability of winning [78,94]. Gamblers' perceptions have been assessed using the speaking/thinking aloud method, in which gamblers are asked to verbalise their thoughts out loud while gambling. Some common misperceptions include the 'illusion of control', where gamblers believe that they can influence the outcome of a game, or believe that they can predict the outcome [95]. Problem gamblers also show an attributional bias, such that wins are attributed to skill, and losses to factors beyond control [93,94,96]. Losses may be treated as "near wins", so instead of viewing it as constantly losing, the player views it as constantly "nearly winning" which is quite exciting [95]. Finally, gamblers typically 'chase' losses, meaning that if the gambler has lost the last few times, they figure that it must be their turn to win this time [97].

In the QHGS (2003-04), faulty cognitions were more common in the problem gambling groups. The percentage of persons agreeing that there was a greater chance of winning after losing many times in a row was 5% of non-gamblers versus 38% in the problem gambling group. Problem gamblers were also more likely to report that you can win more by using a certain strategy [28].

A pathways model of problem gambling

Several authors acknowledge that gambling behaviour is complex, and that any single theory cannot explain why gambling becomes a problem for some but not others [78,79,86]. Blaszczynski and Nower [86] provide the most comprehensive integrated model to explain the aetiology and maintenance of problem gambling behaviours. These authors have argued that a theoretical model is needed which can integrate the complex array of factors that are associated with problem gambling, as well as the multiple pathways these imply. The basic premise is that one model will not fit every gambler, and thus it is necessary to acknowledge that there are different sub-types of gamblers, each influenced by a different set of factors, but with similar problems. Accordingly, they have proposed that there are three distinct subgroups of problem gamblers: (1) behaviourally conditioned problem gamblers; (2) emotionally vulnerable problem gamblers; and (3) antisocial, impulsive problem gamblers.

This pathways model incorporates elements of different theories which have been explained in detail above, thus a brief description is provided in this section. In all three pathways the starting point is that one must have access to gambling. Following this, the gambler proceeds through one of three distinct pathways (described below). Next, conditioning (positive and negative reinforcement) leads to increased participation in gambling. As gambling behaviour increases, faulty cognitions appear. Losses begin to accumulate, and these losses are chased through further gambling, resulting in a further increase in debts and problems.

Pathway 1: Behaviourally conditioned

These gamblers vary between regular/heavy and excessive gambling due to behavioural conditioning and distorted cognitions rather than because of a loss of control. Initially, this sub-group gambles for entertainment or socialization (i.e. they are essentially 'normal' in character). These people may abuse alcohol, be depressed and anxious as a *consequence* of their gambling behaviour (and debts). These symptoms are not the cause of problem gambling. This sub-group has the least severe problems from

gambling, and they do not have major premorbid psychopathology, substance abuse, impulsivity or disorganized behaviours [86].

Pathway 2: Emotionally vulnerable

These gamblers have anxiety and/or depression prior to gambling, a history of poor coping skills and a negative personal history (including familial factors). This sub-group of gamblers may also be biologically vulnerable (see above for more detail). Together, these factors produce an emotionally vulnerable gambler. The main motivation for gambling is a desire to reduce aversive states by providing escape or arousal [86]. Previous research demonstrates that some people gamble to escape unpleasant feeling states such as anxiety, depression and boredom [27,28,78,98,99].

Pathway 3: Antisocial impulsivist

This sub-group of gamblers possess the vulnerabilities (emotional and biological) described for sub-group 2, however they are also impulsive and antisocial. These traits affect the individual's general level of psychosocial functioning, thus these individuals engage in multiple maladaptive behaviours (e.g. substance and alcohol abuse, criminal behaviour, poor interpersonal relationships). Neurological or neurochemical dysfunction underpins this vulnerability [86].

The current research does not test a specific model of gambling behaviour as this is not particularly useful in and of itself. These aforementioned models are outlined to provide a better basis for understanding problem gambling behaviour in terms of potential predictors and factors which play a part in maintaining problem gambling behaviour. This study will examine the influence of such factors.

Conclusion

Previous studies have investigated problem gambling and its relationship to several individual, familial and social factors. They have found that certain demographic variables such as gender, socio-economic status, age, marital status and psychological disorders (e.g. anxiety, depression, substance use) can predict the risk of problem gambling. Previous research also indicates an association between problem gambling in parents and their offspring. Several theories have been advanced to explain the aetiology and maintenance of problem gambling behaviour.

The limitation of previous research is that it has not been able to investigate the causal sequence of these associations in a prospective study. Most surveys analysing gambling behaviour have been cross-sectional and identified prevalence of associations at one point in time. This represents a weakness if one undertakes to examine the cause-effect relationship between correlates. For example, it is not clear whether gambling may cause mental health impairment or if having a mental health problem may be a risk factor for the development of problematic gambling behaviours. Two main questions remain. Firstly, are these aforementioned factors prospectively associated with gambling and secondly, which factors explain young adults' problem gambling versus non-problem gambling. The Mater University Study of Pregnancy observes behaviours and symptoms longitudinally (from birth to 21 years), thus cause and consequence relationships can be investigated. It is essential that research shed some light on the possible causal relationships, which may be associated with problematic gambling behaviours, due to the severe adverse consequences which can be associated with problem gambling.

CHAPTER 2: STUDY DESIGN

This study involves the merging of specifically collected data relating to gambling behaviour with an existing longitudinal prospective data set representing a cumulative 21 years of data describing the early life course of a population sample of Brisbane.

Purposes and objectives

1. To describe prevalence and demographic characteristics of young adults in Brisbane who engage in gambling and problem gambling;
2. To describe problem gambling behaviour and some consequences of such behaviour for young adult gamblers in Brisbane;
3. To identify childhood, individual and environmental predictors of gambling, gambling expenditure and problem gambling among young adults in Brisbane; and
4. To identify adolescent individual and environmental predictors of gambling, gambling expenditure and problem gambling among young adults in Brisbane.

Methods

Study sample

The data for this study have been taken from the Mater-University of Queensland Study of Pregnancy (MUSP). The Mater Misericordiae Mothers' Hospital is one of two major obstetric units in Brisbane, Australia. The project is a 21-year longitudinal investigation that began in 1981. Pregnant women attending their first clinic visit (at approximately 18 weeks gestation) at the Mater Hospital were invited to participate in the study [100,101]. Over 3 years (between 1981 and 1984), 8,556 consecutive pregnant women were invited to join the study and 8458 agreed to participate (phase 1). Of these, 7,223 gave birth to a live singleton infant and it is this group of mothers and offspring that constitutes the MUSP birth cohort sample. Mothers were interviewed again at 3 to 5 days after delivery (phase 2) and their medical records were also accessed. Additional assessments were conducted when the study children were 6

months, 5 years, 14 years, and 21 years old. The MUSP is a multidisciplinary project, which has focussed on health, developmental, behavioural and social outcomes over the life course of these young adults (now 21 years of age). This study is based on over 3000 young adults who responded to questions about gambling involvement including 1023 young adults who responded to the questions about problem gambling (Canadian Problem Gambling Index).

Measures

Measurement of outcomes (gambling and problem gambling)

Prevalence of gambling among young adults was measured at the 21-year follow-up by asking subjects 'Do you spend money on gambling (eg. Buy lottery tickets, play the pokies, go to the casino, bet on horses, dogs, etc)'? According to their response to this item young adults were divided into two groups: "never gambled", and those who "ever gambled". The second question asked about the amount of money young adults spent on gambling per week. The range of answers varied from zero to 500 dollars per week. Subsequently, subjects were divided into four groups: no money spent, one to six dollars, seven to 30 dollars, and 35 dollars or more per week.

The self-administered Canadian Problem Gambling Index (CPGI) [102] was used to establish current prevalence of problem gambling in young adults. The CPGI is a 31-item questionnaire which measures problems which correspond to DSM-IV criteria for pathological gambling [103] and the South Oaks Gambling Screen (SOGS) [104] and is arguably an appropriate measure of problem gambling for use in the general population. The CPGI has three main sections: gambling involvement, problem gambling assessment and correlates of problem gambling (including familial history of gambling). It yields 5 categories of gambling behaviours: no gambling, non-problem gambling, low risk gambling, moderate risk gambling and high risk (problem) gambling. Initial studies indicate that the CPGI demonstrates good reliability and validity [102].

Within the CPGI nine items comprise a sub-scale known as the Problem Gambling Severity Index (PGSI). The PGSI distinguishes four gambler sub-types: non-problem, low risk, moderate risk and problem. The non-problem group is further divided into

gamblers and non-gamblers as these sub-types are believed to display different characteristics. The nine items related to PGSI are shown below.

Table 2.1: Items related to problem gambling severity index

Dimension	Variables	Items (in the past 12 months)
Problem gambling behaviour	Loss of control	Have you bet more than you could really afford to lose?
	Motivation	Have you needed to gamble with larger amounts of money to get the same feeling of excitement?
	Chasing	Have you gone back another day to try to win back the money you bet?
	Borrowing	Have you borrowed money or sold anything to get money to gamble?
	Problem recognition	Have you felt that you might have a problem with gambling?
Adverse consequences	Personal consequences	Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
		Have you felt guilty about the way you gamble or what happens when you gamble?
		Has gambling caused you any health problems, including stress or anxiety?
	Social consequences	Has your gambling caused any financial problems for you or your household?

Tabulation of the nine items is as follows: a score of 1 for each response of "sometimes," a score of 2 for each response of "often" and a score of 3 for each "always" response. Based on this scoring procedure, a respondent's index can range from 0 to 27 and the cut-off points for each gambler sub-type are as follows: 0 = non-problem gambler; 1-2 = low risk gambler; 3-7 = moderate risk gambler; and 8 or higher = problem gambler.

Measurement of the correlates of gambling at 21 years

In the CPGI, there are 15 items by which correlates of problem gambling are assessed. They include variables: faulty cognition, first experience with gambling, family problems related to gambling and alcohol or drugs, co-morbidities of problem gambling, pain relief, stress, depression and suicide. Table 2.2 lists the items in detail.

Table 2.2: Items related to correlates of problem gambling

Variables	Items
Faulty cognition	After losing many times in a row you are more likely to win? You could win more if you use a certain system or strategy?
First experience	Do you remember a big win when you first started gambling? Do you remember a big loss when you first started gambling?
Family problems	Has anyone in your family ever had a gambling problem? Has anyone in your family ever had an alcohol or drug problem?
Co-morbidity	In the last 12 months have you used alcohol or drugs while gambling? In the last 12 months have you gambled while drunk or high? In the last 12 months have you felt you might have an alcohol or drug problem?
Relieve pain	If something painful happened in your life did you have the urge to gamble? If something painful happened in your life did you have the urge to have a drink? If something painful happened in your life did you have the urge to use drugs or medication?
Stress	Have you been under a doctor's care because of physical or emotional problems brought on by stress?
Depression	Have you felt seriously depressed?
Suicide	Have you seriously thought about or attempted suicide as a result of your gambling?

Measurement of other explanatory factors at 21 years

Socio-demographic factors of the young adults at 21 years

The level of education of young adults was assessed using a range of options from primary school to university. Subjects were then categorized into four groups: below high school, completed high school, tertiary education (college, TAFE and others) and university. At the 21-year follow-up young adults were asked to indicate their marital status. Answers to the question include: never married, living together (de-facto), married, separated but not divorced, divorced and widowed. Subsequently, they were divided into two groups: married/de-facto relationship and unmarried.

Level of income by young adults was measured by the amount of money they earned per week. Options ranged between no income at all to $800 or more per week. They were subsequently divided into three groups: low income (up to 25th percentile), middle income (between 25th and 75th percentiles) and high income (highest 25 percentiles). Young adults were also asked about their job. According to having a 'paid job' at the time the survey was conducted they were grouped into a dichotomous variable: paid job and no paid job.

Two questions were asked about the participation of young adults in church and religious activities. Using their answers to these questions, they were grouped into a dichotomous variable indicating church attendance and religious activities.

In order to assess the extent of social problems in the neighbourhood in which the respondent lives a nine-item scale was developed. Young adults were asked to indicate how much each problem exists in their neighbourhood. These items are used to test hypotheses about the impact of "place" on behaviour. Relevant items and internal consistency (Cronbach's alpha) are listed in Table 2.3.

Table 2.3: Items related to problems in neighbourhood

How much are the following a problem in the area where you live? **Options: Don't know = 1, no problem = 2, small problem = 3, moderate problem = 4, major problem = 5**					
Unemployment	Vandalism/graffiti	Violence in the streets	Drug abuse	House burglaries	Car stealing
Noisy and/or reckless driving		Alcohol abuse		School truancy ("wagging" school)	
Reliability Cronbach's alpha = 0.89 & mean inter-item correlation = 0.47					

After combining the first two options (don't know and no problem) we counted the average score of each participant answers to nine items – "don't know" and "no problem" were scored 1; "small problem" was scored 2 and "moderate" and "major problems" were respectively scored 3 and 4. Based on the total score (ranged 1.0 – 4.0), subjects were subsequently divided into three groups, no problem (<1.5), low problem (1.5 – 2.49), and moderate to high problem (2.5 – 4.0) area.

Young adults substance use

Licit drugs

The extent of smoking by young adults at the 21-year follow-up was assessed via the average number of cigarettes smoked per day during the week preceding survey. Subjects were subsequently divided into four categories: non-smokers, less than 10 cigarettes per day and 10 or more cigarettes per day (Table 2.4).

The frequency and quantity of alcohol consumption at the 21-year follow-up were measured with the following questions: "how often do you drink alcohol?" and "how much alcohol do you usually drink at those times?" the respondents were then divided

into three groups: no alcohol use = abstainers, up to a drink (glass) = mild, and more than one drink per day = heavy (Table 2.4).

Table 2.4: Young adults' cigarette smoking and alcohol consumption

Substance	Young adults' substance use (N = 3737)		
	No use (%)	Mild (%)	Moderate to Heavy (%)
Cigarette smoking	63.6	17.4	19.0
	Abstainer (%)	Mild (%)	Heavy (%)
Alcohol consumption	33.7	58.5	7.8

Apart from the current use and amount of use of substances at 21 years of age, young adults were asked two more questions to retrospectively indicate the age at which they started to smoke cigarette and use alcohol. They were subsequently categorized into four groups: never started, started below 15 years, 15-17 years and 18 years or older.

Table 2.5: Age of initiation to smoking and alcohol consumption by young adults

Substance	N	Age of starting to use			
		Never used	<15 years	15-17 years	18 + years
Cigarette smoking	3697	50.0%	15.4%	26.6%	7.9%
Alcohol consumption	3697	5.3%	17.3%	61.7%	15.7%

In order to assess the impact of alcohol consumption on young adult life, an eight-item scale was developed indicating adverse impact of alcohol.

Table 2.6: Items related to impact of alcohol consumption on quality of life

To what extent has alcohol impacted on your life (over the past four weeks)? **Options: have never drunk = 1, not at all = 2, mildly = 3, moderately = 4, severely = 5**
I am troubled about my alcohol use
My alcohol use has limited my performance at work, school or other activities
I have worried about my present or future health because of my alcohol use
I have been limited in going to certain places because of my alcohol use
I have felt frustrated with myself because of my alcohol use
I have felt that my alcohol use is controlling my life
Using alcohol has interfered with my social life
I have felt that using alcohol is preventing me from achieving what I want in life
Reliability Cronbach's alpha = 0.93 & mean inter-item correlation = 0.63

Young adults' endorsement of the first two options was considered to reflect no alcohol consumption and alcohol consumption without impact on life. Endorsement of

any of the last three options was considered adverse impact of alcohol consumption on the young adult life. Finally, subjects were categorized into three groups: no alcohol use, alcohol use without impact on life and alcohol use with negative impact on life.

Illicit drugs

Consumption of illicit drugs was assessed at 21-year follow-up from a self-report questionnaire. The illicit drugs under study included cannabis, amphetamines (amphetamine and ecstasy), heroin, cocaine, inhalants and hallucinogens. Regarding consumption of cannabis, young adults were asked two separate questions. The first question was "in the last month how often did you use cannabis, marijuana, pot, etc.?" Options included: have never used, used everyday, use it every few days, used it once or so and not used it in last month.

In subsequent analysis, young adults were grouped into three categories: never used, recreational users (including 'once or so' and 'not in the last month'), and frequent users (including 'every day' and 'every few days'). A second question asked the age at which an individual started using cannabis. Subsequently those who had previously used cannabis were divided into two groups: those who had begun using cannabis before the age of 15 ('early onset') and those first using cannabis at age 15 or older ('late onset'). Of those who had previously used cannabis (n = 1829), almost 25% reported early onset.

A history of use of other illicit drugs was obtained via the question "during the last 12 months how often have you used the following drugs?" with the range of answers for each class of drug being: 'never used', 'not used in the past year', 'a few times during the year', 'a few times during a month' and 'a few times during a week'. Subsequently, participants were divided into three categories: never use; occasional use (few times a year); and frequent use (a few times a week or a few times a month).

The impact of the use of illicit drugs on the young adult's quality of life was assessed at the 21-year follow-up using eight relevant items.

Table 2.7: Items related to impact of illicit drugs on young adults' quality of life

To what extent has drug/substance use impacted on your life (over the past four weeks)?
Options: have never used = 1, not at all = 2, mildly = 3, moderately = 4, severely = 5
I am troubled about my use
My use has limited my performance at work, school or other activities
I have worried about my present or future health because of my use
I have been limited in going to certain places because of use of substances
I have felt frustrated with myself because of my use
I have felt that my substance use is controlling my life
Using drugs has interfered with my social life
I have felt that using drugs is preventing me from achieving what I want in life
Reliability Cronbach's alpha = 0.94 & mean inter-item correlation = 0.68

Endorsement of the first two options is considered to represent non-use of illicit drugs and use without impact on life. Endorsement of any of the last three options is conceptualised to reflect adverse impact of illicit drugs on young adult's life. Using the overall average of responses to eight items, participants were divided into three groups: non-users of illicit drugs, used illicit drugs without impact on life, mild to severe impact on life.

Young adults' psycho-behavioural factors

In the present study, the young adult's symptoms of problem behaviours during the last six months were measured at 21-year follow-up using the Young Adult Self-Report (YASR), version of the CBCL [105]. The YASR is a questionnaire for subjects aged 18-30 years which contains 114 problem items that can be scored on eight syndromes, including externalizing behaviours (such as delinquency and aggression), internalizing behaviour (including withdrawal behaviours, anxiety and depression), symptoms of SAT problems and 'other problems' [106,107]. For the purpose of this study, anxiety/depression (Table 2.8) and the externalizing behaviour (Table 2.9) at the 21-year follow-up were selected as measures of the young adult's mental health.

Table 2.8: Items related to young adult's anxiety/depression (YASR) at 21 years

Please circle the response that best describes yourself over the past 6 months (even if some don't seem to apply to you) **Options: not true = 0, somewhat of sometimes true = 1, very or often true = 2**
I feel lonely
I feel confused or in a fog
I cry a lot
I worry about my future
I am afraid I might think or do something bad
I feel that I have to be perfect
I feel that no one loves me
I feel worthless or inferior
I am nervous an tense
I lack self-confidence
I am too fearful or anxious
I feel too guilty
I am self-conscious or easily embarrassed
I am unhappy, sad, or depressed
I worry a lot
I am too concerned about how I look
I worry about my relations with the opposite sex
Reliability Cronbach's alpha = 0.91 & mean inter-item correlation = 0.37

The YASR enables comparisons of the behaviours of the child, adolescent and young adult using a consistent standardised measure [108]. Syndromes of YASR have been found to have good validity and the items in each sub-scale have good reliability and are associated with DSM-III-R diagnoses obtained from structured interviews [105].

Table 2.9: Items related to young adults externalizing (YASR) at 21 years

Please circle the response that best describes yourself over the past 6 months (even if some don't seem to apply to you) **Options: not true = 0, somewhat of sometimes true = 1, very or often true = 2**
I argue a lot
I use drugs (other than alcohol) for non-medical purposes
I brag
I am mean to others
I try to get a lot of attention
I destroy things belonging to others
I break rules at work, where I study, or elsewhere
I don't get along with other people
I get along badly with my family
I feel that others are out to get me
I get in many fights
I get teased a lot
I hang around with others who get in trouble
I lie or cheat
I physically attack people
I scream or yell a lot
I show off or clown
I steal
I am stubborn, sullen, or irritable
My moods or feelings change suddenly
I drink too much alcohol or get drunk
I do things that may cause me trouble with the law
I talk too much
I tease others a lot
I have a hot temper
I threaten to hurt people
I am louder than others
I fail to pay debts or meet other financial responsibilities
Reliability Cronbach's alpha = 0.88 & mean inter-item correlation = 0.20

For both scales of young adult problem behaviours, scores falling within the highest decile were considered to represent "caseness".

Apart from the problem behaviours measured by the YASR (CBCL), participants were asked eight questions indicating their involvement in delinquent type behaviours in the twelve months preceding the survey. Question include: shoplifting, stealing from car or motorbike, breaking into a house or building, deliberately hurting somebody, being hurt by somebody else, engaging in forceful sex, being warned by police and being summoned to court. According to participant answers to these questions (yes = 1 and no = 0) young adults were divided into three groups: normal = no delinquency,

low delinquency = one or two events and moderate to high delinquency = three or more events.

Two groups of items were used to assess young adult risk taking behaviour. For the first scale (risk taking behaviour) they were asked to respond to the nine items in Table 2.10.

Table 2.10: Items related to risk taking behaviour at 21 years

How much do you agree with the following?   **Options: strongly disagree = 1, disagree = 2, unsure = 3, agree = 4, strongly agree = 5**
I like to do the unexpected
Without taking risks, life becomes boring
Life is about experiencing the unexpected
I like the idea of travelling to strange places
I like doing new things
I like the idea of trying new things at least once
If you don't take chances, you don't enjoy life
I enjoy the idea of taking a risk
Why take chances when you don't need to
Reliability Cronbach's alpha = 0.85 & mean inter-item correlation = 0.39

Items scores were reversed so that a high score represented high level of risk taking belief or practice. After obtaining each individual's 9-item score, subjects were classified in one of three categories: 1 = no risk taking, 2 = low risk taking, and 3 = moderate to high risk taking.

The items in Table 2.11 were used to measure a preference for the familiar and known. This is intended to be a scale that measures the propensity to avoid new experiences and is intended to assess a conservative social/behavioural attitude.

Table 2.11: Items related to preferences for the familiar

How much do you agree with the following?   **Options: strongly disagree = 1, disagree = 2, unsure = 3, agree = 4, strongly agree = 5**
I prefer to go to places I know
I avoid things that are dangerous
I prefer to be in familiar places
I prefer to order familiar foods when I eat out
Reliability Cronbach's alpha = 0.66 & mean inter-item correlation = 0.32

Using the overall score of each individual's answers, they were divided into three groups: 1 = no preference for the familiar, 2 = low preference for the familiar and 3 = moderate to high preference for the familiar.

Measurement of childhood and adolescent predictors of young adult gambling behaviour

Socio-demographic characteristics of the mothers

Gross family income was ascertained during the 5- and 14-year follow-ups by asking the mother: "On the list below, could you circle the number closest to your whole family income including spouse's income, child endowment, etc. If unsure circle the number closest to the amount that you think may be correct". The MUSP cohort is representative of patients attending a public hospital and is somewhat skewed towards lower class groups [100]. Therefore, there was a need to operationalise income in a way that would be consistent across all phases of the study. The 25th percentile for each phase was selected as the cut-off below which a family's gross income was defined as "low family income" and the 75th percentile was the cut-off above which income was considered "high family income".

The level of mother's education at entry to study assessed from responses to the question "At what level did you complete your education?" Answers were divided into three groups: incomplete high school, completed high school only and some post secondary education. Employment status of the family at each phase was measured via the question: "Are you presently: fully employed, self-employed, employed part-time, unemployed, on pension, other?" This question was repeated for the respondent's partner. Respondents were divided into three groups: employed family = mother and/or her partner were employed, unemployed = mother and her partner were unemployed and no-partner mothers.

To examine the impact of unemployment on gambling outcomes, the employment status of the respondent or her partner were collapsed into a dichotomous variable indicating whether both the mother and her partner were unemployed at the time of the relevant survey. For the purpose of current study, maternal education and parental employment status at entry to study were used as possible intermediate or explanatory factors.

Marital status was measured at each phase of the MUSP, asking mothers: "What is your present marital status?" with the range of answers being: married, single, living together (de-facto relationship), separated, divorced and widowed. Given the very small

number of separated / divorced or widowed mothers, the categories were collapsed into a single category (S/D/W).

As well as measuring marital status at each phase of the study, we also assessed whether the mother of the child had changed partners. Mothers were asked to report the number of divorces, separations and changes in partner they had had during the 5 and 7 years preceding the 5-year and 14-year follow-ups respectively. After calculating the overall number of marital partner changes at those phases, mothers were divided into three groups: no change, one or two changes and three or more changes. Using the number of changes in marital status over the five years preceding the 5-year follow-up and the seven years preceding the 14-year follow-up, an additional variable was created to measure the number of changes in marital status over the 14 years after the birth of the baby.

Maternal substance use

At the 5- and 14-year follow-ups the mother was asked to indicate the number of cigarettes she smoked per day during the last week. Options for this question were structured as none, 1-9, 10-19, 20-29, 30-49, and 50 or more per day. The mothers were subsequently categorized as: non smoker, light smoker = <10, moderate smoker = 10-19 and heavy smoker = 20 + cigarettes per day.

The frequency and quantity of maternal alcohol consumption at each phase of the study were measured with the following questions: "how often do you drink alcohol?" and "how much alcohol do you usually drink at those times?" To calculate the level of alcohol consumption per day, the frequency was multiplied by the quantity and then divided by seven. The four final alcohol consumption categories used in further analyses were as follows: zero; up to half a drink per day; between half and one drink per day; and more than one drink per day - these categories being denoted as: abstainer, light drinker, moderate drinker and heavy drinker. Mother's consumption of illicit drugs was measured at the 5-year follow-up. Five years after delivery, the mothers were asked whether they used cannabis and other illicit drugs and divided into two groups: non-use and users.

Maternal mental health

At each follow-up, mothers completed the short form of the Delusions-Symptoms-States Inventory (DSSI) [109]. The DSSI involves a set of 14 questions developed by clinicians and validated against a clinical sample. It is intended to screen for signs and symptoms of mental illness that limit a person's ability to function and maintain relationships. The DSSI items were administered to the mother in the form of a self-report questionnaire, including two sub-scales. One measured anxiety and the other depression (each comprising 7 items).

Table 2.12: Items related to maternal depression

How often are you feeling the following recently? **Options: all the time = 1, most of the time = 2, some of the time = 3, rarely = 4, never = 5**
I have been so miserable that I have had difficulty sleeping
I have been depressed without knowing why
I have gone to bed not caring if I never woke up
I have been so low in spirit that I have sat up for ages doing absolutely nothing
The future seems hopeless
I have lost interest in just about everything
I have been so depressed that I have thought of doing away with myself

Table 2.13: Items related to maternal anxiety

How often are you feeling the following recently? **Options: all the time = 1, most of the time = 2, some of the time = 3, rarely = 4, never = 5**
I have worried about every little thing
I have been breathless or had a pounding of my heart
I have been so worked up that I could not sit still
For no good reason, I have had feelings of panic
I have had pain or tense feeling in my neck or head
Worrying has kept me awake at night
I have been so anxious that I could not make up mind about the simplest thing

All fourteen symptoms of the DSSI appear to address both the ICD-10 and DSM-IV indicators of depression and anxiety. There was an internal consistency (Cronbach's alpha) for depression = 0.87 and 0.89 and mean inter-item correlation = 0.48 and 0.53 at the 5- and 14-year follow-up, respectively. The maternal anxiety scale had reliability alpha = 0.84 and 0.85 and mean inter-item correlation = 0.43 and 0.45 at those two phases, respectively. A positive response to any three of the alternative responses within the anxiety and depression subscales was taken to indicate that the mother had symptoms of either depression and/or anxiety.

Maternal marital quality

The quality of marital relationships was assessed at each survey using a short form of the Dyadic Adjustment Scale (DAS) [110]. The DAS was devised by Spanier in 1976 to assess the quality of life for married or cohabiting couples. Eventually, 32 items were selected and these are arranged as four subscales: dyadic consensus, dyadic satisfaction, dyadic cohesion and affective expression. Consisting of 10 items, the dyadic satisfaction subscale measures the extent of satisfaction with marital life.

Table 2.14: Items related to marital quality at 5 and 14 years

How well does the following describe the relationship between you and your partner?
Options (Q1-7): all the time = 1, most of the time = 2, some of the time = 3, rarely = 4, never = 5 **(Q8): Very satisfied = 1, satisfied = 2, dissatisfied = 3, very dissatisfied =4**
Are things between you and your partner going well?
How often do you think of divorce, separation or terminating relationship?
How often do you or partner leave house after a fight?
Do you find it easy to confide in partner?
Do you ever regret marriage (or living together)?
How often do you and partner quarrel?
How often you and partner "get on each other's nerves"?
How satisfied are you with your relationship with partner?
Reliability Cronbach's alpha = 0.84 - 0.88 & mean inter-item correlation = 0.44 - 0.48

After obtaining each individual's 8-item score (some items were reverse scored for consistency) subjects were classified in one of four categories of dyadic satisfaction: 1 = good adjustment (scored above 37.5); 2 = moderate adjustment (scored 30 to 37.5); 3 = conflict (below 30); and 4 = no partner. For the purpose of this report dyadic adjustment scores at the 5- and 14-year follow-ups were used as measures of marital quality during early- and late-childhood development.

Maternal parenting style

A range of questions was used to assess the parenting and disciplining style at the 5-year follow-up. Questions included the way in which parents reared their study children. The mother's approach to discipline was measured at the 5-year follow-up using two sets of items indicating 5-item maternal control (Table 2.15) and six-item maternal supervision (Table 2.16).

Table 2.15: Items related to maternal control

How often do you perform the following? **Options: all the time = 1, most of the time = 2, some of the time = 3, rarely = 4, never = 5**
I supervise my child's activities very carefully
I expect child to do as he/she is told without explanation
I watch everything my child does
My child should do as he/she is told immediately
I think strict discipline is good for my child's later development
Reliability Cronbach's alpha = 0.64 & mean inter-item correlation = 0.26

Table 2.16: Items related to maternal supervision at 5 years

At what age would you allow your child to perform the following? **Options: Age (in years) or 0 for never**
Travel on a bus alone
Go to the movies with a friend
Go on a holiday with a group of friends unsupervised
Smoke cigarettes
Stay alone in the house while you are away
Drink alcohol
Reliability Cronbach's alpha = 0.73 & mean inter-item correlation = 0.32

In the analyses, all items measuring maternal control were reversed such that a high score represents a high degree of control. The crude average of items were calculated and then multiplied by 10 to obtain a range of scores between 12 and 50. The subjects were later categorized into three groups: low control (scores of 2-30); moderate control (31-42); and high maternal control (43-50). Regarding maternal supervision at the 5-year follow-up, using the crude average of six items, each individual's overall score ranged between 10 and 40, with a higher score indicating a greater level of supervision. The mothers, subsequently, were categorised into three groups: low supervision (scored 10-22), moderate supervision (scored 23-33) and high supervision (scored 34-40).

Family functioning at the 14-year follow up

In order to assess family relationship and functioning at 14 years, mothers were asked three sets of questions related to mother-child communication and level of violence in their relationship with partners.

Mother-child communication

At the 14-year follow-up participant mothers were asked questions about communication in their family. The Parent-Adolescent Communication Scale developed by Barnes and Olson [111]. The scale is composed of two sub-scales - one that measures the degree of openness in family communication and one that assesses the extent of problems in family communication. Each sub-scale is comprised of 10 items measured on five-point Likert scales showing the extent of agreement with each item (Table 2.17). The openness scale includes items such as "My (mother/father, child) tries to understand my point of view", "It is easy for me to express my true feelings to my (mother/father, child)", and "My (mother/father, child) is always a good listener". Alpha and test-retest reliabilities were 0.87 and 0.78, respectively [112].

The problem scale includes items such as "My (mother/father, child) has a tendency to say things to me which would be better left unsaid", "I don't think I can tell my (mother/father, child) how I really feel about some things" and "When we are having a problem, I often give my (mother/father, child) the silent treatment". Alpha and test-retest reliabilities were 0.78 and 0.77, respectively [112].

Table 2.17: Items related to mother-child open communication

How well can you communicate with your child?
Options: strongly agree = 1, agree = 2, unsure = 3, disagree = 4, strongly disagree = 5
I can discuss my beliefs with my child without feeling restrained or embarrassed
My child is always a good listener
My child can tell how I am feeling without asking
I am very satisfied with how my child and I talk together
If I were in trouble, I could tell my child
I openly show affection to my child
When I ask questions, I get honest answers from my child
My child tries to understand my point of view
I find it easy to discuss problems with my child
It is very easy for me to express all my true feelings to my child
Reliability Cronbach's alpha = 0.85 & mean inter-item correlation = 0.37

After obtaining each individual's 10-item score, the participants were categorized into three groups: "Poor communication" (lowest decile), "Fair communication" (2nd decile) or "Good communication" (the rest) for the openness scale. For the problem scale, the scores were categorized as: "Few problems" (first 80%), "Some problems" (9th decile) and "Many problems" (top decile).

Table 2.18: Items related to mother-child problem communication

How ineffective is communication with your child? **Options: strongly agree = 1, agree = 2, unsure = 3, disagree = 4, strongly disagree = 5**
Sometimes I have trouble believing everything my child tells me
I am sometimes afraid to ask my child for what I want
My child has a tendency to say things to me which would be better left unsaid
When we are having a problem, I often give my child silent treatment
I am careful about what I say to my child
When talking with my child, I have a tendency to say things that would be better left unsaid
There are topics I avoid discussing with my child
My chid nags/bothers me
My child insults me when he/she is angry with me
I don't think I can tell my child how I really feel about some things
Reliability Cronbach's alpha = 0.78 & mean inter-item correlation = 0.26

Violence in the home

At the 14-year follow-up the mothers were asked about having violent disagreement with their partners. The seven items in Table 2.19 investigate the level of disagreement between partners during the year preceding survey.

Table 2.19: Items related to the degree of violence in home at 14 years

How often has the following occurred during a disagreement? **Options: Often = 1, sometimes = 2, never = 3**
Argued heatedly without yelling
Yelled at and/or insulted you
Sulked and/or refused to talk about the problem
Threw something at you
Pushed, grabbed or shoved you
Tried to hit you
Hit you
Reliability Cronbach's alpha = 0.78 & mean inter-item correlation = 0.34

All seven items were reversed for analyses such that a high score represents high level of violence in marital relationship. The crude average of items was multiplied by 10 to obtain a score range of 10 and 30. After obtaining each individual's 7-item score subjects were classified in one of three categories: low violence, high violence and no partner.

Social problems in neighbourhood

At the 14-year follow-up, mothers were asked nine questions indicating the prevalence of various problems in the area in which they lived. Relevant items are listed below.

Table 2.20: Items related to problems in neighbourhood

How much of a problem is the following in the area in which you live? **Options: major problem = 1, moderate problem = 2, small problem = 3, no problem = 4**	
Vandalism/graffiti	House burglaries
Car stealing	Drug abuse
Violence in the streets	Unemployment
Noisy and/or reckless driving	Alcohol abuse
School truancy ("wagging" school)	
Reliability Cronbach's alpha = 0.93 & mean inter-item correlation = 0.59	

Using the average of each participant answers to nine items (scored 1.0 – 4.0), subjects were subsequently divided into three groups: no problem (< 1.5), low problem (1.5 – 2.49) and moderate to high problem (2.5 – 4.0) area.

Child problem behaviours

The assessment of the child mental health and behaviour at the 5-year follow-up was undertaken using the Child Behaviour Checklist (CBCL) [107,113]. The CBCL is a well-known scale and is widely used to assess child psychopathology. Several validation studies have been published on the CBCL and factor analysis and reliability estimates of subscales appear to be consistent with Achenbach's original data [107,113]. The CBCL has been validated with both clinical and population samples. The Checklist includes subscales assessing symptoms of externalizing behaviours (such as delinquency and aggression), symptoms of internalizing behaviour (including withdrawal behaviours, anxiety and depression), symptoms of SAT and 'other problems' [107,113]. For the purpose of this study, the internalizing, externalizing and SAT at 5-year follow-up were selected as measures of the child's mental health.

Table 2.21: Items related to child aggressive behaviour (CBCL)

How often has your child had this problem in the last year? **Options: often = 1, sometimes = 2, never = 3**
My child argues a lot
My child demands a lot of attention
My child destroys his/her own things
My child destroys things belonging to his/her family or other children
My child is disobedient at home
My child gets in too many fights
My child lies or is dishonest
My child screams a lot
My child has sudden changes in mood or feeling
My child is stubborn, sullen or irritable
My child has temper tantrums or hot temper
Reliability Cronbach's alpha = 0.83 & mean inter-item correlation = 0.33

Table 2.22: Items related to child internalizing problems (CBCL)

How often has your child had this problem in the last year? **Options: often = 1, sometimes = 2, never = 3**
My child cries a lot
My child feels worthless
My child likes to be alone
My child is nervous, highly strung, tense
My child is too fearful or anxious
My child feels too guilty
My child refuses to talk
My child sulks a lot
My child is withdrawn, does not get involved with others
My child is worrying
Reliability Cronbach's alpha = 0.76 & mean inter-item correlation = 0.25

Table 2.23: Items related to SAT (CBCL)

How often has your child had this problem in the last year? **Options: often = 1, sometimes = 2, never = 3**
Acts too young for his/her age
Can't concentrate, can't pay attention for long
Can't get his/her mind off certain thoughts
Can't sit still, is restless or hyperactive
Clings to adults or is too dependent
Day dreams or gets lost in his/her thoughts
Does not get along with other children
Not liked by other children
Poorly coordinated or clumsy
Repeats certain acts over and over, has compulsions
Reliability Cronbach's alpha = 0.74 & mean inter-item correlation = 0.22

Youth problem behaviours

Both the CBCL (maternal report) and the YSR (Youth Self Report of the CBCL) [106,113] were used at 14-year follow-up. The YSR was designed for individuals aged 11-18 years. Each instrument consists of 112 items assessing nine sub-scales including aggression, delinquency, intrusive behaviour, withdrawal, anxiety/depression, somatic complaints, social problems, attention problems, thought problems and other problems. It requires respondents to rate (on a three-point scale ranging from 0 - not true to 2 - very true or often true) how true each item is for them.

CBCL or YSR: which one is more appropriate?

One of the major differences between adult psychiatry and child and adolescent psychiatric assessment is that for adult cases the individual seeking help is usually the main source of information about his/her psychiatric problems. In child and adolescent psychiatry, multiple informants are required to obtain necessary information. However, the severity of a child's problems may appear quite different, depending on whether the source of information is the parent or child. Children tend to report more internalizing problems than their parents, whereas parents may ascribe more externalizing behaviour to their children than the children themselves recognize [107,114]. Nonetheless, Loeber et al.[61] concluded that mental health professionals regarded mothers as more useful informants than children for externalizing as well as internalizing problems.

For the purpose of this study, three main scales were used: a 33-item externalizing behaviours (including aggression and delinquency); a 32-item internalizing problems scale (including withdrawn, somatic complaints and anxiety/depression); and, a 26-item SAT problems scale. Two subscales derived from the externalising problems scale, aggression (20 items) and delinquency (13 items) were also used. Scores for these items, based on maternal report of child behaviour at the time of the 14-year follow-up, were used as indicators of adolescent mental health.

Table 2.24: Items related to youth aggression at 14 years (CBCL)

Which best describes your child in the last six months? **Options: often = 1, sometimes = 2, rarely/never = 3**
Argues a lot
Bragging, boasting
Cruelty, bullying, or meanness to others
Demands a lot of attention
Destroys his/her own things
Destroys things belonging to his/her family or other children
Disobedient at home
Disobedient at school
Easily jealous
Gets in too many fights
Physically attacks people
Screams a lot
Showing off or clowning
Sudden changes in mood or feeling
Stubborn, sullen or irritable
Talks too much
Teases a lot
Temper tantrums or hot temper
Threatens people
Unusually loud
Reliability Cronbach's alpha = 0.90 & mean inter-item correlation = 0.32

Table 2.25: Items related to youth delinquency at 14 years (CBCL)

Which best describes your child in the last six months? **Options: often = 1, sometimes = 2, rarely/never = 3**
Does not seem to feel guilty after misbehaving
Hangs around with children who get in trouble
Lying or cheating
Prefers being with other kids
Runs away from home
Sets fires
Steals at home
Steals outside home
Swearing or obscene language
Thinks about sex too much
Truancy, skips school
Uses alcohol or drugs for non-medical purposes
Vandalism
Reliability Cronbach's alpha = 0.80 & mean inter-item correlation = 0.23

The main 33-item externalising scale had an internal consistency (Cronbach's alpha) = 0.92 and mean inter-item correlation = 0.25.

Table 2.26: Items related to youth internalising at 14 years (CBCL)

Which best describes your child in the last six months? **Options: often = 1, sometimes = 2, rarely/never = 3**
Withdrawn problem
Likes to be alone
Refuses to talk
Secretive, keeps things to self
Shy or timid
Stares blankly
Sulks a lot
Under-active, slow moving or lacks energy
Unhappy, sad or depressed
Withdrawn, does not get involved with others
Somatic problem
Feels dizzy
Overtired
Aches or pains (not headaches)
Headaches
Nausea, feels sick
Problems with eyes
Rashes or other skin problems
Stomach aches or cramps
Vomiting, throwing up
Anxiety/depression
Complains of loneliness
Cries a lot
Fears he/she might think or do something bad
Feels or complains that no-one loves him/her
Feels others are out to get him/her
Feels worthless or inferior
Nervous, high strung or tense
Too fearful or anxious
Feels guilty
Self-conscious or easily embarrassed
Suspicious
Unhappy, sad or depressed
Worries
Reliability Cronbach's alpha = 0.88 & mean inter-item correlation = 0.19

Table 2.27: Items related to youth SAT problem at 14 years (CBCL)

Which best describes your child in the last six months? **Options: often = 1, sometimes = 2, rarely/never = 3**
Social problems
Acts too young for his/her age
Clings to adults or too dependent
Does not get along with other children
Gets teased a lot
Not liked by other children
Overweight
Poorly coordinated or clumsy
Prefers being with younger kids
Attention problems
Acts too young for his/her age
Cannot concentrate, cannot pay attention for a long time
Cannot be still, is restless or hyperactive
Is confused or seems to be in a fog
Day-dreams or gets lost in his/her thoughts
Impulsive or acts without thinking
Nervous, highly strung or tense
Nervous movements or twitching
Poor school work
Poorly coordinated or clumsy
Stares blankly
Thought problems
Cannot get his/her mind off certain thoughts; obsessions
Hears sounds or voices that are not there
Repeats certain acts over and over
Sees things that are not there
Stares blankly
Strange behaviour
Strange ideas
Reliability Cronbach's alpha = 0.87 & mean inter-item correlation = 0.23

Cases of behaviour problems were selected using cut-offs consistent with the percentage of cases for each syndrome identified in a community sample by Achenbach [107]. Thus the behaviour of almost 10% of children was defined as reaching 'caseness' within each sub-scale.

Analysis of data

In this study we have three main objectives. Our first objective is to describe the prevalence of gambling behaviour and problem gambling in young adults in Brisbane. We also aim to explore the correlates and consequences of problem gambling. Our second objective is to examine young adult gambling by several concurrent, childhood,

and adolescence predictors. Thirdly, we aim to discern factors associated with different levels of gambling expenditure. To identify individual, familial and social factors that are associated with sub-types of young adult gambling we present four steps of our statistical analyses.

In the first part, using frequency and simple cross tabulations, we describe gambling practices, gambling expenditure and sub-types of gambling in young adults. We also explore individual, familial and social characteristics of young adults who participated in the 21-year survey. For the second objective, we first use chi-square tests and conduct three stages of analyses to: (1) find cross-sectional associations between gambling practice and various factors at 21 years; (2) examine the prospective relationship between different individual and environmental factors in early childhood and young adult gambling; and, (3) determine associations between young adult gambling and adolescent background. We then use a series of logistic regression models to examine the risk of gambling (expressed in odds ratio) from each and every factor that was significantly associated with gambling. Using multivariate models we test whether these associations are confounded by other variables.

For the purpose of the second objective, according to the amount of money young adults spend on gambling, we first categorized participants into four groups: no money at all, less than $7, $7.0 – $34.9, and $35.0 or more. We then repeated the chi-square tests and logistic regressions as described for the second objective.

To examine the third objective, we first used the Canadian Problem Gambling Index (CPGI) [102] to identify young adult problem gambling. Of 1025 young adults who were administered the CPGI questionnaire, 42% gambled at 21 years of whom 30.3% had no gambling-related problem, 6.4% were categorized as low risk gamblers, 3.7% as moderate risk gamblers, and just over 1% met the criteria for problem gambling (or high risk gamblers). It was of interest to examine problem gambling in relation to other factors. However, the small number of people in the problem gambling group presented a problem in terms of analyses. Based on a group this small, analyses and results would be unstable. Thus in preliminary analyses moderate and high risk gamblers were combined into one group. The results of these analyses can be found in Appendix 2. Nonetheless, it was still the case that this group of gamblers was too small to provide robust results (e.g. some cells contained less than 8 people), and thus

ultimately the decision was made to combine low, moderate and high risk gamblers in to one group. This did not substantially change the pattern of results. Both sets of results can be compared by viewing the table in the body of the report and the corresponding table in Appendix 2. This method of using the combined low to high risk group for analyses was favoured over using only the combined moderate and high risk group, since with more power to detect significant effects and more participants, results are more meaningful. In the body of this report the combined low, moderate and high risk gamblers are called 'at risk and problem' gamblers (hereafter referred to as ARP gamblers). This group constituted 11.3% of the cohort of young adults. We then repeated the chi-square tests for the associations between sub-types of gambling and a variety of individual, family and social factors measured at the time of the 5-, 14- and 21-year follow-up phases. In these analyses, we include those variables that were significantly associated with young adult gambling. In order to estimate the risk of ARP gambling from childhood and adolescent factors, we consistently used unadjusted and adjusted logistic regression analyses, using the *P* value < 0.05 (for chi-square tests) and 95% confidence intervals (95% CI) (for odds ratios) as significance criteria.

CHAPTER 3: FINDINGS ON YOUNG ADULTS' GAMBLING

Introduction

This chapter explores the prevalence of gambling behaviour in young adults and its association with various social, familial and individual factors. In the first section we describe the cross-sectional association between young adult gambling and a selected number of individual and environmental factors. The second section examines the association between gambling behaviour in young adults and relevant explanatory factors in early adolescence. The final section analyses early life influences on young adult gambling. Each section presents tabulated results followed by a multivariate risk prediction model obtained from multiple logistic regression models.

Section 1: Gambling and individual, family, and social factors at 21 years

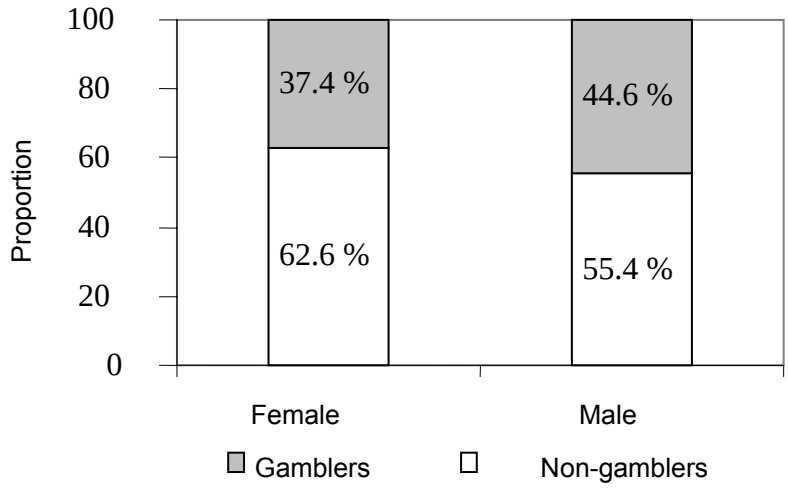
In this section we describe the prevalence of gambling behaviour by young adults according to their socio-demographic characteristics. Then the correlation between gambling and the respondent characteristics is examined by looking at the use of different legal and illicit drugs at 21 years including: cigarette smoking, alcohol consumption, use of cannabis and other illicit drugs and life impact of these drugs on young adult life. Individual factors also include several problem behaviours at 21 years such as anxiety/depression, aggression, delinquency and risk-taking behaviour. Finally, we include the association for some social factors such as church attendance, religious activity, and neighbourhood environment.

Socio-demographic profile of gamblers and non-gamblers

The overall prevalence of young adult gambling and a demographic profile of gamblers and non-gamblers are outlined in Figure 3.1, Figure 3.2 and Table 3.1. It

should be noted that the data presented in Figure 3.1 and Figure 3.2 are based on a sample of 3747 people, while Table 3.1 is based on 3638 people. The latter is due to some participants not responding to all questions, and a response to all questions was necessary to be included in Table 3.1. This gives rise to slightly different proportions of gamblers and non-gamblers for some categories (e.g. males, income), however the differences are negligible.

Figure 3.1: Prevalence of young adult gambling by gender



Of the 3747 young adults who participated in the 21-year follow-up some 41% reported having gambled. Gambling prevalence was significantly different between male and females. A higher proportion of males than females reported that they gambled (Figure 3.1, Table 3.1). Higher rates of gambling were observed among higher income families (Figure 3.2)

Figure 3.2: Prevalence of young adult gambling by income

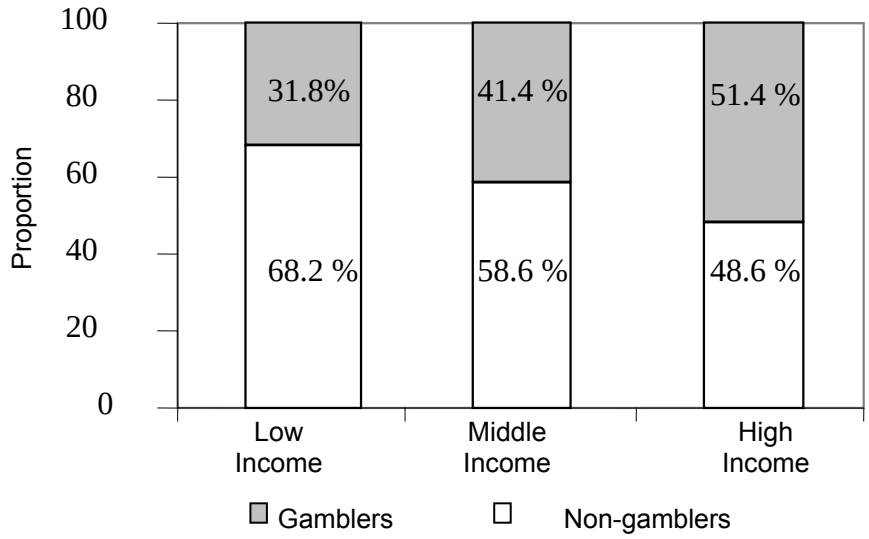


Table 3.1 shows that 40.8 % of young adults reported gambling when they were 21 years old. Individuals holding tertiary and university degrees were significantly less likely to gamble than respondents in all other education attainment categories. Those who had a paid job or higher level of income were more likely to report gambling compared to jobless or low-income groups. However, there was no significant association between young adult marital status and prevalence of gambling.

Table 3.1: Gambling behaviour and young adult socio-demographic characteristics

Variables	N	Gambling (%)		P value
		No	Yes	
Gender of respondent				<0.001
Male	1713	55.3	44.7	
Female	1925	62.6	37.4	
Education of respondent				0.001
Below high school	752	52.8	47.2	
Completed high school	1925	52.8	47.2	
Tertiary education	811	60.8	38.7	
University	150	60.0	40.0	
Paid job				<0.001
Yes	2796	57.0	43.0	
No	842	66.4	33.6	
Income of respondent				<0.001
Low	1015	68.6	31.4	
Middle	1822	58.6	41.4	
High	801	48.8	51.2	
Marital status of respondent				0.153
Married/de-facto	769	57.0	43.0	
Single/separate	2869	59.8	40.2	
Total	3638	59.2	40.8	

Gambling and socio-demographic characteristics of the family

Table 3.2 presents the association between gambling behaviour in young adulthood and the family's socio-demographic characteristics. Employment status of the mothers and their partners was assessed at the 21-year follow-up.

Table 3.2: Gambling behaviour and family socio-demographic characteristics

Variables	N	Gambling (%)		P value
		No	Yes	
Maternal age at first clinic visit (FCV)				0.574
Below 20	382	56.8	43.2	
20-34	2446	59.0	41.0	
35 and over	138	61.6	38.4	
Employment status				0.471
Employed	2199	58.6	41.4	
Unemployed	187	63.1	36.9	
No partner	580	58.4	41.6	
Gross family income				0.036
Low income	599	61.3	38.7	
Middle income	1403	56.4	43.6	
High income	964	60.9	39.1	
Marital status				0.353
Married	2021	59.3	40.7	
Single	84	61.9	38.1	
De-facto	207	53.1	46.9	
S/D/W	654	58.9	41.1	
Total	2966	58.8	41.2	

The prevalence of gambling among young adults is not associated with the mothers' age at entry to the study, family employment status or marital status. Economic status of the family appears to be moderately associated with young adult gambling: low and high income families were less likely to have children who gambled at early adulthood.

Gambling and substance use by young adults

The following section examines the association between young adult's current gambling and their substance use at the time of the 21-year follow-up. Substances are classified into two main groups: legal substances including cigarette smoking and illicit drugs including cannabis, heroin, amphetamines, etc. Additional analysis clarifies this association with the age at which participant started to use different substances. Figure 3.3 presents the prevalence of gambling among young adults according to their smoking behaviour.

Figure 3.3: Prevalence of young adult gambling by their pattern of smoking

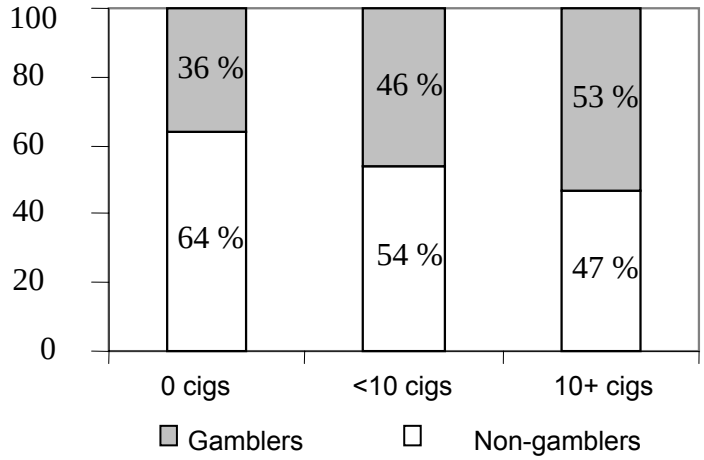


Table 3.3 shows that cigarette smoking, alcohol consumption and the use of illicit drugs are significantly associated with young adult gambling. Those who smoked a greater number of cigarettes per day were more likely to gamble. There was a linear association between number of cigarettes smoked per day, and engagement in gambling activities. By contrast, heavier alcohol consumption is associated with a lower rate of gambling compared with non-drinkers and light drinkers. Use of both cannabis and other illicit drugs was associated with an increased likelihood of gambling at age 21. Those reporting frequent use of cannabis were found to be more likely to gamble, than either occasional and non-users.

Table 3.3: Gambling and substance use among young adults

Variables	N	Gambling (%)		P value
		No	Yes	
Cigarette smoking (per day)				<0.001
Non-smoker	2354	64.1	35.9	
<10 per day	644	54.3	45.7	
10+ per day	695	47.2	52.8	
Alcohol consumption				<0.001
Abstainer	1237	55.7	44.3	
≤ 1 drink per day	2171	58.9	41.1	
> 1 drink per day	285	76.5	23.5	
Cannabis ever used				<0.001
No	1857	64.8	35.2	
Yes	1836	53.5	46.5	
Pattern of current cannabis use				<0.001
No use	1857	64.8	35.2	
Occasional use	1384	55.5	44.5	
Frequent use	452	47.6	52.4	
Use of other illicit drugs				<0.001
No	2735	61.7	38.3	
Yes	958	52.0	48.0	
Total	3693	59.2	40.8	

Figure 3.4 and Table 3.4 provide information about the prevalence of young adult gambling according to the age at which they started to use substances.

Figure 3.4: Prevalence of young adult gambling by age of onset of smoking

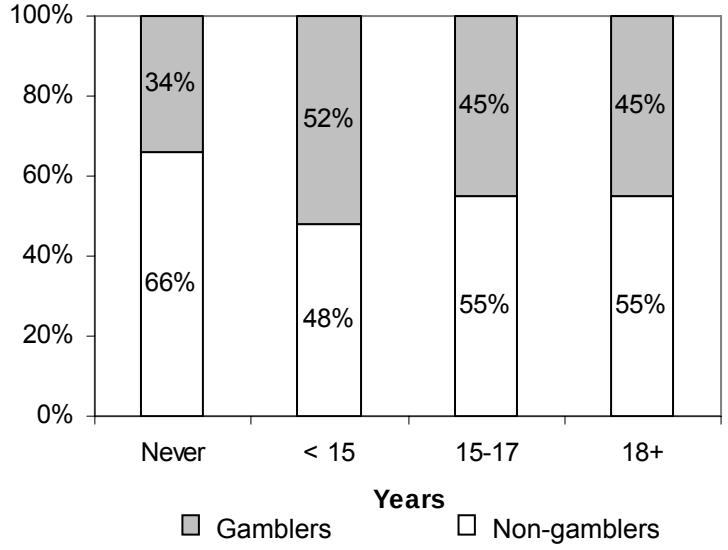


Figure 3.4 shows gambling status by age of onset of smoking. There was no linear association between these variables. Table 3.4 shows that respondents who had never smoked, never consumed alcohol and never used cannabis had the lowest rates of gambling. There was evidence of a consistent association between the age of onset for

each of these three substances and the likelihood of gambling in young adulthood. The earlier the respondents started to smoke cigarettes, drink alcohol or use cannabis the greater the chance that they gambled at age 21. It is also interesting that those who abstain from smoking, alcohol and cannabis use have by far, the lowest rates of gambling.

Table 3.4: Gambling and age of starting to use substances

Variables	N	Gambling (%)		P value
		No	Yes	
Age of starting smoking				<0.001
Never started	1827	65.6	34.4	
14 years or younger	557	48.3	51.7	
15-17 years	959	55.2	44.8	
18 years or older	288	54.9	45.1	
Age of starting to drink alcohol				<0.001
Never started	190	84.2	15.8	
14 years or younger	630	53.0	47.0	
15-17 years	2238	57.2	42.8	
18 years or older	573	66.3	33.7	
Age of starting to use cannabis				<0.001
Never used	1836	64.7	35.3	
14 years or younger	444	51.1	48.9	
15-17 years	1018	53.8	46.2	
18 years or older	333	57.5	42.5	
Total	3631	59.4	40.6	

Gambling and life impact of young adults' substance use

At the 21-year follow-up young adults were asked two series of questions related to impact of alcohol and illicit drugs on their quality of life. A description of each scale has been given in the section on methods (Table 2.6 and 2.7)

Table 3.5 shows that life impact of alcohol and illicit drugs use by young adults is associated with their participation in gambling. The greater the impact of alcohol and illicit drugs is perceived to have on life, the greater the rate of gambling.

Table 3.5: Gambling and impact of alcohol and illicit drugs on life

Variables	N	Gambling (%)		P value
		No	Yes	
Impact of alcohol on life				<0.001
Abstainer	186	82.3	17.7	
Drinker without impact	2745	59.5	40.5	
Mild to severe impact	735	51.8	48.2	
Impact of illicit drugs				<0.001
No drug use	2085	62.5	37.5	
Drug user without impact	1070	56.0	44.0	
Mild to severe impact	512	51.6	48.4	
Total	3666	59.1	40.9	

Gambling and substance use by family

The following section examines the association between young adult gambling and patterns of cigarette smoking and alcohol consumption observed for the mothers of the young adults at the time of the 21-year follow-up. According to the mothers' current levels of cigarette smoking at 21 years, subjects were divided into four groups: non-smoker, light smoker = <10, moderate smoker = 10-19, and heavy smoker = 20+ cigarettes per day. Corresponding categories for maternal alcohol consumption include: abstainer = no alcohol, up to 1 drink, and more than one drink (glass) per day.

Table 3.6: Gambling behaviour and maternal substance use at 21 years

Variables	N	Gambling (%)		P value
		No	Yes	
Maternal cigarette smoking				<0.001
Non-smoker	2244	61.5	38.5	
< 10 cigarettes per day	210	55.2	44.8	
10 – 19 cigarettes per day	284	52.5	47.5	
20 + cigarettes per day	371	51.5	48.5	
Maternal alcohol consumption				0.020
Abstainer	247	55.1	44.9	
≤ 1 drink per day	1778	57.6	42.4	
>1 drink per day	1084	62.3	37.7	
Total	3109	59.0	41.0	

Table 3.6 shows a significant association between maternal smoking and alcohol consumption and young adult gambling at 21 years of age. Any increase in the number of cigarettes smoked per day by the mother is associated with higher rate of gambling among offspring. In fact, 38.5% of children of non-smoking mothers reported having

gambled, while 48.5% of children of heavy smokers reported having gambled. By contrast, an opposite relationship appears to exist for maternal alcohol consumption and gambling prevalence among young adults. Young adults who gambled were more likely to have a mother who abstained from drinking alcohol (44.9%) than they were to have a mother who consumed alcohol at a rate of more than one glass of alcohol per day (37.7%).

Gambling and young adult problem behaviours

This section examines the association between young adult gambling and problem behaviour. This section examines how the behaviour of young adults and their gambling behaviours are correlated. Two behavioural syndromes, *anxiety/depression* and *externalizing behaviour* (measured from scores on the YASR) are examined.

Table 3.7: Gambling and problem behaviours at age 21 years

Variables	N	Gambling (%)		P value
		No	Yes	
Anxiety/Depression at 21 years				0.933
No	3207	59.0	41.0	
Yes	351	59.3	40.7	
Externalizing behaviour at 21 years				<0.001
No	3234	60.4	39.6	
Yes	324	45.7	54.3	
Delinquency				<0.001
Normal	2383	62.9	37.1	
Low delinquency	968	53.4	46.6	
Moderate to high delinquency	207	40.6	59.4	
Risk-taking belief/behaviour				0.002
No risk	637	65.3	34.7	
Low risk	2064	57.7	42.3	
Moderate to high risk	857	57.6	42.4	
Safety belief/behaviour				0.695
No safety	154	62.3	37.7	
Low safety	2144	59.0	41.0	
Moderate to high safety	1260	58.8	41.2	
Total	3558	59.1	40.9	

Table 3.7 shows that prevalence of young adult gambling is associated with externalizing behaviour, delinquency and risk-taking behaviour. Young adults who reported more symptoms of externalizing behaviour at 21 years, i.e. aggression and delinquency, were more likely to participate in gambling activities. In addition, young

adults who endorsed risk-taking attitudes and/or reported having engaged in risky behaviours were more likely to gamble relative to those who scored zero on the risky-taking scale. By contrast, there appears to be no associations between either young adult anxiety/depression or safety beliefs/behaviours, and gambling prevalence.

Gambling and the social life of young adults

Table 3.8 presents the associations between young adult gambling and their participation in religious activity, church attendance and characteristics of the neighbourhood environment. Church attendance and engagement in religious practices were assessed at the 21-year follow-up. Table 3.8 shows that young adults who reported attending church were less likely to gamble (34.6%) compared with those who did not go to church (43%). However, involvement in other religion-related activities is not associated with gambling prevalence. Further, participants who reported the presence of problems in their neighbourhood were more likely to gamble at 21 years.

Table 3.8: Gambling and social characteristics of young adults

Variables	N	Gambling (%)		P value
		No	Yes	
Church attendance				<0.001
Yes	855	65.4	34.6	
No	2759	57.1	42.9	
Religious activities				0.062
Yes	1269	61.2	38.8	
No	2345	58.0	42.0	
Problem in neighbourhood				<0.001
No problem	1546	63.1	36.9	
Low problem	1511	56.4	43.6	
Moderate to high problem	557	55.1	44.9	
Total	3614	59.1	40.9	

Summary

In this section, we have examined the contemporaneous association between young adult gambling and a variety of individual, familial and social factors. The purpose of

this section was to clarify correlates of young adult gambling behaviour. We found that males are more likely to gamble than females and that the prevalence of gambling in young adults is associated with their socio-economic status. Less educated people and those who have a paid job or higher income were more likely to gamble than highly educated and lower income groups. The association between substance use and young adult gambling shows that an increase in the number of cigarettes smoked per day is related to a higher rate of gambling by young adults. A similar relationship existed for illicit drug use by young adults and gambling, and pattern of maternal smoking and gambling. However there was an inverse association between gambling behaviour and the young adults' maternal alcohol consumption at 21 years. We also found that early onset of substance use was associated with a higher rate of gambling in early adulthood, as was a report of adverse impact of alcohol and illicit drugs on life.

Finally, young adults who reported externalising behaviour symptoms at 21 years were found to be more likely to participate in gambling than those without symptoms. This is also the case for young adults who have risk-taking beliefs and/or engage in risky behaviours. Respondents who reported that they attended church constituted a smaller proportion of gamblers. Living in a neighbourhood with various social problems is associated with an increased rate of gambling.

Section 2: Childhood predictors of gambling

Introduction

In the previous section we examined the concurrent associations between a variety of individual, family and social factors, and young adults gambling behaviour. The current section investigates these relationships for the background factors in the early childhood of young adults. Family factors include socio-economic status of the family, maternal mental health, quality of maternal marital relationship, maternal substance use and parenting style at 5 years. Individual factors refer to children's problem behaviours as reported by their mothers at the 5-year follow-up. The association between each explanatory factor and young adult gambling is examined using chi-square tests. The sample size differs slightly between tables presented below, due to variation in the number of missing cases for each independent variable presented.

Gambling and socio-demographic characteristics of the family at 5 years

Table 3.9 identifies the prevalence of gambling among young adults according to socio-demographic characteristics of the family. The table shows that the socio-demographic characteristics of the family in the early life of the child, including the age of the mother, parental employment status, family income, marital status, and change in marital status are not associated with gambling behaviour in young adults. On the other hand, level of maternal education at the time the child was born is prospectively related to offspring gambling in young adulthood. Children whose mothers had higher education were less likely to report having gambled at age 21.

Table 3.9: Prevalence of young adult gambling by childhood socio-demographic background

Variables	N	Gambling (%)		P value
		No	Yes	
Mother's age				0.691
<20 years	383	58.2	41.8	
20 – 34 years	2637	59.3	40.7	
35 + years	146	62.3	37.7	
Maternal education				0.001
Incomplete high school	479	54.9	45.1	
Completed high school	2039	58.5	41.5	
Post high school	648	65.1	34.9	
Family employment status				0.994
Both parents employed	2756	59.3	40.7	
Either of them unemployed	410	59.3	40.7	
Family income				0.682
Low income	715	59.0	41.0	
Middle income	1504	60.0	40.0	
High income	947	58.3	41.7	
Marital status				0.488
Married	2671	59.2	40.8	
Single	77	58.4	41.6	
De-facto	167	64.7	35.3	
S/D/W	251	57.4	42.6	
Change in marital status				0.279
Nil	2641	59.4	40.6	
1 – 2 changes	449	57.5	42.5	
3 + changes	76	67.1	32.9	
Total	3166	59.3	40.7	

Gambling and maternal mental health and marital quality at 5 years

Prevalence of young adult gambling is examined according to mothers' symptoms of depression and anxiety, as well as the quality of their marital relationship at the time of the 5-year follow-up (Table 3.10). As described previously, based on the report of symptoms of depression and/or anxiety, mothers were divided into two groups: normal and depressed or anxious. Partnered mothers were categorized as having good, moderate or low adjustment in their marital relationship. Table 3.10 shows that maternal mental health and quality of the mother's relationship with her partner when the child was 5 years old are not associated with gambling prevalence in young adulthood. However, although there was no significant difference in the proportion of

Table 3.10: Prevalence of young adult gambling by maternal mental health and marital quality in childhood

Variables	N	Gambling (%)		P value
		No	Yes	
Maternal depression				0.551
No	2989	59.7	40.3	
Yes	319	58.0	42.0	
Maternal anxiety				0.707
No	2464	59.7	40.3	
Yes	844	59.0	41.0	
Marital quality				0.671
Good adjustment	2475	59.8	40.2	
Moderate adjustment	485	58.8	41.2	
Conflict	75	53.3	46.7	
No partner	273	60.8	39.2	
Total	3308	59.6	40.4	

gamblers in the different marital quality groups, it can be seen that young adults living in a family with marital conflict were on average 6% more likely to gamble than those without conflict.

Gambling and maternal substance use at 5 years

Table 3.11 examines the association between the use of licit and illicit substances by the mother at 5 years post-delivery and offspring gambling subsequently.

Table 3.11: Prevalence of young adult gambling according to maternal substance use at 5 years

Variables	N	Gambling (%)		P value
		No	Yes	
Cigarette smoking (per day)				<0.001
Non smoker	2182	62.1	37.9	
< 10	248	54.8	45.2	
10 - 19	380	54.2	45.8	
20 +	509	54.0	46.0	
Alcohol consumption				0.001
Abstainer	685	63.6	36.4	
≤ ½ drink per day	2077	59.5	40.5	
½ - 1 drink per day	332	56.9	43.1	
> 1 drink per day	225	48.9	51.1	
Illicit drug use				0.984
No	3206	59.4	40.6	
Yes	113	59.3	40.7	
Total	3319	59.4	40.6	

Table 3.11 shows that maternal cigarette smoking and alcohol consumption in the early period of child development are significantly associated with the gambling behaviour of young adults. Mothers who had smoked at any level when their child was 5 years old were more likely to have children who reported having gambled in early adulthood. Consistently, 5-year old children whose mothers drank alcohol were more likely to gamble later in life and the higher the level of alcohol consumption by mothers, the higher their rate of having offspring who gamble. However, no association was found for mother's use of illicit drugs at 5 years.

Gambling and mental health of the child at 5 years

Using the sub-scales of problem behaviour measured by the CBCL, we included child's depression, aggression, internalising and SAT problems as indicators of problem behaviours and examined their prospective relationship with young adult gambling.

Table 3.12: Prevalence of gambling according to child problem behaviours at 5 years

Variables	N	Gambling (%)		P value
		No	Yes	
Child depression				0.870
No	3079	59.4	40.6	
Yes	258	58.9	41.1	
Child aggression				0.052
No	2994	60.0	40.0	
Yes	343	54.5	45.5	
Internalizing behaviour				0.243
No	2959	59.0	41.0	
Yes	378	62.2	37.8	
SAT problems				0.865
No	3100	59.4	40.6	
Yes	237	59.9	40.1	
Total	3337	59.4	40.6	

Table 3.12 shows no significant relationship between indicators of child mental health at 5 years and young adult gambling behaviour. However, it appears that children with symptoms of aggression in early childhood are slightly more likely to gamble when they grow up (borderline statistical significance).

Gambling and parenting style at 5 years

The following section examines the association between gambling behaviour in young adults and their mother's parenting style when the child was 5 years of age. As described previously, at the 5-year follow-up of the study, mothers were asked questions about how they reared their children. In the current study two different instruments were used to assess parenting styles in childhood - maternal control and maternal supervision.

Table 3.13 shows that various degrees of maternal control and supervision of the child in the early period of the child's life are not significantly associated with gambling in young adulthood, although it appears that children more highly supervised by their mothers at 5 years of age (36%) are less likely to be involved in gambling when they became adults, compared with less-supervised children (46%). However, the association did not reach statistical significance.

Table 3.13: Prevalence of gambling according to parenting style at 5 years

Variables	N	Gambling (%)		P value
		No	Yes	
Maternal control on child				0.584
Low	452	57.3	42.7	
Moderate	2469	59.6	40.4	
High	310	60.6	39.4	
Maternal supervision on child				0.079
Low	240	53.8	46.3	
Moderate	2798	59.5	40.5	
High	193	64.2	35.8	
Total	3231	59.4	40.6	

Summary

In this section, we examined the association between young adult gambling and individual and family factors in early childhood. Maternal education at the time the child was born was prospectively related to gambling in early adulthood. Children of highly educated mothers were less likely to gamble at age 21. Maternal smoking and alcohol consumption at 5 years appeared to be associated with gambling in that a greater proportion of gambling was found in children whose mothers smoked more

cigarettes or drank more alcohol. Of several problem behaviours, child aggression at 5 years was the only one associated with later gambling.

Section 3: Adolescent predictors of gambling

Introduction

The following section provides information about the prospective association between various environmental and individual factors measured in adolescence and gambling behaviour in early adulthood. We examined associations between family socio-economic status, maternal mental health, maternal and adolescent smoking and alcohol consumption, adolescent problem behaviours, mother-child communication, family conflict, problems in the neighbourhood area, and gambling prevalence in young adulthood.

Gambling and socio-economic status of the family at 14 years

Table 3.14 shows associations between gross family income, maternal marital status at 14 years, and the frequency of changes in maternal marital status between 5 and 14 years, and young adult gambling behaviour.

Table 3.14: Prevalence of gambling according to socio-economic status of the family at 14 years

Variables	N	Gambling (%)		P value
		No	Yes	
Family income at 14 years				0.650
Low income	630	60.2	39.8	
Middle income	1447	58.1	41.9	
High income	1327	54.3	40.7	
Marital status at 14 years				0.048
Married	2604	59.7	40.3	
Single	63	65.1	34.9	
De-facto	252	51.2	48.8	
S/D/W	485	58.4	41.6	
Change in marital status (5-14 years)				0.141
Nil	2575	59.9	40.1	
1 – 2 changes	701	55.8	44.2	
3 + changes	128	57.8	42.2	
Total	3404	59.0	41.0	

Table 3.14 shows that maternal marital status at 14 years is associated with later gambling by children. Adolescents whose mothers were in de-facto relationships at 14

years were more likely to gamble when they grew up. By contrast, single mothers constituted the group least likely to have offspring who gamble. No significant relationship is evident between either family income at 14 years and change in maternal marital status between 5 and 14 years, and young adults' gambling behaviour.

Gambling and maternal mental health and marital quality at 14 years

This section examines the association between gambling prevalence and maternal anxiety, depression and quality of marital relationship at the time of the 14-year follow-up.

Table 3.15: Prevalence of gambling by maternal mental health and marital quality at 14 years

Variables	N	Gambling (%)		P value
		No	Yes	
Maternal depression at 14 years				0.451
No	3106	59.5	40.5	
Yes	400	57.5	42.5	
Maternal anxiety at 14 years				0.862
No	2492	59.1	40.9	
Yes	1014	59.5	40.5	
Marital quality at 14 years				0.557
Good adjustment	2359	59.5	40.5	
Moderate adjustment	559	59.4	40.6	
Conflict	144	53.5	46.5	
No partner	444	59.5	40.5	
Total	3506	59.2	40.8	

Table 3.15 shows that symptoms of maternal anxiety or depression, and quality of the marital relationship at 14 years are not associated with gambling in young adulthood. However, although there was no significant difference in the proportion of gamblers in the different marital quality groups, it can be seen that young adults living in a family with marital conflict were approximately 6% more likely to gamble than those without conflict.

Maternal substance use at 14 years and young adult gambling

Table 3.16 highlights the prospective relationship between mothers' pattern of cigarette smoking and alcohol consumption at 14 years and young adult gambling. It can be seen that maternal tobacco and alcohol use at 14 years is related to young adult gambling. Children of mothers with light (less than 10 cigarettes per day) or heavy (20 or more cigarettes per day) smoking habits were more likely to report gambling at 21 years than children of non-smokers or moderate smokers (10-19 cigarettes per day). An increase in the amount of alcohol consumed by mothers is associated with greater likelihood that offspring will gamble in early adulthood. Some 47.5% of children of mothers who drank one or more glasses of alcohol per day reported having gambled at 21 years.

Table 3.16: Prevalence of gambling according to maternal substance use at 14 years

Variables	N	Gambling (%)		P value
		No	Yes	
Cigarette smoking				0.002
Non smoker	2517	60.9	39.1	
Light smoker	182	52.2	47.8	
Moderate smoker	307	59.3	40.7	
Heavy smoker	511	53.0	47.0	
Alcohol consumption				0.001
Abstainer	624	64.6	35.4	
≤ ½ drink per day	2078	59.4	40.6	
½ - 1 drink per day	432	56.3	43.8	
> 1 drink per day	383	52.5	47.5	
Total	3517	59.2	40.8	

Adolescent substance use at 14 years and young adult gambling

In this section young adult gambling at 21 years is examined by their pattern of cigarette smoking and alcohol consumption when they were 14 years old. As described previously, the extent of smoking by youth at the 14-year follow-up was assessed via the average number of cigarettes smoked per day during the week preceding survey.

Subjects were subsequently divided into three categories: non-smokers, smokers of less than 10 cigarettes and 10 or more cigarettes per day. In regard to consumption of alcohol the respondents at the 14-year follow-up were also divided into three groups: no alcohol use (abstainers), less than one drink (glass), and one or more drinks per day. Figure 3.5 and Table 3.17 provide information about adolescent substance use and subsequent gambling behaviour.

Figure 3.5: Prevalence of young adult gambling by substance use at 14 years

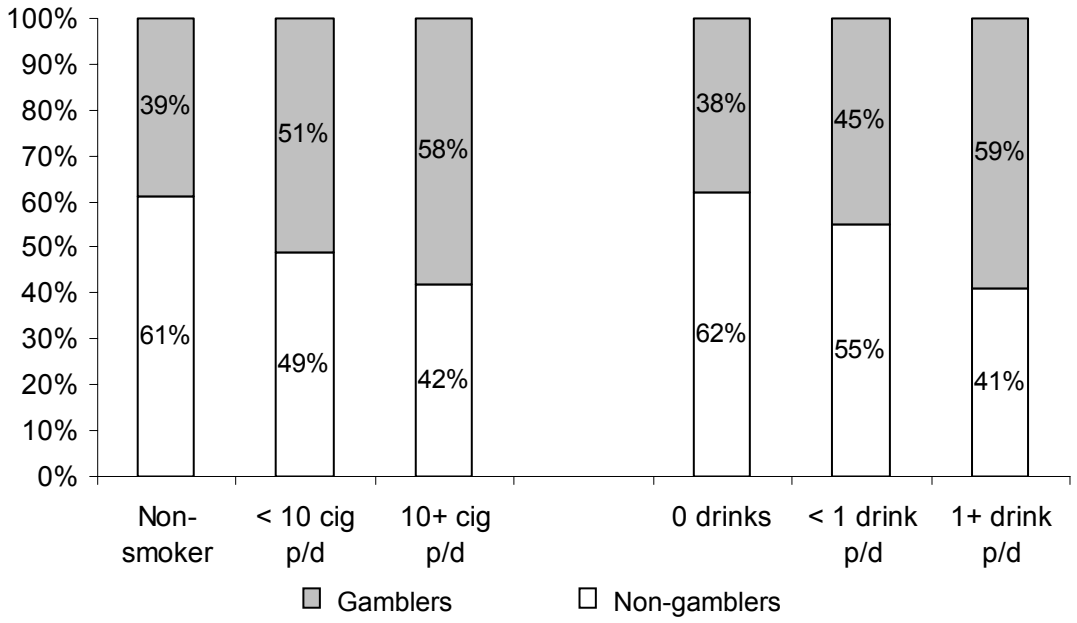


Table 3.17: Prevalence of gambling and adolescent substance use at 14 years

Variables	N	Gambling (%)		P value
		No	Yes	
Cigarette smoking				<0.001
Non smoker	3125	60.7	39.3	
<10 cigarettes per day	221	48.9	51.1	
10 + cigarettes per day	160	41.9	58.1	
Alcohol consumption				<0.001
Abstainer	2298	61.5	38.5	
≤ 1 drink per day	1169	55.1	44.9	
> 1 drink per day	39	41.0	59.0	
Total	3506	59.1	40.9	

Cigarette smoking and alcohol consumption in adolescence were significantly related to gambling at 21 years (Table 3.17). Those who smoked in early adolescence were more likely to gamble when they become young adults, with the highest rate of gambling (58.1%) being found among smokers of more than 10 cigarettes per day. In relation to alcohol consumption, there appears to be a direct association between the

amount of alcohol consumed per day at 14 years and engagement in gambling activities at 21 years. These associations are moderately strong and do suggest that early substance use by children is related to subsequent gambling participation.

Youth problem behaviours at 14 years and young adult gambling

Table 3.18 examines the prospective association between problem behaviours at 14 years and gambling in young adulthood. In order to test the temporal effect of adolescent problem behaviour we have used two different methods of measurement - the Youth Self-Report (YSR) [106] and the Child Behaviour Checklist (CBCL) [113]. Adolescent problem behaviours were assessed from three main scales - 'internalizing', 'externalizing' and 'SAT' problems; and three sub-scales - 'aggression', 'delinquency' and 'anxiety/depression'. Cases of problem behaviours at the 14-year follow-up were selected using 10% cut-offs (the highest 10% of scores represent "caseness").

Table 3.18: Prevalence of gambling according to youth problem behaviours at 14 years (YSR)

Variables	N	Gambling (%)		P value
		No	Yes	
Internalizing				0.506
No	3176	59.4	40.6	
Yes	344	57.6	42.4	
Externalizing				<0.001
No	3201	60.6	39.4	
Yes	319	45.5	54.5	
SAT				0.031
No	3178	59.8	40.2	
Yes	342	53.8	46.2	
Aggression				<0.001
No	3256	60.3	39.7	
Yes	264	45.8	54.2	
Delinquency				<0.001
No	3259	60.2	39.8	
Yes	261	46.7	53.3	
Anxiety/depression				0.252
No	3193	59.5	40.5	
Yes	327	56.3	43.7	
Total	3520	59.2	40.8	

Table 3.18 shows the relationship between young adult gambling status and problem behaviours at 14 years (based on YSR). Externalizing behaviour and SAT problems, and aggression and delinquency, are significantly associated with young adult

gambling at 21 years. Youth who reported symptoms of externalizing, (aggression and delinquency) at 14 years were more likely to gamble in early adulthood compared to those who did not report externalising behaviours. Regarding the association of gambling with SAT problems, this difference is statistically significant but of lesser magnitude. On the other hand, internalizing behaviour (anxiety/depression) is not associated with gambling in young adulthood.

Table 3.19: Prevalence of gambling according to youth problem behaviour at 14 years (CBCL)

Variables	N	Gambling (%)		P value
		No	Yes	
Internalizing				0.969
No	3199	59.2	40.8	
Yes	322	59.3	40.7	
Externalizing				<0.001
No	3228	60.2	39.8	
Yes	293	48.1	51.9	
SAT				0.612
No	3198	59.3	40.7	
Yes	323	57.9	42.1	
Aggression				0.003
No	3225	60.0	40.0	
Yes	296	51.0	49.0	
Delinquency				<0.001
No	3292	60.1	39.9	
Yes	229	46.7	53.3	
Anxiety/depression				0.664
No	3228	59.3	40.7	
Yes	293	58.0	42.0	
Total	3521	59.2	40.8	

Table 3.19 shows maternal reports of youth externalising symptoms (aggression and delinquency) and their association with young adult gambling behaviour. On the other hand, consistent with the youth self-report of behaviour, there is no significant association for internalising and anxiety/depression. Regarding SAT problems, maternal report predicted no difference in the proportions of gamblers and non-gamblers in young adulthood according to whether an adolescent had SAT problems or not, but these problems were a significant factor according to youth report.

The family relationship and social environment at 14 years and young adult gambling

Table 3.20 examines prospective associations between mother-child communication, violence in the home and neighbourhood problems during adolescence, and young adult gambling.

Table 3.20: Prevalence of gambling according to family relationship, violence in home, problems in the neighbourhood

Variables	N	Gambling (%)		P value
		No	Yes	
Open communication				0.556
Good	2694	59.3	40.7	
Moderate	320	59.1	40.9	
Poor	317	56.2	43.8	
Problem communication				0.026
Few	2624	60.1	39.9	
Some	400	56.0	44.0	
Many	307	53.1	46.9	
Violence in home				0.999
Low	2727	59.0	41.0	
High	209	58.9	41.1	
No partner	395	59.0	41.0	
Problem in neighbourhood				0.579
No problem	1062	59.2	40.8	
Low problem	1617	59.6	40.4	
Moderate to high problem	652	57.2	42.8	
Total	3331	59.0	41.0	

Table 3.20 shows an association between problems in mother-child communication at 14 years and later gambling habits at age 21. Mothers who reported more communication problems in their relationship with the child were more likely to have a child who gambled in early adulthood. However, there was no association between young adult gambling and the level of open communication with mother, the degree of violence in the home between parents, or living in a neighbourhood with problems at 14 years.

Summary

This section reports the temporal associations between exposure to various individual, family and social factors in early adolescence and young adult gambling. We

found that marital status of the mother at 14 years was significantly associated with offspring gambling in young adulthood. Consistent with childhood predictors of young adult gambling, maternal smoking and alcohol consumption at 14 years were also associated with gambling by young adults. Children of mothers who drank alcohol reported a higher rate of gambling in early adulthood. Children of mothers who were light or heavy smokers reported a higher rate of gambling in early adulthood, however children of mothers who were moderate smokers did not.

Looking at the associations of child's own problem behaviours at 14 years, we have found that symptoms of externalizing behaviour (aggression and delinquency) in adolescence were prospectively related to their later gambling. By contrast there was no association for internalizing behaviour and anxiety/depression. The association of SAT problems with young adult gambling was less clear, whereas problems in mother-youth communication at 14 years was associated with gambling in young adulthood.

Section 4: Multiple risk prediction of young adult gambling by prospective factors

Prediction (risk) of young adult gambling by childhood factors

We have examined the association between several individual and environmental factors during early childhood and gambling behaviour by young adults. In order to determine the independent contribution of each specific factor, we entered a range of childhood variables into a multiple logistic regression. Using the chi-square test and the p values obtained from previous analyses we selected those factors that were significantly associated with young adult gambling and estimated the risk of gambling for each of the selected factors.

Table 3.21: Risk of young adult gambling by childhood factors

Variables	Gambled at 21 years (N = 3285)			
	Unadjusted		Adjusted*	
	OR	95% CI	OR	95% CI
Gender				
Male	1.0		1.0	
Female	0.8	0.7-0.9	0.7	0.6-0.9
Maternal education at entry to study				
Incomplete high school	1.0		1.0	
Completed high school	0.9	0.7-1.1	0.9	0.7-1.1
Post high school	0.7	0.5-0.9	0.7	0.6-0.9
Maternal smoking at 5 years				
Non smoker	1.0		1.0	
< 10 cigarettes per day	1.3	1.0-1.7	1.2	1.0-1.6
10-19 cigarettes per day	1.4	1.1-1.7	1.3	1.0-1.6
20+ cigarettes per day	1.4	1.1-1.7	1.3	1.0-1.6
Maternal alcohol consumption at 5 years				
Abstainer	1.0		1.0	
< ½ drink per day	1.2	1.0-1.4	1.2	1.0-1.4
½-1 drink per day	1.3	1.0-1.0	1.3	1.0-1.7
> 1 drink per day	1.8	1.3-2.4	1.7	1.2-2.3
Child aggression at 5 years				
No	1.0		1.0	
Yes	1.2	1.0-1.5	1.1	0.9-1.4

*Adjusted for other variables in the table

Table 3.21 shows that gender, maternal education, maternal smoking and alcohol consumption were significantly associated with young adult gambling, though the

strength of these associations was weak. Female participants were less likely to gamble in early adulthood (OR = 0.8; 95% CI: 0.7-0.9) compared with males. Children of mothers who had post-high school education at the time child was born had lower risk of gambling as young adults relative to other educational groups. Mothers who smoked cigarettes or consumed alcohol at 5 years were more likely to have a child who gambled at 21 years. In addition, symptoms of child aggression at the 5-year follow-up were associated with a slight increase in the risk for gambling at 21 years. All except for child aggressive behaviour, the observed associations remained statistically significant, even after controlling for all the other variables in the table.

Prediction (risk) of young adult gambling by adolescent factors

Table 3.22 shows the unadjusted and adjusted risk for young adult gambling according to family factors at 14 years of age. Children of mothers who lived in a de-facto relationship at the time of the 14-year follow-up were more likely to gamble as young adults (OR = 1.4; 95% CI: 1.1-1.8). Mothers who reported light (< 10) or heavy (20 or more cigarettes per day) tobacco use were at increased risk of having a child who gambled at 21 years.

Table 3.22: Risk of young adult gambling by family factors during adolescence

Variables at 14 years (N = 3389)	Gambled at 21 years			
	Unadjusted		Adjusted*	
	OR	95% CI	OR	95% CI
Maternal marital status				
Married	1.0		1.0	
Single	0.8	0.5-1.3	0.7	0.4-1.2
De-facto	1.4	1.1-1.8	1.3	1.0-1.7
S/D/W	1.1	0.9-1.3	1.0	0.8-1.2
Maternal cigarette smoking (per day)				
Non smoker	1.0		1.0	
< 10	1.4	1.1-2.0	1.4	1.0-1.9
10 – 19	1.1	0.8-1.4	1.0	0.8-1.3
20 +	1.4	1.1-1.7	1.3	1.1-1.6
Maternal alcohol consumption (per day)				
Abstainer	1.0		1.0	
< ½ drink	1.3	1.0-1.5	1.2	1.0-1.5
½ - 1 drink	1.4	1.1-1.8	1.4	1.1-1.8
> 1 drink	1.7	1.3-2.2	1.6	1.2-2.0
Mother-child communication				
No problem	1.0		1.0	
Some problem	1.2	1.0-1.5	1.2	1.0-1.5
Many problem	1.4	1.1-1.7	1.4	1.1-1.7

*Adjusted for the other variables in the table

Consistently, maternal alcohol consumption at 14 years was associated with increased likelihood of gambling in young adulthood. Gambling increased with the rise in the amount of alcohol consumed by mothers. In addition, problems in mother-child communication at 14 years predicted gambling in 21 year olds.

Table 3.23 shows that adolescent cigarette smoking and alcohol consumption at 14 years predicted gambling behaviour at 21 years. The more adolescents smoked cigarettes or drank alcohol, the greater the risk of gambling. However, these associations did not remain significant after adjusting for other covariates in the table. Gambling at 21 years was also associated with the age at which adolescents started to smoke cigarettes, consume alcohol or use cannabis.

Table 3.23: Risk of young adult gambling by individual factors during adolescence

Variables at 14 years (N = 3389)	Gambled at 21 years			
	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
Adolescent cigarette smoking (per day)				
Non smoker	1.0		1.0	
< 10 cigarettes	1.7	1.3-2.2	1.2	0.9-1.6
10 + cigarettes	2.1	1.5-2.9	1.4	0.9-2.0
Adolescent alcohol consumption (per day)				
Abstainer	1.0		1.0	
Up to one drink	1.3	1.1-1.5	1.0	0.8-1.2
> one drink	2.2	1.1-4.2	1.3	0.6-2.6
Age of starting to smoke				
Never started	1.0		1.0	
< 15 years	2.1	1.7-2.5	1.5	1.1-1.9
15 – 17 years	1.5	1.3-1.8	1.2	1.0-1.5
18 + years	1.6	1.2-2.1	1.4	1.1-1.8
Age of starting to consume alcohol				
Never started	1.0		1.0	
< 15 years	4.8	3.1-7.4	3.3	2.1-5.3
15 – 17 years	4.1	2.7-6.2	3.4	2.2-5.3
18 + years	2.7	1.7-4.2	2.6	1.7-4.1
Age of starting to use cannabis				
Never started	1.0		1.0	
< 15 years	1.8	1.5-2.3	1.1	0.8-1.4
15 – 17 years	1.6	1.3-1.9	1.2	1.0-1.4
18 + years	1.4	1.1-1.7	1.1	0.9-1.5
Adolescent externalising behaviour				
No	1.0		1.0	
Yes	1.9	1.5-2.4	1.5	1.1-1.9
Adolescent SAT behaviour				
No	1.0		1.0	
Yes	1.3	1.0-1.6	1.0	0.8-1.3

Early initiation to substances predicted an increased risk of young adult gambling. For example, participants who reported the onset of alcohol consumption before 15 years were 4.8 times more likely to gamble (95% CI: 3.1-7.4) relative to those who never started to drink. Most of the associations remained significant after adjustment for other covariates, though they were slightly attenuated.

Symptoms of externalising behaviour (including aggression and delinquency) at 14 years increased the risk of later gambling (OR = 1.9 (95% CI: 1.5-2.4). Further, adolescents with symptoms of SAT problems were more likely to gamble at 21 years, although the association was confounded by inclusion of other covariates in the model.

Prediction (risk) of young gambling by level of exposure to childhood and adolescent risk factors

In the last two sections we examined the associations between sets of individual and family explanatory factors and young adult gambling. Tables 3.24 lists groups of individual and familial influences operating during childhood and adolescence, which were significantly associated with young adult gambling. We then explore the pattern of young adult gambling by the level of exposure to risk factors.

Table 3.24: Risk factors associated with young adult gambling

Factors in child hood	Factors in adolescence
Child's gender	Maternal marital status
Maternal education at the child's birth	Mother-child communication
Maternal smoking at 5 years	Adolescent smoking
Maternal alcohol consumption at 5 years	Adolescent alcohol consumption
	Age of initiation to smoking
	Age of initiation to alcohol
	Age of initiation to cannabis
	Externalising behaviour

Table 3.25: Pattern of young adult gambling by level of exposure to risk factors

Level of risk factors	Gambling at 21 years (N = 3023)		
	No N = 1802	Yes N = 1221	
	%	%	OR (95% CI)
Low risk (0-2)	15.1	8.4	1.0
3 – 4 risks	58.2	53.8	1.7 (1.3-2.1)
5 risks	19.3	25.1	2.3 (1.8-3.1)
6 + risks	7.5	12.6	3.0 (2.2-4.2)

Table 3.25 shows that out of 1221 young adults who reported gambling at 21 years, 53.8% had been exposed to 3-4 risk factors during the childhood and adolescent periods. Some 58.2% of non-gamblers also had exposure to 3-4 risk factors. Most people in our sample are exposed to some risk and most gamblers are from this group. Some 8.4% of gamblers were exposed to low (0-2) risk prior to early adulthood while 12.6% of gamblers come from the highest risk group. Predicting gambling involvement on the basis of exposure to risk is unlikely to be useful or helpful either from a policy or treatment perspective.

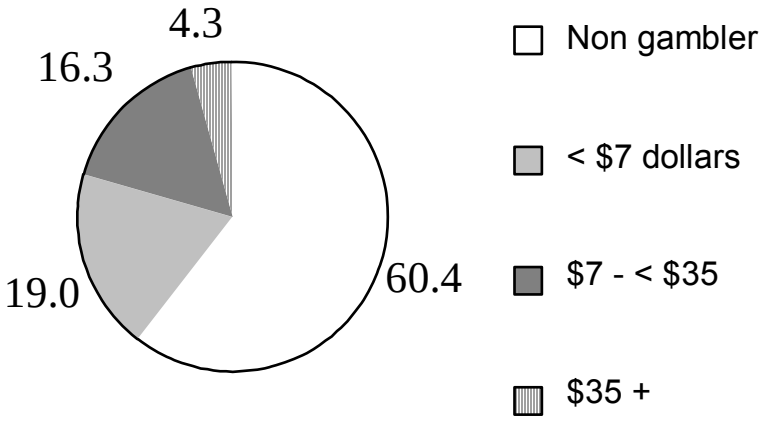
CHAPTER 4: FINDINGS ON YOUNG ADULT GAMBLING EXPENDITURE

Introduction

In this chapter we examined the expenditure of young adult gambling and their association with different individual, familial and social factors. We first examined correlates of gambling expenditure at 21 years. Next, we investigated prospective relationships between young adult gambling costs with relation to each of the childhood and adolescent variables. Finally we developed a predictive model of the risk of gambling expenditure using significant factors identified by chi-square tests.

At the 21-year follow-up participants were asked about the amount of money they usually spent on gambling (per week). They were then grouped into four categories as described in page 19: no money paid at all, less than $7, $7 - < $35, and $35 + per week. Of the cohort of 1480 young adults who reported having gambled at 21 years, 48% spent less than $7 per week, while 11% and 41% respectively spent $35 + and $7 – $35 per week on gambling practice. Figure 4.1 shows the percentage of gamblers in each of these aforementioned three categories, and also the proportion of young adults who were non-gamblers.

Figure 4.1: Money spent on gambling by young adults (dollars per week)



Section 1: Gambling expenditure and individual, family and social factors in young adulthood

Gambling expenditures and socio-demographic characteristics of young adults

Table 4.1 summarises gambling expenditure according to different socio-demographic variables. A number of socio-demographic factors are associated with the amount of money young adults spend on gambling. Male participants reported higher amounts of money spent on gambling. While 14.5 % of young women spent $7 or more per week on gambling, 27.4 % of young men spent the same amount of money on gambling.

Table 4.1: Money spent on gambling according to young adult socio-demographic characteristics

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Gender						<0.001
Male	1713	56.5	16.1	20.4	7.0	
Female	1925	63.8	21.6	12.6	1.9	
Education						<0.001
Below high school	752	54.1	14.0	22.9	9.0	
Completed high school	1925	61.8	20.4	14.5	3.3	
Tertiary education	811	62.1	19.5	15.7	2.7	
University	150	63.3	24.7	9.3	2.7	
Paid Job						<0.001
Yes	2796	58.2	19.8	17.3	4.6	
No	842	67.5	16.3	12.8	3.4	
Income						<0.001
Low income	1015	70.2	17.4	10.7	1.6	
Middle income	1822	59.4	19.5	17.1	4.0	
High income	801	49.9	19.9	21.6	8.6	
Marital status						<0.05
Married/de-facto	769	58.3	19.8	18.9	3.1	
Single/separate	2869	60.9	18.8	15.6	4.6	
Total	3638	60.4	19.0	16.3	4.3	

Those who didn't complete high school were likely to spend greater amounts of money on gambling than others who have had higher education. Middle and high incomes were associated with greater gambling expenditure. Young adults who were

married or living in de facto relationships were only slightly less likely to spend money on gambling activities than those who were separated or single.

Gambling expenditure and socio-demographic characteristics of the family

Table 4.2 examines the amounts of money young adults spent on gambling by their families' characteristics at 21 years.

Table 4.2: Money spent on gambling by socio-demographic characteristics of the family

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Age of mother (years)						0.912
Below 20	381	58.0	21.8	16.0	4.2	
20 – 34	2444	59.9	19.3	16.6	4.2	
35 +	138	63.0	18.1	14.5	4.3	
Family employment						0.878
Employed	2197	59.5	19.8	16.4	4.3	
Unemployed	187	64.7	16.6	15.5	3.2	
No partner	579	59.2	19.7	16.9	4.1	
Family income						0.005
Low income	598	62.2	15.7	16.6	5.5	
Middle income	1402	57.2	21.0	18.1	3.7	
High income	963	62.1	19.8	13.9	4.2	
Marital status						0.056
Married	2019	60.4	20.1	15.8	3.7	
Single	84	63.1	16.7	17.9	2.4	
De-facto	207	53.6	18.4	19.3	8.7	
S/D/W	653	59.4	18.7	16.4	4.2	
Total	2963	59.8	19.5	16.4	4.2	

Table 4.2 shows that gambling expenditure by young adults was not associated with the age of the mother, the employment of both or just one parent, or marital status. However, young adults from middle income families were more likely to spend up to $34.90 per week on gambling than those from low or high income families. In the category of spending more than $35.00 per week, the pattern of results are somewhat unclear, with only minimal differences between the different income groups.

Gambling expenditure and substance use by young adults

The following tables provide information on the association between young adult gambling expenditure and use of legal and illicit substances by young adults and the age of starting to use each substance.

Table 4.3: Money spent on gambling according to substance use by young adults

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Cigarette smoking						<0.001
Non smoker	2347	65.5	19.5	12.4	2.6	
< 10 per day	644	55.6	19.4	20.3	4.7	
10 + per day	694	47.7	16.7	25.8	9.8	
Alcohol consumption						<0.001
Abstainer	1237	57.1	16.5	20.0	6.5	
≤ 1 drink per day	2163	60.1	21.8	14.9	3.2	
> 1 drink per day	285	77.2	8.4	11.2	3.2	
Cannabis ever use						<0.001
No	1850	66.4	18.1	13.3	2.4	
Yes	1835	54.4	19.8	19.6	6.2	
Pattern of current cannabis use						<0.001
No use	1850	66.4	18.1	13.1	2.4	
Occasional use	1384	56.4	20.4	18.2	5.0	
Frequent use	451	48.1	18.2	23.7	10.0	
Ever use of other illicit drugs						<0.001
No	2728	63.2	19.2	14.7	2.9	
Yes	957	52.6	18.3	21.0	8.2	
Total	3685	60.4	19.0	16.3	4.3	

Table 4.3 shows that gambling expenditure by young adults was associated with the use of legal and illegal substances. However, this association was not consistent for all of the drugs examined. The smoking of cigarettes by young adults, for example, was directly related to amount of money spent on gambling, such that the greater the number of cigarettes smoked per day, the more the money spent on gambling activities. This association was identical for "ever use" of cannabis and other illicit drugs and the pattern of use of cannabis by young adults, that is, the use of cannabis and other illicit drugs and the frequent use of cannabis was significantly associated with more gambling expenditure. On the other hand, heavy alcohol consumption by young adults was inversely associated with amount of money spent.

Gambling expenditure and age of starting substance use by young adults

Table 4.4 examines the association between age of starting to use substances and gambling expenditure by young adults.

Table 4.4: Money spent on gambling according to age of starting substance use

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Age of starting smoking						<0.001
Never started	1822	67.0	18.9	11.9	2.3	
< 15 years	557	48.7	20.8	22.8	7.7	
15 – 17 years	957	56.7	17.2	19.7	6.3	
18 + years	287	55.7	20.6	20.2	3.5	
Age of starting to use alcohol						<0.001
Never started	190	85.3	5.3	6.3	3.2	
< 15 years	630	53.7	19.8	20.2	6.3	
15 – 17 years	2232	58.5	20.6	16.6	4.3	
18 + years	287	55.7	20.6	20.2	3.5	
Age of starting to use cannabis						<0.001
Never started	1829	66.3	17.9	13.2	2.6	
< 15 years	443	51.5	19.0	21.2	8.4	
15 – 17 years	1018	55.0	20.5	18.5	6.0	
18 + years	333	58.3	19.2	19.8	2.7	
Total	3623	60.6	18.9	16.3	4.3	

The data show that the amount of money young adults spent on gambling was associated with the age of starting to use licit and illicit substances. Those who began to smoke cigarettes, consume alcohol or use cannabis before 15 years of age were most likely to spend a greater amount of money on gambling compared with those who never smoked or those who started later.

Gambling expenditure and impact of substances on young adult life

Table 4.5 examines the association between the amount of money spent on gambling and self-perceived impact of alcohol and illicit drugs on young adult life.

There was a direct relationship between gambling expenditure by young adults and the impact of the use of alcohol and illicit drugs on their lives. Young people who reported a negative impact of alcohol and/or illicit drugs on their lives were more likely to spend $7 or more per week on gambling compared with non- substance users and those who had functional drug use (drug use without negative impact).

Table 4.5: Money spent on gambling according to impact of substances on young adult life

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Alcohol consumption						<0.001
No drink	186	83.9	5.9	6.5	3.8	
Use without impact	2736	60.9	19.7	15.9	3.6	
Mild to severe impact	736	52.6	19.3	20.7	7.5	
Illicit drugs						<0.001
No use	2083	64.0	18.9	14.5	2.6	
Use without impact	1066	57.0	18.8	18.3	5.9	
Mild to severe impact	509	52.3	19.3	20.0	8.4	
Total	3658	60.4	18.9	16.3	4.4	

Gambling expenditure by young adults and maternal substance use

Table 4.6 presents associations between the amount of money young adults spent on gambling and the pattern of cigarette smoking and alcohol consumption by their mothers at 21 years. A greater number of cigarettes smoked by mothers was associated with young adults spending $35 or more per week on gambling. There was no association between the pattern of maternal alcohol consumption and the amount of money young adults spent on gambling.

Table 4.6: Money spent on gambling according to maternal substance use at 21 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Cigarette smoking						<0.001
Non smoker	2239	62.5	19.7	14.3	3.5	
< 10 per day	210	57.6	16.7	20.5	5.2	
10-19 per day	284	54.6	18.3	22.9	4.2	
20 + per day	370	51.9	20.0	21.1	7.0	
Alcohol consumption						0.129
Abstainer	246	56.1	19.5	19.5	4.9	
≤ 1 drink per day	1773	58.7	20.5	16.8	4.0	
> 1 drink per day	1084	63.5	17.6	14.8	4.2	
Total	3103	60.2	19.4	16.3	4.1	

Gambling expenditure by young adults and problem behaviour at 21 years

The following section describes the relationship between young adult problem behaviour and money spent on gambling. Problem behaviour at 21 years includes symptoms of anxiety/depression, externalising, delinquency, risk-taking behaviour and safety beliefs. Table 4.7 shows that the amount of money young adults spent on gambling was associated with externalising and delinquent behaviour as well as risk-taking thoughts and behaviours.

Table 4.7: Money spent on gambling according to young adult problem behaviours

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Anxiety/Depression						0.857
No	3200	60.4	19.2	16.0	4.4	
Yes	350	60.0	20.9	14.9	4.3	
Externalizing						<0.001
No	3163	62.0	18.8	15.6	3.6	
Yes	387	46.8	23.5	18.6	11.1	
Delinquency						<0.001
No	2378	64.3	19.7	13.8	2.3	
Low	966	54.8	18.6	18.9	7.7	
High	206	41.3	18.4	26.2	14.1	
Risk-taking						0.004
No risk	635	66.5	18.1	12.8	2.7	
Low risk	2059	58.8	20.0	16.9	4.4	
Moderate to high risk	856	59.5	18.7	16.0	5.8	
Safety beliefs						0.863
No safety	152	63.8	15.1	17.1	3.9	
Low safety	2139	60.2	19.8	15.7	4.3	
Moderate to high safety	1259	60.1	19.1	16.1	4.7	
Total	3550	60.3	19.3	15.9	4.4	

Those with symptoms of externalizing at 21 years were significantly more likely to spend a greater sum of money on gambling. For instance, nearly one third of respondents who reported externalising symptoms spent $7 or more per week, as opposed to 20% who did not. A similar pattern is seen for delinquent behaviour. Greater symptoms of delinquency are associated with an increased rate of young adults who reported greater gambling expenditure. Furthermore, young adults who believed in risk-taking were more likely to spent $7 or more on gambling. However, there was no association between symptoms of anxiety/depression at 21 years and safety beliefs, and gambling expenditure.

Gambling expenditure and the social life of young adults

The following section examines relationships between young adult religious activities, problems in the neighbourhood and gambling expenditure. Table 4.8 shows that the amount of money spent on gambling by young adults was associated with their religious activities and the presence of problems in their neighbourhood. A smaller proportion of young adults who acknowledged that they attended church or engaged in

other religious practices spent $7 or more per week on gambling. In addition, living in an area with social problems was related to higher gambling expenditure.

Table 4.8: Money spent on gambling according to the social life of young adults

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Church attendance						<0.001
Yes	854	67.1	17.2	13.2	2.5	
No	2752	58.2	19.8	17.1	4.9	
Religious activities						<0.001
Yes	1268	62.9	20.2	14.3	2.7	
No	2338	59.0	18.6	17.2	5.2	
Problems in neighbourhood						<0.001
No	1543	64.5	17.8	14.5	3.2	
Low	1508	56.2	20.1	17.4	5.9	
Moderate to high	555	20.4	17.5	18.1	5.8	
Total	3606	60.3	19.2	16.2	4.3	

Summary

Overall, gambling expenditure by young adults was associated with gender, the level of education, having a paid job, the level of income, substance use by the youth and their mothers, age of initiation to substance use, problem behaviours, religious activities and problem neighbourhoods. Male participants and those who had lower levels of education, or who had a paid job and higher incomes were more likely to spend greater amounts of money on gambling. Those who smoked cigarettes or had ever used cannabis or other illicit drugs reported larger amounts of money spent on gambling. By contrast, we found an inverse association between alcohol consumption and young adult gambling expenditure. Further, earlier initiation to substances use was associated with more money spent on gambling. Symptoms of externalizing problems, delinquent behaviour, risk-taking beliefs and problems in the neighbourhood area were all associated with greater money spent on gambling. Finally, those who participated in religious activities and/or attended church reported lower gambling expenditure.

Section 2: Childhood predictors of gambling expenditure

In the previous sections we examined the associations between individual, family, and social factors during childhood, and young adult gambling. The following section investigates the associations between childhood factors at 5 years and gambling expenditure in young adulthood.

Gambling expenditure and socio-demographic characteristics of the family

Table 4.9 provides information about young adults' gambling expenditure according to the socio-demographic characteristics of their families during childhood. Maternal age, mother's education, parental employment status, gross family income and marital status at the 5 years, and changes in marital status during the child's first five years are considered.

Table 4.9: Young adult gambling expenditure according to socio-demographic background at 5 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Mother's age						0.938
<20 years	382	60.2	19.9	16.0	3.9	
20 – 34 years	2631	60.3	19.3	16.1	4.3	
35 + years	146	63.7	16.4	14.4	5.5	
Maternal education						<0.001
Incomplete high school	478	56.3	18.2	19.5	6.1	
Completed high school	2033	59.7	19.1	16.7	4.5	
Post high school	643	65.9	20.2	11.3	2.6	
Family employment status						0.091
Both parents employed	2750	60.4	19.5	15.5	4.5	
Either parent employed	409	60.6	17.1	19.3	2.9	
Family income						0.490
Low income	712	60.3	18.3	16.7	4.8	
Middle income	1502	61.3	18.5	16.4	3.9	
High income	945	59.4	21.1	14.8	4.8	
Marital status						0.762
Married	2665	60.3	19.3	16.1	4.2	
Single	77	61.0	16.9	15.6	6.5	
De facto	166	65.1	16.3	12.7	6.0	
S/D/W	251	58.6	21.1	16.7	3.6	
Change in marital status						0.853
Nil	2634	60.3	19.2	16.0	4.3	
1 – 2 changes	449	58.8	20.3	16.3	4.7	
3 + changes	76	67.1	14.5	13.2	5.3	
Total	3159	60.5	19.2	16.0	4.3	

Table 4.9 shows that the socio-demographic characteristics of the family in the early life of the child, including the age of the mother, parental employment status, family income, marital status and change in marital status are not associated with young adult gambling expenditure. On the other hand, the level of maternal education at the time the child was 5 years is related to the amount of money young adults spent on gambling 21 years later. Children whose mother had higher education were less likely to spend money on gambling activities in general and far less likely to spend large amounts on gambling than children of mothers who did not complete high school.

Gambling expenditure, maternal mental health and quality of marital relationship

Table 4.10 examines the cost of young adult gambling activities according to maternal depression, anxiety and the quality of the marital relationship at 5 years. Maternal depression and anxiety at the time the child was 5 years of age are both associated with the amount of money children spent on gambling as young adults. While a greater proportion of children whose mothers were depressed spent an amount of $7 to $34.9 dollars per week, those of non-depressed mothers constituted a higher proportion of the high cost gambling group ($35 or more per week). In addition, anxious mothers were more likely to have children who spent larger sums of money on gambling as young adults. No significant association was found for quality of the marital relationship when the child was 5 years old.

Table 4.10: Young adult gambling expenditure according to maternal mental health and marital quality at 5 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Maternal Depression						0.041
No	2981	60.9	19.2	15.5	4.5	
Yes	319	59.9	16.9	20.7	2.5	
Maternal Anxiety						0.006
No	2458	60.9	19.5	16.0	3.6	
Yes	842	60.5	17.3	15.9	6.3	
Dyadic Adjustment						0.930
Good adjustment	2469	60.9	19.1	15.8	4.2	
Moderate adjustment	483	60.2	18.0	16.4	5.4	
Conflict	75	57.3	18.7	18.7	5.3	
No partner	273	61.5	19.4	16.1	2.9	
Total	3606	60.8	19.0	16.0	4.3	

Gambling expenditure and maternal substance use at 5 years

Table 4.11 examines the association between maternal use of various substances at the time the child was 5 years old and the amount of money young adults spent on gambling. These substances include cigarettes, alcohol, and illicit drugs.

Table 4.11: Young adult gambling expenditure according to maternal substance use at 5 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Maternal cigarette smoking (per day)						<0.001
Non-smoker	2176	63.1	19.3	13.7	3.9	
< 10 cigarettes	247	56.7	18.2	18.6	6.5	
10 – 19 cigarettes	380	56.3	20.0	19.7	3.9	
20 + cigarettes	508	55.3	17.5	21.7	5.5	
Alcohol consumption (per day)						<0.001
Abstainer	683	65.3	15.8	14.3	4.5	
< ½ drink	2072	60.8	19.3	16.2	3.8	
½ - 1 drink	331	57.7	23.0	15.4	3.9	
> 1 drink	225	49.3	21.3	20.0	9.3	
Illicit drug use						0.763
No	3199	60.6	19.0	16.1	4.3	
Yes	112	59.8	21.4	13.4	5.4	
Total	3311	60.6	19.1	16.0	4.3	

Data in Table 4.11 shows that patterns of maternal cigarette smoking and alcohol consumption when the child was age 5 is associated with the personal cost of gambling in young adulthood. Mothers who smoked cigarettes or drank alcohol when their children were 5 years of age were more likely to have offspring who spent larger amounts of money on gambling.

Gambling expenditure and mental health of the child at 5 years

Table 4.12 provides information on gambling expenditure and child behaviour at age 5. Depression, aggression and internalising and SAT problems are examined.

Table 4.12: Young adult gambling expenditure according to mental health of the child

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0+	
Child's depression						0.363
No	3073	60.6	18.8	16.1	4.4	
Yes	256	60.2	22.7	13.7	3.5	
Child's aggression						0.244
No	2985	61.0	19.2	15.6	4.2	
Yes	344	57.0	18.6	18.9	5.5	
Child's internalising						0.226
No	2954	60.3	19.0	16.4	4.3	
Yes	375	63.2	19.7	12.3	4.8	
Child's SAT						0.980
No	3092	60.5	19.2	15.9	4.3	
Yes	237	61.2	18.1	16.0	4.6	
Total	3329	60.6	19.1	16.0	4.3	

Table 4.12 shows that several indicators of child behaviour as assessed at the 5-year follow-up are not associated with patterns of young adult gambling expenditure.

Gambling expenditure and parenting style at 5 years

Table 4.13 examines parental control and supervision in relation to the amount of money young adults reported spending on gambling. Table 4.13 indicates that young adult expenditure on gambling is not significantly associated with maternal parenting styles at 5 years of age.

Table 4.13: Young adult gambling expenditure according to parenting style at 5 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Maternal control						0.688
Low control	452	58.0	20.1	17.3	4.6	
Moderate control	2464	60.8	16.2	15.7	4.4	
High control	309	62.8	16.2	17.5	3.6	
Maternal supervision						0.052
Low supervision	239	58.4	21.3	15.9	7.9	
Moderate	2794	60.7	19.0	16.3	4.0	
High	192	66.1	16.7	13.0	4.2	
Total	3225	60.6	19.0	16.1	4.3	

Summary

In this section we examined the association between young adult gambling expenditure and individual and environmental factors in early childhood. Depressed and/or anxious mothers when the child was 5 years of age were more likely to have children spending greater money on gambling as young adults. Maternal smoking and alcohol consumption at 5 years appeared to be associated with gambling expenditure but the pattern was not clear. None of the problem behaviours examined in childhood were significantly related to later patterns of gambling expenditure among young adults.

Section 3: Adolescence predictors of gambling expenditure

In this section we examine the prospective association between several individual and environmental factors in early adolescence (14 years) and young adult gambling expenditure. The explanatory variables included in this association are: family income and maternal marital status at 14 years, changes in maternal marital status between 5 and 14 years of the child's age, maternal mental health, maternal quality of marital relationship, maternal substance use, mother-child communication, violence in the home, problems in the living environment, adolescent problem behaviour and adolescent substance use.

Gambling expenditure and socio-economic status of the family at 14 years

Table 4.14 examines the prospective association between gross family income, maternal marital status at 14 years and marital changes (within 5 to 14 years), and young adult gambling expenditure.

Table 4.14: Gambling expenditure according to socio-economic backgrounds in early adolescence

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Family income						0.749
Low	630	61.0	17.6	17.0	4.4	
Middle	1442	59.4	18.9	17.2	4.4	
High	1325	60.5	20.1	15.2	4.2	
Maternal marital status						0.090
Married	2598	61.0	19.3	15.7	4.0	
Single	63	65.1	15.9	17.5	1.6	
De-facto	252	52.0	21.8	20.2	6.0	
S/D/W	484	58.9	17.4	18.0	5.8	
Changes in marital status (5-14 years)						0.026
No change	2570	61.2	19.4	15.6	3.8	
One or two changes	699	56.4	18.3	19.3	6.0	
Three or more	128	58.6	18.8	16.4	6.3	
Total	3397	60.1	19.1	16.4	4.4	

Table 4.14 indicates that neither marital status nor family income at 14 years was related to gambling expenditure in young adulthood. However, *change* in marital status between 5 and 14 years was prospectively associated with the child's gambling expenditure as a young adult. Children of mothers who experienced one or more changes to their marital relationship between childhood and adolescence were more likely to spend over $35 per week on gambling activities than those children whose mothers' marital status remained the same.

Gambling expenditure, family relationship and social environment at 14 years

Table 4.15 examines the prospective association between mother-child communication during adolescence, violence in the home, and problems in the neighbourhood at 14 year, and young adult gambling expenditure.

Table 4.15: Young adult gambling expenditure according to family and neighbourhood problems at 14 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Open mother-child communication						0.250
Good	2686	60.6	19.3	15.9	4.1	
Moderate	319	60.2	19.4	17.2	3.1	
Poor	317	56.5	17.7	19.6	6.3	
Problem in mother-child communication						<0.001
Few	2617	61.4	19.6	15.4	3.6	
Moderate	399	56.9	18.5	17.5	7.0	
Many	306	54.2	16.0	23.9	5.9	
Violence in home						0.905
Low	2720	60.3	19.4	16.2	4.2	
High	208	60.1	17.3	18.8	3.8	
No partner	394	59.6	18.5	16.8	5.1	
Problem in neighbourhood						0.183
No problem	1061	60.6	20.7	14.6	4.1	
Low problem	1612	60.7	18.6	16.3	4.3	
Moderate to high	649	58.1	18.0	19.6	4.3	
Total	3322	60.2	19.2	16.4	4.2	

Table 4.15 shows that mother-adolescent communication was prospectively associated with gambling expenditure in adulthood. Children who had a moderate to high number of problems in communication with their mother were more likely to be

in the higher gambling expenditure groups than those who had few communication problems. Openness in mother-child communications, domestic violence within the home, and the quality of the surrounding neighbourhood all appear to be unrelated to subsequent gambling expenditure.

Gambling expenditure, maternal mental health and quality of marital relationship at 14 years

Maternal mental health (depression and anxiety) and the quality of the mother's marital relationship were assessed at the 14-year follow-up. Table 4.16 shows that there is no association between maternal depression and/or anxiety, or marital quality (dyadic adjustment) at 14 years, and gambling expenditure.

Table 4.16: Young adult gambling expenditure according to maternal mental health at 14 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Maternal depression						0.785
No	3099	60.7	19.0	16.3	4.1	
Yes	398	58.8	19.8	16.3	5.0	
Maternal anxiety						0.083
No	2486	60.3	20.0	15.9	3.9	
Yes	1011	60.8	16.9	17.2	5.0	
Dyadic adjustment						0.102
Good	2353	60.9	19.7	15.6	3.9	
Moderate	557	60.5	16.0	18.7	4.8	
Conflict	144	54.2	26.4	13.9	5.6	
No partner	443	60.3	17.4	17.8	4.5	
Total	3497	60.5	19.1	16.3	4.2	

Gambling expenditure and maternal substance use at 14 years

During the 14-year follow-up, maternal patterns of cigarette smoking (cigarettes per day) and alcohol consumption (glasses per day) were assessed from mother self-report. Table 4.17 shows that both maternal smoking and alcohol consumption at the time of the 14-year follow-up are prospectively related to young adult gambling expenditure at 21 years. Those whose mothers smoked cigarettes or drank alcohol at 14 years were more likely to spend a greater amount of money on gambling in adulthood. Offspring of mothers who smoked and drank the most were disproportionately represented in the $35+ per week gambling expenditure group.

Table 4.17: Young adult gambling expenditure according to maternal substance use at 14 years

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Smoking (cigarette p/d)						<0.001
Non smoker	2510	62.1	19.7	14.2	4.0	
< 10	181	54.7	21.0	21.0	3.3	
10 -19	306	59.8	16.3	19.6	4.2	
20 +	511	54.4	17.0	22.7	5.9	
Alcohol consumption						0.004
Abstainer	622	65.8	16.2	13.8	4.2	
< ½ drink	2073	60.8	18.9	16.3	4.1	
½ - 1 drink	431	57.1	23.2	16.0	3.7	
> 1 drink	382	53.1	20.2	20.7	6.0	
Total	3508	60.4	19.1	16.3	4.2	

Gambling expenditure, adolescent mental health and problem behaviour

The following tables examine young adult gambling expenditure according to adolescent behaviour problems. Internalising, externalising, and SAT problems, as well as aggression and delinquency are all considered within these tables.

Table 4.18 and Table 4.19 compare findings from analyses of data obtained from two different informants: (1) the youth themselves, and (2) mothers (reporting on their

children's behaviour). The tables show that symptoms of externalising behaviour, aggression and delinquency at 14 years are all associated with the amount of money spent on gambling in adulthood. The consistency of these results between two different informants on the same individual suggests that aggressive and delinquent behaviour during adolescence does increase the risk for spending greater amounts of money ($7 or more per week) on gambling in young adulthood. While no association was found between SAT problems and gambling expenditure according to adolescents' self-reports (Table 4.18), a significant but modest association was found to exist according to maternal reports on offspring behaviour (Table 4.19).

Table 4.18: Young adult gambling expenditure according to problem behaviours at 14 years (YSR)

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Internalising						0.391
No	3168	60.7	18.8	16.4	4.2	
Yes	343	58.6	21.6	14.6	5.2	
Externalising						<0.001
No	3193	61.8	19.1	15.4	3.8	
Yes	319	47.2	18.6	24.8	9.4	
SAT						0.228
No	3168	61.0	18.8	16.1	4.2	
Yes	343	55.4	21.6	17.8	5.2	
Aggression						<0.001
No	3248	61.5	18.9	15.7	3.9	
Yes	263	47.5	20.9	22.4	9.1	
Delinquency						<0.001
No	3251	61.6	19.0	15.7	3.7	
Yes	260	46.9	18.8	22.3	11.9	
Anxiety/depression						0.237
No	3184	60.8	18.8	16.4	4.1	
Yes	327	57.5	21.7	15.0	5.8	
Total	3511	60.5	19.0	16.2	4.3	

Table 4.19: Young adult gambling expenditure according to problem behaviours at 14 years (CBCL)

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Internalising						0.704
No	3190	60.3	19.2	16.1	4.4	
Yes	322	61.5	18.3	17.1	3.1	
Externalising						<0.001
No	3219	61.3	19.4	15.3	4.0	
Yes	293	50.9	15.0	27.0	7.2	
SAT						0.026
No	3189	60.6	19.4	16.0	4.0	
Yes	343	59.1	15.5	18.6	6.8	
Aggression						<0.001
No	3216	61.2	19.3	15.5	4.0	
Yes	296	52.7	16.6	24.3	6.4	
Delinquency						<0.001
No	3284	61.3	19.5	15.3	3.9	
Yes	228	48.7	13.2	29.4	8.8	
Anxiety/depression						0.701
No	3218	60.5	19.2	16.0	4.3	
Yes	294	60.2	17.7	16.2	4.2	
Total	3512	60.4	19.1	16.2	4.2	

Gambling expenditure and pattern of substance use by adolescents at 14 years

Table 4.20 provides information about the associations between adolescent cigarette smoking and alcohol consumption, and the amount of money they spend on gambling in early adulthood. We found that youth cigarette smoking and alcohol consumption was significantly associated with gambling expenditure at 21 years. Those who smoked 10 or more cigarettes per day or drank alcohol in adolescence were much more likely to gamble more than $35 per week than those who smoked fewer cigarettes per day or didn't smoke or drink alcohol at all when they were aged 14 years.

Table 4.20: Young adult gambling expenditure according to substance use during adolescence

Variables	N	Money spent on gambling (Dollars per week) (%)				P value
		None	<7.0	7.0-34.9	35.0 +	
Smoking						<0.001
Non	3115	62.0	19.2	14.9	3.9	
< 10	221	49.8	19.5	25.8	5.4	
10 +	159	44.0	17.0	28.3	10.7	
Alcohol consumption						<0.001
Abstainer	2291	62.9	18.7	14.6	3.8	
≤ 1 drink	1166	55.9	19.9	18.9	5.3	
> 1 drink	38	44.7	18.4	31.6	5.3	
Total	3495	60.4	19.1	16.2	4.3	

Section 4: Multiple risk prediction of young adult gambling expenditure

Prediction (risk) of young adult gambling expenditure by childhood factors

We examined the association between several individual and environmental factors during early childhood and the pattern of expenditure on gambling in young adults. In order to discern the independent risk attributed to each particular factor, we included these childhood variables in a multiple logistic regression. Using the chi-square test and *p* values obtained from previous analyses, we selected those factors that were significantly associated with young adult gambling expenditure. In the adjusted model we were able to estimate an independent risk of gambling for each particular variable.

Table 4.21: Risk of gambling expenditure by gender

Gender	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Female	1.0	1.0	1.0	1.0	1.0	1.0
Male	0.8 (0.7-1.0)	0.8 (0.7-1.0)	1.8 (1.5-2.2)	1.8 (1.5-2.2)	4.1 (2.8-6.2)	4.2 (2.8-6.4)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother's education, family employment status, maternal depression, maternal anxiety, maternal smoking, and maternal alcohol consumption

Table 4.21 shows that young adult males are much more likely to spend money on gambling activities than their female counterparts. Males are almost twice as likely (OR = 1.8; 95% CI: 1.5-2.2) to spend $7 – $34.9 per week and four times more likely (OR = 4.1; 95% CI: 2.8-6.2) to spend $35 or more per week as females. Adjustment for other potentially confounding factors such as maternal education, maternal mental health and maternal substance use at the 5-year follow-up did not alter the risk estimates.

Table 4.22: Gambling expenditure by mother's education

Maternal education At birth	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Incomplete high school	1.0	1.0	1.0	1.0	1.0	1.0
Complete high school	1.0 (0.8-1.3)	1.0 (0.8-1.3)	0.8 (0.6-1.0)	0.8 (0.6-1.1)	0.8 (0.5-1.2)	0.8 (0.5-1.3)
Post high school	1.0 (0.7-1.3)	0.9 (0.7-1.3)	0.5 (0.4-0.7)	0.6 (0.4-0.8)	0.5 (0.4-0.7)	0.4 (0.2-0.7)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Child's gender, family employment status, maternal depression, maternal anxiety, maternal smoking, and maternal alcohol consumption

Children whose mothers had post high school education at entry to the study appeared to be less likely to spend $7 or more per week on gambling once they reached adulthood ($7-$34.9 OR = 0.6; 95% CI: 0.4-0.8 and $35 or over OR = 0.4; 95% CI: o.2-0.7) compared with those of mothers who had not completed high school.

Table 4.23: Risk of gambling expenditure by family employment at the child's birth

Family employment	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Employed	1.0	1.0	1.0	1.0	1.0	1.0
Unemployed	0.9 (0.7-1.2)	0.9 (0.7-1.2)	1.3 (1.0-1.7)	1.2 (0.9-1.5)	0.6 (0.3-1.1)	0.5 (0.3-1.0)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother's education, child's gender, maternal depression, maternal anxiety, maternal smoking, and maternal alcohol consumption

Employment status when the child was born is not significantly associated with young adult gambling expenditure (Table 4.23).

Table 4.24: Risk of gambling expenditure by maternal depression at 5 years

Maternal depression	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Normal	1.0	1.0	1.0	1.0	1.0	1.0
Depressed	0.9 (0.7-1.2)	1.0 (0.7-1.4)	1.3 (1.0-1.8)	1.4 (1.0-2.0)	0.6 (0.3-1.2)	0.3 (0.2-0.7)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother's education, family employment status, child's gender, maternal anxiety, maternal smoking, and maternal alcohol consumption

Table 4.24 shows that maternal depression at the time the child was 5 years old was associated with an increased risk for their offspring spending $7.0 – $34.9 per week on gambling in young adulthood (OR = 1.3; 95% CI: 1.0-1.8).

Table 4.25: Risk of gambling expenditure by maternal anxiety at 5 years

Maternal anxiety	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Normal	1.0	1.0	1.0	1.0	1.0	1.0
Anxious	0.9 (0.7-1.1)	0.9 (0.7-1.2)	1.0 (0.8-1.3)	0.8 (0.6-1.1)	1.8 (1.2-2.5)	2.1 (1.4-3.1)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother's education, family employment status, maternal depression, child's gender, maternal smoking, and maternal alcohol consumption

Table 4.25 indicates that mothers who were anxious when their child was 5 years of age were more likely to have children who spent $35 or more on gambling as young adults (OR = 1.8; 95% CI: 1.2-2.5). Adjustment for other childhood variables slightly increased this risk.

Table 4.26: Risk of gambling expenditure by maternal smoking at 5 years

Maternal smoking (p/day)	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI) Unadjusted	OR (95% CI) Adjusted[2]	OR (95% CI) Unadjusted	OR (95% CI) Adjusted[2]	OR (95% CI) Unadjusted	OR (95% CI) Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
None	1.0	1.0	1.0	1.0	1.0	1.0
< 10	1.1 (0.7-1.5)	1.0 (0.7-1.5)	1.4 (1.0-2.0)	1.3 (0.9-1.9)	1.9 (1.1-3.3)	1.7 (1.0-3.1)
10 - 19	1.2 (0.9-1.5)	1.1 (0.8-1.5)	1.6 (1.2-2.2)	1.5 (1.1-2.0)	1.2 (0.7-2.1)	1.1 (0.6-2.0)
20 +	1.0 (0.8-1.3)	1.0 (0.7-1.3)	1.8 (1.4-2.3)	1.7 (1.3-2.2)	1.6 (1.0-2.5)	1.4 (0.9-2.3)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother's education, family employment status, maternal depression, maternal anxiety, child's gender, and maternal alcohol consumption

Table 4.26 shows that any level of maternal smoking increases the risk of children being in the two higher expenditure groups ($7.0 – $34.9 or $35+ per week) and that this risk increased with the number of cigarettes smoked by the mother. The increased risk remained significant even after adjustment for other factors in the model.

Table 4.27: Risk of gambling expenditure by maternal alcohol consumption at 5 years

Maternal alcohol consumption	Gambling expenditure (dollars per week)[1] (N = 3264)					
	OR (95% CI) Unadjusted	OR (95% CI) Adjusted[2]	OR (95% CI) Unadjusted	OR (95% CI) Adjusted[2]	OR (95% CI) Unadjusted	OR (95% CI) Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
None	1.0	1.0	1.0	1.0	1.0	1.0
< ½ drink	1.3 (1.0-1.6)	1.3 (1.0-1.6)	1.3 (1.0-1.6)	1.2 (0.9-1.6)	0.9 (0.6-1.3)	0.9 (0.6-1.4)
½ - 1 drink	1.7 (1.2-2.4)	1.7 (1.2-2.3)	1.3 (0.9-1.9)	1.3 (0.9-1.9)	0.9 (0.5-1.8)	0.9 (0.4-1.8)
> 1 drink	1.8 (1.2-2.6)	1.8 (1.2-2.6)	1.9 (1.3-2.9)	1.7 (1.1-2.6)	2.7 (1.5-5.0)	2.8 (1.5-5.2)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother's education, family employment status, maternal depression, maternal anxiety, maternal smoking, and child's gender

Table 4.27 shows that patterns of maternal alcohol consumption at the time of the 5 year follow-up were associated with the amount of money the child spent on gambling as a young adult. Children whose mothers reported having drunk one or more glasses of alcohol per day when they were 5 years of age were more likely to spend money on gambling than children of non-drinking mothers. Mothers who consumed more than one alcoholic drink per day were found to be nearly three times more likely than non-drinking mothers to have a child who spends more than $35 per week on gambling

activities (OR = 2.7 (95% CI: 1.5-5.0). This level of risk remained even after controlling for other factors.

Prediction (risk) of young adult gambling expenditure by adolescence factors

We identified variables that were initially found to have significant associations (p value set at <0.05) with gambling expenditure through chi square tests, and conducted univariate and multivariate logistic regression analyses.

Table 4.28: Risk of young adults gambling expenditure by changes in maternal marital status

Maternal marital change	Gambling expenditure (dollars per week)[1] (N = 3483)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
0	1.0	1.0	1.0	1.0	1.0	1.0
1 or 2	1.0 (0.8-1.3)	1.0 (0.8-1.3)	1.4 (1.1-1.7)	1.2 (1.0-1.6)	1.7 (1.2-2.5)	1.5 (1.1-2.3)
3 or more	1.1 (0.7-1.7)	1.0 (0.7-1.6)	1.1 (0.7-1.8)	1.0 (0.6-1.6)	1.6 (0.8-3.4)	1.5 (0.7-3.2)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother-child communication, maternal smoking, and maternal alcohol consumption

Table 4.28 shows that changes in maternal marital status between the ages of 5 and 14 years was associated with the amount of money a young adult spends on gambling. Children whose mothers reported one or two changes in marital status during the childhood to adolescent period were more likely to be in the high expenditure categories ($7.0 or more) at age 21 than those whose mother did not change marital status between childhood and adolescence.

Table 4.29 shows associations between the quality of mother-child communications when the child was 14 years of age and young adult gambling expenditure. Problem communication predicted an increased risk of spending larger amounts of money on gambling. Adjustment for other confounders in the model did not alter these estimates of risk.

Table 4.29: Risk of young adult gambling expenditure by mother-adolescent communication

Problem in communication at 14 years	Gambling expenditure (dollars per week)[1] (N = 3483)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Few problems	1.0	1.0	1.0	1.0	1.0	1.0
Some problems	1.0 (0.8-1.3)	1.0 (0.8-1.3)	1.3 (1.0-1.7)	1.3 (1.0-1.7)	2.3 (1.5-3.5)	2.3 (1.5-3.5)
Many problems	1.0 (0.7-1.3)	1.0 (0.7-1.3)	1.8 (1.3-2.4)	1.7 (1.3-2.3)	1.9 (1.1-3.2)	1.8 (1.1-3.0)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Changes in maternal marital status 5-14 years, maternal smoking, and maternal alcohol consumption

Table 4.30: Risk of young adult gambling expenditure by maternal smoking at 14

Pattern of smoking	Gambling expenditure (dollars per week)[1] (N = 3483)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted	Unadjusted	Adjusted
	< 7.0		7.0 – 34.9		35 +	
Non	1.0	1.0	1.0	1.0	1.0	1.0
< 10	1.2 (0.8-1.8)	1.1 (0.8-1.7)	1.7 (1.1-2.5)	1.6 (1.1-2.3)	0.9 (0.4-2.2)	0.9 (0.4-2.0)
10 – 19	0.9 (0.7-1.2)	0.9 (0.6-1.2)	1.4 (1.0-1.9)	1.3 (1.0-1.8)	1.1 (0.6-2.0)	1.0 (0.6-1.8)
20 +	1.0 (0.8-1.3)	1.0 (0.7-1.3)	1.8 (1.4-2.3)	1.6 (1.3-2.1)	1.7 (1.1-2.6)	1.5 (0.9-2.3)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Mother-child communication, Changes in maternal marital status 5-14 years, and maternal alcohol consumption

Table 4.30 shows that mothers who smoked cigarettes at 14 years were more likely than non-smoking mothers to have children spending between $7.0 and $34.9 per week on gambling. Children of mothers who smoked 20 or more cigarettes per day were more likely than those who smoked less than 10 cigarettes or not at all, to have offspring who spent $35 or more on gambling activities (OR = 1.7; 95% CI: 1.1-2.9).

Table 4.31: Risk of young adult gambling expenditure by maternal alcohol consumption at 14 years

Pattern of alcohol consumption	Gambling expenditure (dollars per week)[1] (N = 3483)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Abstainer	1.0	1.0	1.0	1.0	1.0	1.0
< ½ drink	1.3 (1.0-1.6)	1.3 (1.0-1.6)	1.3 (1.0-1.7)	1.2 (0.9-1.6)	1.1 (0.7-1.7)	1.0 (0.6-1.6)
½ - 1 drink	1.7 (1.2-2.3)	1.6 (1.2-2.3)	1.3 (0.9-1.9)	1.3 (0.9-1.8)	1.0 (0.5-2.0)	1.0 (0.5-1.9)
> 1 drink	1.5 (1.1-2.2)	1.5 (1.1-2.2)	1.9 (1.3-2.7)	1.6 (1.1-2.3)	1.8 (1.0-3.2)	1.6 (0.9-2.9)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Changes in maternal marital status 5-14 years, maternal smoking, and mother-child communication

Table 4.31 shows associations between maternal alcohol consumption at the 14-year follow-up and young adults' gambling expenditure at age 21. Mothers who consumed more than one glass of alcohol per day were more likely to have children in the high cost group. More moderate drinking patterns were not associated with increased risk for offspring spending $35 or more on gambling activities.

Table 4.32: Risk of young adult gambling expenditure by externalising behaviour at 14 years

Adolescent externalising	Gambling expenditure (dollars per week)[1] (N = 3385)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
No	1.0	1.0	1.0	1.0	1.0	1.0
Yes	1.3 (0.9-1.8)	1.1 (0.8-1.6)	2.2 (1.6-3.0)	1.5 (1.1-2.1)	2.1 (1.3-3.4)	1.0 (0.6-1.6)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Adolescent smoking, adolescent alcohol consumption, and age of initiation to cigarette, alcohol, and cannabis

Table 4.32 shows that adolescents who had symptoms of externalising behaviour at 14 years were more likely to spend a greater amount of money (OR = 2.2 for $7.0 to $34.9 and OR = 2.1 for $35+ per week) on gambling as young adults. However, the increased risk for spending $35 or more from exhibiting externalising behaviours in adolescence disappeared after adjustment for other factors.

Table 4.33: Risk of young adult gambling expenditure by adolescent smoking

Pattern of smoking	Gambling expenditure (dollars per week)[1] (N = 3385)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Non	1.0	1.0	1.0	1.0	1.0	1.0
< 10	1.3 (0.9-1.9)	1.1 (0.7-1.6)	2.1 (1.5-3.0)	1.4 (1.0-2.0)	1.9 (1.0-3.5)	0.9 (0.5-1.8)
10 +	1.2 (0.7-1.9)	0.9 (0.5-1.5)	2.6 (1.8-3.9)	1.5 (1.0-2.4)	3.6 (2.0-6.6)	1.6 (0.8-3.2)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Adolescent externalising behaviour, adolescent alcohol consumption, and age of initiation to cigarette, alcohol, and cannabis

Table 4.33 shows that adolescent cigarette smoking substantially increased the risk for substantial amounts of money being spent on gambling at 21 years. The greater the number of cigarettes smoked, the greater the risk for spending money on gambling. However, as with externalising behaviour, adjustment for other variables led to not only a decrease in risk for being in the highest expenditure group, but the increased odds of high spending on gambling were no longer statistically significant.

Table 4.34: Risk of young adult gambling expenditure by adolescent alcohol consumption

Pattern of alcohol use	Gambling expenditure (dollars per week)[1] (N = 3385)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Abstainer	1.0	1.0	1.0	1.0	1.0	1.0
≤ 1 drink	1.2 (1.0-1.4)	1.0 (0.8-1.2)	1.4 (1.2-1.7)	1.1 (0.9-1.3)	1.5 (1.1-2.1)	0.9 (0.6-1.4)
> 1 drink	1.2 (0.5-3.1)	1.0 (0.4-2.7)	3.0 (1.4-6.4)	1.5 (0.7-3.5)	2.0 (0.5-8.8)	0.6 (0.1-3.0)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Adolescent externalising behaviour, adolescent smoking, and age of initiation to cigarette, alcohol, and cannabis

Consistent with the previous table, Table 4.34 shows that youth alcohol consumption was prospectively associated with gambling expenditure at 21 years. Those who drank more than one glass of alcohol per day in adolescence were more likely to spend more than $35 or more per week (OR = 2.0; 95% CI: 0.5-8.8) than those who drank up to one glass per day (OR = 1.5; 95% CI: 1.1-2.1). However, this effect disappeared in the multivariate model.

Table 4.35: Risk of young adult gambling expenditure by age of initiation to smoking

Initiation to smoking	Gambling expenditure (dollars per week)[1] (N = 3385)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Never started	1.0	1.0	1.0	1.0	1.0	1.0
< 15 years	1.6 (1.2-2.0)	1.3 (0.9-1.7)	2.6 (2.0-3.4)	1.8 (1.3-2.5)	4.3 (2.7-6.8)	2.0 (1.1-3.8)
15 – 17 years	1.1 (0.9-1.4)	0.9 (0.7-1.1)	1.9 (1.5-2.4)	1.5 (1.2-2.0)	3.1 (2.0-4.7)	2.0 (1.2-3.3)
18 + years	1.4 (1.0-1.9)	1.2 (0.9-1.7)	2.0 (1.4-2.9)	1.7 (1.2-2.5)	2.0 (1.0-4.0)	1.7 (0.8-3.5)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Adolescent externalising behaviour, adolescent smoking, adolescent alcohol consumption, and age of initiation to alcohol and cannabis

Table 4.35 shows that smoking at an early age is associated with gambling expenditure in early adulthood. Those who started smoking when they were under 15 years of age have a higher risk of spending $35.00 or more gambling (OR = 4.3; 95% CI: 2.7-6.8) than those who commence smoking when 18 years or older (OR = 2.0; 95% CI: 1.0-4.0) or never started smoking (reference group). While the risk for high gambling expenditure from starting smoking before the age of 15 years was found to decrease after adjustment for other variables, early initiation to smoking was observed to be independently associated with a two-fold increase in risk for spending $35.00 or more on gambling.

Table 4.36: Young adult gambling expenditure by age of initiation to alcohol

Initiation to alcohol	Gambling expenditure (dollars per week)[1] (N = 3385)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Never started	1.0	1.0	1.0	1.0	1.0	1.0
< 15 years	6.2 (3.1-12.6)	5.2 (2.5-11.0)	4.9 (2.6-9.4)	2.9 (1.5-5.8)	3.1 (1.2-8.2)	1.2 (0.4-3.3)
15 – 17 years	5.8 (2.9-11.5)	5.4 (2.7-10.8)	3.8 (2.0-7.1)	2.9 (1.6-5.6)	2.2 (0.9-5.6)	1.4 (0.5-3.5)
18 + years	3.6 (1.8-7.3)	3.5 (1.7-7.2)	2.8 (1.5-5.5)	2.6 (1.4-5.1)	0.8 (0.3-2.4)	0.8 (0.3-2.4)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Adolescent externalising behaviour, adolescent smoking, adolescent alcohol consumption, and age of initiation to cigarette and cannabis

Table 4.36 shows that those who used alcohol at an early age were more likely to spend money on gambling. In addition, age of initiation to alcohol was inversely associated with gambling expenditure at 21 years. After adjusting for other variables, this relationship was no longer statistically significant for the high expenditure group. However, elevated risk for spending money on gambling (up to $34.90 per week) remained for starting to drink alcohol, regardless of the age at which alcohol consumption began.

Table 4.37: Young adult gambling expenditure by age of initiation to cannabis

Initiation to cannabis	Gambling expenditure (dollars per week)[1] (N = 3385)					
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]	Unadjusted	Adjusted[2]
	< 7.0		7.0 – 34.9		35 +	
Never started	1.0	1.0	1.0	1.0	1.0	1.0
< 15 years	1.5 (1.1-2.0)	1.1 (0.7-1.6)	2.1 (1.5-2.8)	1.0 (0.7-1.5)	4.2 (2.6-6.8)	2.1 (1.1-3.9)
15 – 17 years	1.4 (1.2-1.7)	1.2 (0.9-1.5)	1.6 (1.3-2.1)	1.1 (0.9-1.4)	2.9 (1.9-4.4)	1.8 (1.1-2.8)
18 + years	1.3 (0.9-1.7)	1.1 (0.8-1.5)	1.7 (1.2-2.3)	1.3 (0.9-1.8)	1.2 (0.5-2.5)	0.9 (0.4-2.0)

[1] Gambling expenditure = 0 is the reference category

[2] Covariates: Adolescent externalising behaviour, adolescent smoking, adolescent alcohol consumption, and age of initiation to alcohol and cigarette

Table 4.37 shows that young adults who started to use cannabis in early adolescence (below 15 years) were more likely to spend more money on gambling compared with those who did not use. Participants who started cannabis by the age of 14 were about four times more likely (OR = 4.2; 95% CI: 2.6-6.8) to spend $35.0 or more compared

to non-users, while those who started to use cannabis between 15 and 17 years of age were almost three times more likely (OR = 2.9; 95% CI: 1.9-4.4) to spend this amount on gambling than those who had never used cannabis. Though adjustment for other variables reduced these levels of risk, there appeared to be an independent two-fold risk for high expenditure gambling in adulthood from starting cannabis under the age of 18 years.

Prediction (risk) of young adult gambling expenditure by level of exposure to childhood and adolescence risk factors

In the last two sections we examined the associations between sets of individual and family explanatory factors and young adult gambling expenditure. Table 4.38 lists individual and familial factors operating in childhood and in adolescence that were found to be significantly associated with young adult gambling expenditure.

Table 4.38: Risk factors associated with young adult gambling expenditure

Factors in child hood	Factors in adolescence
Child's gender	Change in maternal marital status 5-14 years
Maternal education at the child's birth	Mother-child communication
Maternal depression at 5 years	Externalising behaviour
Maternal anxiety at 5 years	Adolescent smoking
Maternal smoking at 5 years	Adolescent alcohol consumption
Maternal alcohol consumption at 5 years	Age of initiation to smoking
	Age of initiation to alcohol
	Age of initiation to cannabis

Table 4.39 shows the amount of money spent on gambling in adulthood according to varying levels of exposure to risk factors occurring in childhood and adolescence.

Table 4.39: Pattern of young adult gambling expenditure by level of exposure to risk factors

Level of risk	Gambling expenditure at 21 years (N = 3109)			
	No money N = 1885 %	< 7.0 dollars N = 597 %	7.0 – 34.9 dollars N = 494 %	35.0 + dollars N = 133 %
Low (0 – 2)	8.8	8.7	8.9	9.0
3 – 4 risks	48.0	44.7	42.5	37.6
5 risks	23.6	24.1	20.6	30.8
6 or more risks	19.6	22.4	27.9	22.6
Total	100	100	100	100

Table 4.40: Risk of gambling expenditure by level of exposure to risk factors

Level of risk	Gambling expenditure at 21 years (N = 3109)			
	OR (95% CI)			
	No money	< 7.0 dollars	7.0 – 34.9 dollars	35.0 + dollars
Low (0 – 2)	1.0	1.0	1.0	1.0
3 – 4 risks	1.0	0.9 (0.7-1.3)	0.9 (0.6-1.3)	0.7 (0.4-1.5)
5 risks	1.0	1.0 (0.7-1.5)	0.9 (0.6-1.3)	1.3 (0.7-2.5)
6 + risks	1.0	1.2 (0.8-1.7)	1.4 (1.0-2.1)	1.1 (0.6-2.2)

Tables 4.39 and 4.40 both show that there was no clear pattern of difference between several categories of gambling expenditure in terms of varying levels of exposure to risk factors during childhood and adolescence.

CHAPTER 5: FINDINGS ON YOUNG ADULT AT RISK AND PROBLEM GAMBLING

Introduction

This chapter has three sections. The first section explores the prevalence of at risk and problem (ARP) gambling, its correlates and co-morbidities, as well as the consequences of gambling in young adults. In the second section, young adult gambling is disaggregated by selected individual and environmental factors measured at 21 years. The third section explores relationships between factors operating in the early life of children and in adolescence, and young adult gambling. Finally, in the fourth section of this chapter the independent risk for ARP gambling in young adulthood is estimated for each of the explanatory variables. This section presents results from unadjusted logistic regression analyses followed by multivariate risk prediction models obtained from multiple logistic regression analyses.

Section 1: Prevalence of at risk and problem gambling and associated factors

Using the Canadian Problem Gambling Index Questionnaire (CPGI), respondents are separated into two categories: those who have gambled in the previous 12 months (gamblers) and those who have not (non-gamblers). In addition, the gambler category is divided into four sub-types according to respondent scores on the Problem Gambling Severity Index (PGSI). These are the sub-types described on page 19: (1) no-problem gamblers, (2) low risk gamblers, (3) moderate risk gamblers and (4) problem gamblers.

Table 5.1 shows the proportion of young adults in the MUSP sample classified into these four sub-types, as well as the non-gambler category. In the survey, of the total number of 1025 participants who provided complete data for items in the CPGI, 58.3% said they had not gambled in the previous 12 months. The breakdown of the gambler into the four PGSI-score categories shows that almost three out of four gamblers did not report any problem related to gambling. Of the total sample, 6.4% are low risk gamblers; 3.7% moderate risk gamblers; and 1.2% problem gamblers.

Table 5.1: Classification of problem gambling according to CPGI

	N	Non-gamblers (%)	Gamblers (%)			
			No-problem	Low risk	Moderate risk	Problem gamblers
Total	1025	58.3	30.3	6.4	3.7	1.2

Due to the very small numbers in the problem gambling group we collapsed three categories - low risk, moderate risk and problem gamblers - into one category labelled 'at risk and problem' (ARP) gamblers. This new variable allowed us to determine various correlates and factors associated with those who have gambling problems. This issue was discussed at length in Chapter 2; please see above for more detail pertaining to this matter.

Figure 5.1: Prevalence of sub-types of young adult gambling

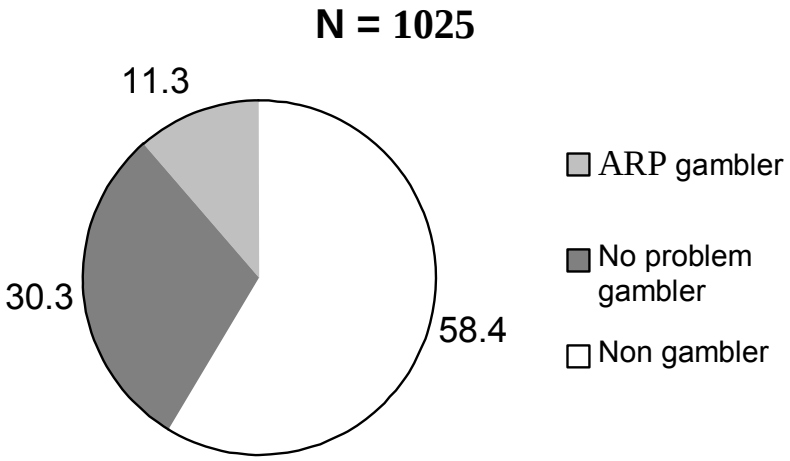


Figure 5.1 shows that of the 1025 young adults who responded to the CPGI, 58.4% reported they had never gambled at 21 years, 30.3% reported gambling without problem and 11.3% were recognized as a group with low to high risk gambling problems. Figure 5.2 presents the distribution of the gambling groups for each gender.

Figure 5.2: Sub-types of young adult gambling by gender

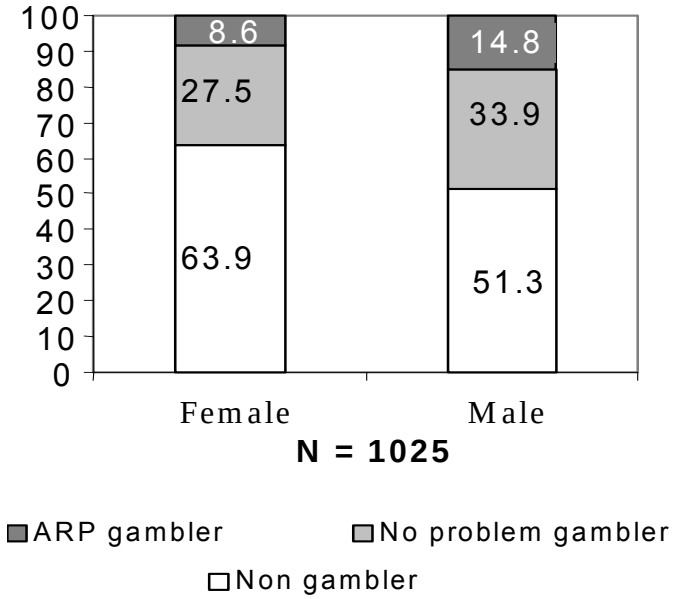


Figure 5.2 shows that 63.9% of females did not gamble at all, 27.5% gambled but without problems and 8.6% provided responses indicating ARP gambling. In contrast, 48.7% of male young adults had participated in gambling activities of which 14.8% reported ARP gambling.

Gambling behaviours

Table 5.2 shows the rates of gambling problems found among young adult gamblers according to the four PSGI behavioural items.

Table 5.2: Problem gambling behaviours in young adult gamblers at 21 years

Gambling behaviour	N	Never or rarely (%)	Sometimes (%)	Often (%)	Always (%)
Loss of control					
Bet more than could afford	427	82.9	14.3	2.3	0.5
Bet more than wanted to	426	79.3	16.7	2.8	1.2
Motivation					
Increased wagers for excitement	427	92.3	6.3	1.2	0.2
Chasing					
Returning to win back losses	427	89.2	9.4	0.9	0.5
Borrowing					
Borrowing to get gambling	427	95.6	4.2	0.0	0.2
Lying	426	96.0	3.1	0.7	0.2

The most commonly reported problem behaviours involved bets that were more than the respondent could afford or wanted to bet. Almost one in ten gamblers reported returning to win back losses. Very few gamblers reported borrowing or lying to gamble.

Adverse consequences of problem gambling behaviour

Problem gambling may have a negative impact on the gambler's daily life, his/her family, friends and the community. Four scored items on the PGSI measure the following adverse consequences of problem gambling: (1) how often gambling has caused health problems, including stress or anxiety; (2) how often people have criticized his/her betting or told the gambler that he/she had a gambling problem, regardless of whether or not it was thought to be true; (3) how often gambling has caused personal or household financial problems; and (4) how often he/she felt guilty about the way he/she gambled or what happens when he/she gambles. These consequences, as well as two others relating to problems associated with the individual's relationship with family or friends, and job performance are examined in Table 5.3.

Table 5.3: Adverse consequences of gambling in young adults

Consequences of gambling	N	Never or rarely (%)	Sometimes (%)	Often (%)	Always (%)
Personal consequences					
Health problem	427	97.9	1.6	0.2	0.2
People criticized gambling	427	92.3	6.6	0.9	0.2
Felt guilty	427	89.2	7.3	2.3	1.2
Social consequences					
Financial problems	427	96.7	2.6	0.5	0.2
Problem with family or friends	380	99.7	0.3	0.0	0.0
Affected job	380	98.9	0.8	0.0	0.3

NB: N = 380 for the final two consequences because not all participants responded to the relevant items in the questionnaires.

Most commonly, gamblers reported being criticised or feeling guilty, with only a small proportion reporting financial problems and a very few reporting other problems. Of course, it may be that gamblers tended to minimise the perceived negative consequences of their gambling behaviour.

Gambling correlates

The CPGI investigates variables that are correlated with problem gambling. In this study, four such correlates were examined: namely an early big win, an early big loss and two other variables which refer to the gambler's irrational thought patterns about probabilities relating to gambling outcomes. For the first two items, respondents are asked whether they remember a first big win or loss with the answers being: yes, no, or don't know. Two other questions ask whether they are more likely to win after losing many times and whether they could win if a certain system or strategy was used. Options for these questions include: 1- agree (strongly agree or agree), 2- disagree (strongly disagree or disagree), and 3- don't know. Table 5.4 provides data on responses to these items.

Table 5.4: Correlates of problem gambling in young adults

Problem gambling correlates	N	Yes/Agree (%)	No/Disagree (%)	Don't know (%)
First win or loss				
Do you remember a first big win?	425	46.6	44.5	8.9
Do you remember a first big loss?	425	18.8	71.5	9.6
Faulty cognition				
More likely to win after losing many times	425	16.5	72.5	11.5
Can win more with a certain strategy	425	22.4	62.6	15.1

Table 5.4 shows that the majority of young adult gamblers disagree that a win ensures after many losses (72.5%) or that having a system makes one a more successful gambler (62.6%). Of the cohort of young adult gamblers, just over 46% remember an early big win while about 19% recall a first big loss in gambling. Experience and memory of a big win at the time gambling activity commenced may serve to encourage further gambling activity, at least for some people.

Co-morbidities of gambling

To investigate the association between gambling and certain personal health issues, respondents were asked about their alcohol and illicit drug use while gambling (Tables 5.5 and 5.6).

Table 5.5: Alcohol and drug use in young adult gamblers

Questions[1]	N	Yes (%)	No (%)	Don't know (%)
Used alcohol or drugs while gambling	427	57.1	41.2	1.6
Gambled while under the influence of drugs	426	59.2	39.9	0.9
Felt might have an alcohol or drug problem	427	9.1	89.7	1.2

1 In the last 12 months, have you done the following?

Table 5.5 presents rates of alcohol use and the use of other legal or illegal drugs among young adult gamblers. Around 57% of young adults who reported gambling at 21 years also reported the use of alcohol or other drugs while gambling. In addition, a similar proportion reported gambling while under the influence of drugs. Some 9% of young adults believed they might have an alcohol or drug problem.

Table 5.6: Mental health status in young adult gamblers

Questions[2]	N	Yes (%)	No (%)	Don't know (%)
Urge to gamble if something painful happened	427	3.0	96.3	0.7
Urge to drink if something painful happened	427	37.9	60.7	1.4
Urge to use drugs if something painful happened	427	19.4	79.6	0.9
Doctor's care because of stress	427	6.6	93.0	0.4
Felt seriously depressed	426	24.9	73.0	2.1

[2] In the last 12 months, have you been affected by the following?

Table 5.6 presents information about the mental health status of young adult gamblers over the 12 months prior to survey. A considerable proportion of the gambling group reported the use of alcohol or other drugs to cope with painful life events, or being depressed in the year preceding the survey. This raises the possibility that respondents who gamble may have a particular mental health problem or have preferred ways of responding to life's stresses.

Family gambling and substance use problems

Table 5.7 addresses the possibility that other family members of the young adult gamblers have a gambling or a substance abuse problem. Of the cohort of young adults, just under one-fifth reported that they had close relatives who were problem gamblers and over one-third reported having a substance-abusing family member. This raises the possibility that gambling behaviour and/or substance-using behaviour are acquired within the family environment, at least for a proportion of gamblers.

Table 5.7: Gambling and substance problems in the families of young adults

Family problems	N	Yes (%)	No (%)	Don't know (%)
Gambling problem	425	18.4	73.4	8.2
Alcohol or drug problem	424	35.4	58.7	5.9

Sub-types of young adults' gambling and gambling expenditure

The average reported monthly gambling expenditure for an ARP gambler was $27.80 per week (ranging between $0.00-300.00) and for a non-problem gambler was $10.20 (ranging between $0.00-100.00). Apart from the substantial difference between the two groups in average expenditure, there was considerable variation in expenditure among ARP gamblers and much less variation among those without gambling problems. Table 5.8 examines the association between sub-types of young adults gambling and gambling expenditure.

Table 5.8: Sub-types of gambling and gambling expenditure

Gambling expenditure ($ per week)	N	Gambling sub-types			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
No money spent	620	96.5	1.1	2.4	
< 7.0	183	0.0	88.0	12.0	
7.0 – 34.9	177	0.0	71.2	28.8	
35 +	41	0.0	34.1	65.9	<0.001

Table 5.8 shows the associations between the amount of money spent on gambling and ARP gambling. Those who had spent more on gambling were more likely to report symptoms of problem gambling.

Section 2: Young adult gambling and individual and environmental factors at 21 years

The following section examines cross-sectional associations between ARP gambling and a series of factors that were significantly associated with young adult gambling: the young adults' socio-economic status, the young adults' and maternal substance use, the young adults' problem behaviour and social activities.

Young adult gambling and socio-economic factors at 21 years

Table 5.9 examines the association between young adults' socio-demographic characteristics at 21 years and their corresponding gambling sub-type.

Table 5.9: Gambling and socio-economic status at 21 years

Variables	N	Gambling sub-types (N = 997)			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Gender					<0.001
Male	438	51.1	34.0	14.8	
Female	559	63.7	27.9	8.4	
Young adults education					0.137
Below high school	190	53.2	30.0	16.8	
Complete high school	501	60.9	29.9	9.2	
Tertiary education	245	58.0	31.0	11.0	
University	61	52.5	36.1	11.5	
Young adults paid job					0.006
Yes	785	56.8	32.9	10.3	
No	212	63.2	22.2	14.6	
Young adults income					0.001
Low income	226	68.6	21.7	9.7	
Middle income	478	57.5	32.4	10.0	
High income	293	51.2	34.5	14.3	

Table 5.9 shows that male young adults were significantly more likely to report both no-problem gambling (34%) and ARP gambling (15%) compared with females (27.9% and 8.4% respectively). Though statistically non-significant, young adults with the lowest level of education constituted the highest proportion of those with gambling problems/being at risk, while university educated people were most likely to report no-problem gambling. Having a paid job and a higher level of income were associated with

both gambling and ARP gambling. Young adults who did not have a paid job were less likely to have experienced problem-free gambling and more likely to report ARP gambling. By contrast, those with high incomes were more likely to gamble and to have gambling problems/be at risk than lower income earners.

Young adult gambling and substance use at 21 years

Table 5.10 presents associations between young adult gambling and current substance use at 21 years.

Table 5.10: Gambling behaviour and young adult substance use

Variables	N	Gambling sub-types (N = 1014)			P value
		Non-amblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Cigarette smoking					<0.001
Non smoker	653	62.9	29.6	7.5	
Light smoker	172	58.1	29.7	12.2	
Moderate smoker	136	44.1	36.8	19.1	
Heavy smoker	53	37.7	24.5	37.7	
Alcohol consumption					<0.001
Abstainer	318	51.9	31.1	17.0	
≤ 1 drink per day	607	59.5	31.8	8.7	
> 1 drink per day	89	73.0	16.9	10.1	
Cannabis ever use					<0.001
No	520	63.3	30.4	6.3	
Yes	494	53.0	30.2	16.8	
Pattern of cannabis use					<0.001
Never used	520	63.3	30.4	6.3	
Occasional use	378	55.3	30.7	14.0	
Frequent use	116	45.7	28.4	25.9	
Use of other illicit drugs					<0.001
No	730	60.8	30.5	8.6	
Yes	284	51.8	29.6	18.7	

Table 5.10 shows that both legal and illegal substances used by young adults were associated with ARP gambling at 21 years. There was a direct relationship between smoking and gambling. Heavy smokers were disproportionately represented in the ARP gambling group. By contrast, while 73% of drinkers of more than one glass of alcohol per day did not gamble at all, alcohol abstainers constituted the highest proportion of the group with ARP gambling. Self-report of having used cannabis was associated with an increased prevalence of ARP gambling and the risk increased for those who

frequently used cannabis in the month preceding the survey. Finally, those who had ever used illicit drugs other than cannabis appeared much more likely to have ARP gambling at 21 years (18.7%) than non-users (8.6%).

Young adult gambling and age of starting to use drugs

Due to the significant association found between young adult gambling and the use of various substances, we also examined these associations according to the age at which participants started to use each of these substances. Using the retrospective self-report of the young adults at 21 years we divided them into four categories: those who never started to use drugs, started below age 15 years, 15-17 years and 18 years or over.

Table 5.11 shows that age of substance use initiation was significantly associated with young adult ARP gambling. That is, those who started drug use at a younger age were more likely to report symptoms of ARP gambling at 21 years. For instance, of the group of young adults who had reportedly started smoking cigarettes in early adolescence (below 15 years) around 21% reported gambling-related problems/were at risk, while only around 9% of those who started smoking at 18 years reported experiencing gambling problems/were at risk.

Table 5.11: Young adult gambling behaviour by age of starting to use drugs

Variables	N	Gambling sub-types (N = 998)			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Age of starting cigarette smoking					<0.001
Never started	494	66.6	27.9	5.5	
< 15 years	168	49.4	29.2	21.4	
15 – 17 years	251	51.8	32.3	15.9	
≥ 18 years	85	50.6	40.0	9.4	
Alcohol consumption					<0.001
Abstainer	52	86.5	9.6	3.8	
< 15 years	182	54.9	28.6	16.5	
15 – 17 years	604	57.0	31.8	11.3	
≥ 18 years	160	60.0	33.1	6.9	
Cannabis use					<0.001
Never started	515	63.1	30.7	6.2	
< 15 years	126	50.5	26.2	23.8	
15 – 17 years	247	53.0	30.8	16.2	
≥ 18 years	110	60.0	31.8	8.2	

Young adult gambling and impact of substances on their life

Having determined the association between the pattern of age of starting to use substances and the prevalence of ARP gambling in young adults, this section examines the possible relationship between young adult self-report of adverse impacts from substance use and gambling problems. Young adults were divided into three groups: no drug users, drug user without adverse impact and user with mild to severe impact.

Table 5.12 shows that there was a sizeable difference in ARP gambling according to respondents' perceptions of having experienced/not having experienced adverse effects from alcohol consumption and/or illicit drug use. Almost one-fifth of young adults with a range of negative consequences from alcohol/illicit drugs reported a gambling problem/were at risk, compared with less than 6% who did not use alcohol and 9% who did not use illicit drugs. However, no clear difference in the prevalence of no-problem gambling was found according to self-perceived impact on life from drugs.

Table 5.12: Young adult gambling behaviour and the impact of substances on quality of life

Adverse impact on life due to:	N	Gambling sub-types (N = 1012)			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Alcohol consumption					<0.001
No alcohol drink	51	82.4	11.8	5.9	
No impact	769	59.3	30.9	9.8	
Mild to severe impact	192	48.4	32.3	19.3	
Illicit drug use					0.004
Not user	585	60.7	30.4	8.9	
No impact	286	58.4	29.4	12.2	
Mild to severe impact	141	48.9	31.2	19.9	

Young adult gambling and maternal substance use at 21 years

In Chapter 3, we found a significant relationship between maternal cigarette smoking and alcohol consumption, and young adult gambling. The following table examines these associations for young adult gambling. Table 5.13 shows that maternal substance use at 21 years was not statistically associated with young adult ARP gambling, although children of heavy-smoker mothers were more likely to report ARP gambling compared with those of non-smokers and light smokers. There was no clear pattern in the prevalence of young adult ARP gambling according to their mothers' alcohol use.

Table 5.13: Young adult gambling and maternal substance use at 21 years

Maternal substance use	N	Gambling sub-types (N = 814)			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Cigarette smoking					0.140
Non-smoker	592	60.0	30.4	9.6	
Light smoker	56	55.4	30.4	14.3	
Moderate smoker	65	50.8	33.8	15.4	
Heavy smoker	101	48.5	33.7	17.8	
Alcohol consumption					0.377
Abstainer	55	61.8	21.8	16.4	
Light drinker	440	58.4	32.3	9.3	
Moderate drinker	32	53.1	31.3	15.6	
Heavy drinker	287	55.7	31.0	13.2	

Young adult gambling and problem behaviours at 21 years

In Table 5.14 gambling behaviour is examined according to different types of behaviour problems at 21 years. In the previous chapter we found that externalizing behaviour, delinquency and risk-taking belief/behaviour were associated with gambling in young adulthood.

Table 5.14: Young adult gambling and problem behaviours at 21 years

Young adult's behaviour	N	Gambling sub-types (N = 988)			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Externalizing					<0.001
No	879	61.1	29.9	9.0	
Yes	109	38.5	32.1	29.4	
Delinquency					<0.001
No	687	63.6	29.7	6.7	
Low level	255	48.2	31.0	20.8	
High level	46	41.3	32.6	26.1	
Risk-taking					0.028
No	191	57.6	33.5	8.9	
Low risky	555	58.0	31.9	10.1	
High risky	242	60.7	23.6	15.7	

Table 5.14 shows a significant correlation between externalizing and delinquent behaviour at 21 years and ARP gambling. Young adults with externalising problems were more than three times as likely to be ARP gamblers. Likewise, delinquent behaviour was associated with gambling problems among young adults. In the previous chapter we found that risk-taking was associated with young adult gambling behaviour. The significant association between risk-taking behaviour and young adult ARP gambling indicates that endorsement of risk-taking beliefs/practices was correlated with ARP gambling in young adulthood.

Young adult gambling and religious activity and neighbourhood problems

Table 5.15 examines the association between young adults' church attendance and neighbourhood problems, and gambling behaviour.

Table 5.15: Young adult gambling and church attendance and problems in the neighbourhood at 21 years

Variables	N	Gambling sub-types (N = 1001)			P value
		None-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Church attendance					0.008
Yes	223	65.9	22.0	12.1	
No	778	55.9	32.8	11.3	
Neighbourhood					<0.001
No problem	362	64.4	29.0	6.6	
Low problem	392	55.6	32.4	12.0	
Moderate to high Problem	247	53.0	29.1	17.8	

Table 5.15 shows that church attendance made a difference as to the likelihood of whether young adults gambled or not, but that it made little difference in regard to whether individuals became ARP gamblers. Living in an area with social problems was cross-sectionally associated with an increased likelihood of gambling problems/being at risk. Young adults who reported living in a neighbourhood with moderate to high numbers of problems were much more likely to be ARP gamblers than those living in neighbourhoods with no problems or fewer problems.

Section 3: Childhood and adolescent predictors of young adult ARP gambling

In the previous chapter we examined prospective associations between various factors related to the young adult's background in childhood and early adolescence and young adult gambling. Factors prospectively related to young adult gambling included maternal education at time the child was born, maternal smoking and alcohol consumption at 5 and 14 years, supervision in early childhood, aggression at 5 and 14 years, marital status of the mother at 14 years, and symptoms of externalizing behaviour, SAT problems, and delinquency in adolescence. In this section, we explore these adolescent factors further to determine their connection to ARP gambling. Table 5.16 provides information about the associations between maternal characteristics and behaviours at 5 years post-delivery, as well as aggressive behaviour in childhood, and ARP gambling at 21 years.

Table 5.16: Young adult gambling and early childhood background

Variables	N	Gambling sub-types			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Mother's education					0.011
Incomplete high school	149	61.7	26.8	11.4	
Completed high school	663	55.1	32.6	12.4	
Post high school	204	68.6	24.0	7.4	
Child aggression					0.079
No	821	60.9	29.1	10.0	
Yes	88	48.9	36.4	14.8	
Maternal smoking					0.102
Non smoker	600	61.3	29.7	9.0	
Light smoker	73	50.7	38.4	11.0	
Moderate smoker	96	53.1	39.2	17.7	
Heavy smoker	142	61.3	26.8	12.0	
Maternal alcohol consumption					0.005
Abstainer	199	57.3	26.6	16.1	
Light drinker	569	61.9	29.3	8.8	
Moderate drinker	85	60.0	35.3	4.7	
Heavy drinker	59	44.1	39.0	16.9	
Maternal supervision					0.967
Low	63	55.6	33.3	11.1	
Moderate	778	59.8	29.8	10.4	
High	47	61.7	27.7	10.6	

Table 5.16 shows that the mother's education at the time the child was born and maternal alcohol consumption at 5 years were prospectively associated with young adult ARP gambling. Compared with high school or lower educated mothers, children whose mothers had any kind of tertiary education were less likely to report ARP gambling in early adulthood than those whose mothers did not complete high school. Children of mothers who were non-drinkers or who drank more than one glass of alcohol per day were more likely to be ARP gamblers as young adults than children of light and moderate drinking mothers. Although aggressive children constituted a greater proportion of ARP gamblers as young adults, the relationship was not statistically significant (P = 08). Two other childhood variables that were associated with young adult gambling, namely maternal smoking and maternal supervision at 5 years, appeared to have no connection to ARP gambling.

Table 5.17: Young adult gambling and early adolescent background

Variables	N	Gambling sub-types			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Maternal marital status					0.052
Married	701	59.6	30.8	9.6	
Single	22	63.6	22.7	13.6	
De-facto	87	47.1	33.3	19.5	
S/D/W	136	63.2	24.3	12.5	
Maternal smoking					0.220
Non smoker	674	60.8	29.1	10.1	
Light smoker	55	49.1	41.8	9.1	
Moderate smoker	82	54.9	28.0	17.1	
Heavy smoker	138	56.5	31.2	12.3	
Maternal alcohol consumption					0.084
Abstainer	178	56.2	30.9	12.9	
Light drinker	548	62.0	28.5	9.5	
Moderate drinker	122	58.2	32.8	9.0	
Heavy drinker	100	48.0	34.0	18.0	
Problem in family communication					0.524
Few	756	60.2	29.4	10.4	
Moderate	100	56.0	33.0	11.0	
Many	96	52.1	33.3	14.6	

Table 5.17 presents associations between gambling, and maternal marital status smoking and drinking patterns, and family communication at 14 years. These factors include family influences operating in adolescence that were significantly associated

with young adult gambling and presented in Chapter 3. There were no significant associations between any of these variables and ARP gambling in young adulthood.

Table 5.18 examines the association between young adult gambling and the pattern of substance use and problem behaviours at 14 years. Whereas adolescent cigarette smoking and alcohol consumption and several problem behaviours at 14 years of age were associated with engaging in gambling activities in early adulthood, a different pattern of association emerged for ARP gambling.

Table 5.18: Young adult gambling and substance use and problem behaviours during adolescence

Variables	N	Gambling sub-types			P value
		Non-gamblers (%)	Gamblers (%)		
			No problem	ARP gamblers	
Adolescent smoking					<0.001
Non smoker	837	60.7	30.7	8.6	
Light smoker	67	47.8	22.4	29.9	
Moderate smoker	19	47.4	21.1	31.6	
Heavy smoker	26	42.3	38.5	19.2	
Adolescent alcohol consumption					0.182
Abstainer	623	61.3	28.7	10.0	
Up to one glass	316	55.1	32.6	12.3	
More than one glass	9	33.3	44.4	22.2	
Adolescent externalizing					<0.001
No	865	59.8	30.5	9.7	
Yes	86	50.0	25.6	24.4	
Adolescent SAT					0.154
No	863	59.1	30.5	10.4	
Yes	88	56.8	26.1	17.0	
Adolescent aggression					0.012
No	882	60.0	29.7	10.3	
Yes	69	44.9	34.8	20.3	
Adolescent delinquency					<0.001
No	869	60.0	30.3	9.8	
Yes	82	47.6	28.0	24.4	

Table 5.18 shows that patterns of cigarette smoking during adolescence are related to gambling behaviour in young adulthood. Non-smoking adolescents are less likely than smokers (regardless of the number of cigarettes smoked per day) to be ARP gamblers. In contrast, there is no significant relationship between alcohol consumption in adolescence and gambling-related problems at 21 years. Adolescent externalizing, aggressive and delinquent behaviours significantly predict subsequent ARP gambling. Nearly one quarter of adolescents with externalising problems also reported symptoms

of ARP gambling at 21 years, compared with 10% in the comparison group. Symptoms of SAT problems at 14 years were not associated with ARP gambling in early adulthood.

Section 4: Multiple risk prediction of young adult gambling sub-types by prospective factors

We examined the association between several individual and environmental factors during early childhood and sub-types of young adult gambling. In order to ascertain the independent contribution of each factor to gambling problems in young adults, we selected factors that were found to be significant in previous analyses. We then included them in a multivariate model. In the adjusted model we are able to estimate an independent risk of gambling for each particular variable.

Table 5.19: Risk of sub-types of gambling by childhood factors

Variables	Gambling sub-types[1] (N = 905)			
	No problem gamblers		ARP gamblers	
	OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Child's gender				
Female	1.0	1.0	1.0	1.0
Male	1.5 (1.1-2.1)	1.6 (1.2-2.1)	1.9 (1.2-2.9)	1.9 (1.2-2.9)
Mother's education				
Incomplete high school	1.0	1.0	1.0	1.0
Completed high school	1.3 (0.8-2.0)	1.3 (0.8-2.0)	1.0 (0.5-1.8)	1.0 (0.6-1.9)
Post high school	0.8 (0.5-1.3)	0.8 (0.4-1.3)	0.6 (0.3-1.3)	0.6 (0.3-1.3)
Maternal alcohol consumption				
Abstainer	1.0	1.0	1.0	1.0
< ½ drink	1.0 (0.7-1.5)	1.1 (0.7-1.5)	0.5 (0.3-0.8)	0.5 (0.3-0.8)
½ - 1 drink	1.3 (0.7-2.3)	1.3 (0.7-2.3)	0.3 (0.1-0.8)	0.3 (0.1-0.9)
> 1 drink	1.9 (1.0-3.6)	2.0 (1.0-3.8)	1.4 (0.6-3.1)	1.4 (0.6-3.3)

[1] Non-gamblers are the reference category

As Table 5.19 shows, male participants are more likely to report ARP gambling. Children whose mothers had tertiary education at the time the child was born were less likely to report ARP gambling as young adults (OR = 0.6; 95% CI: 0.3-1.3) compared to mothers with a lower level of education (incomplete high school). The association between maternal alcohol consumption and ARP gambling showed a different pattern. While light and moderate drinking mothers were less likely to have children with symptoms of ARP gambling as young adults, children of heavier drinking mothers have a higher risk of being ARP gamblers. However, the confidence interval for the risk estimate for ARP gambling from having a heavier drinking mother shows that there

was no significant increase in the odds of having gambling problems from maternal alcohol consumption of more than one glass of alcohol per day.

Table 5.20: Risk of sub-types of gambling by factors in adolescence

Variables	Gambling sub-types[1] (N = 915)			
	No problem gamblers		ARP gamblers	
	OR (95% CI)		OR (95% CI)	
Adolescence factors	Unadjusted	Adjusted	Unadjusted	Adjusted
Maternal marital status				
Married	1.0	1.0	1.0	1.0
Single	0.6 (0.2-1.7)	0.6 (0.2-2.0)	1.4 (0.4-5.1)	1.2 (0.3-4.8)
De-facto	1.3 (0.8-2.2)	1.2 (0.7-2.1)	2.8 (1.5-5.3)	2.0 (1.0-3.9)
S/D/W	0.7 (0.5-1.1)	0.7 (0.5-1.1)	1.2 (0.7-2.2)	0.9 (0.5-1.7)
Externalising behaviour				
No	1.0	1.0	1.0	1.0
Yes	1.0 (0.6-1.7)	1.0 (0.6-1.7)	3.2 (1.8-5.7)	1.7 (0.9-3.3)
Adolescent's smoking				
Non smoker	1.0	1.0	1.0	1.0
< 10 cigarettes	0.9 (0.5-1.8)	0.8 (0.4-1.6)	4.6 (2.5-8.5)	2.5 (1.3-5.0)
10 + cigarettes	1.2 (0.5-2.5)	1.0 (0.4-2.3)	3.9 (1.7-8.7)	1.5 (0.6-3.9)
Age of initiation to smoking				
Never started	1.0	1.0	1.0	1.0
< 15 years	1.3 (0.9-2.1)	1.3 (0.8-2.3)	4.8 (2.7-8.7)	2.1 (1.0-4.5)
15 – 17 years	1.4 (1.0-2.0)	1.3 (0.9-1.9)	3.5 (2.0-6.2)	2.2 (1.2-4.0)
18 + years	2.1 (1.3-3.5)	1.9 (1.1-3.2)	2.3 (0.9-5.8)	1.7 (0.7-4.4)
Age of initiation to alcohol				
Never started	1.0	1.0	1.0	1.0
< 15 years	4.9 (1.7-14.6)	4.2 (1.4-13.0)	10.7 (1.4-81.9)	2.7 (0.3-22.4)
15 – 17 years	5.3 (1.9-15.1)	4.5 (1.6-13.1)	7.3 (1.0-54.5)	3.5 (0.5-26.8)
18 + years	5.0 (1.7-14.9)	4.4 (1.5-13.1)	4.3 (0.5-34.6)	3.5 (0.4-28.7)
Age of initiation to cannabis				
Never started	1.0	1.0	1.0	1.0
< 15 years	1.3 (0.8-2.0)	1.0 (0.6-1.9)	4.4 (2.4-8.1)	2.1 (0.9-4.8)
15 – 17 years	1.3 (0.9-1.8)	1.1 (0.7-1.6)	3.1 (1.8-5.3	1.8 (0.9-3.3)
18 + years	1.3 (0.8-2.0)	1.0 (0.6-1.7)	1.6 (0.7-3.5)	1.2 (0.5-2.8)

[1] Non-gamblers were considered as reference category

Table 5.20 summarises the prospective associations between several individual and familial factors and ARP gambling. Children whose mothers were in a de facto relationship at 14 years were more likely to experience ARP gambling in young adulthood (OR = 2.8; 95% CI: 1.5-5.3) than children of married mothers. Adolescents who had symptoms of externalising behaviour at 14 years were also more likely to report having ARP gambling at 21 years, but after adjustment for other covariates, this association was no longer significant. In addition, smoking of cigarettes at 14 years predicted ARP gambling later in early adulthood.

The age of starting to smoke cigarettes, drink alcohol or use cannabis were all associated with ARP gambling at 21 years. Participants who reported starting to use any of the substances before 15 years of age were more likely to be categorized as ARP gamblers, with the strongest associations being observed for age of initiation to alcohol.

Table 5.21 clearly identifies that exposure to multiple risk factors (5 or more) during the developing years is associated with a three-fold risk for having ARP gambling in young adulthood, compared to those exposed to two or less risks factors.

Table 5.21: Risk of young adult ARP gambling by level of exposure to risk factors

Level of risk	Gambling sub-types (N = 829)					
	Non gamblers		No problem gamblers		ARP gamblers	
	N = 505		N = 238		N = 86	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Low risk (0-2)	11.5	1.0	4.6	1.0	5.8	1.0
3-4 risk	62.0	1.0	66.0	2.6 (1.4-5.2)	52.3	1.7 (0.6-4.4)
5 or more	26.5	1.0	29.4	2.8 (1.4-5.9)	41.9	3.1 (1.2-8.3)

CHAPTER 6: DISCUSSION

Introduction

Using the data from a 21-year longitudinal prospective birth cohort study we have examined the profile of young adult gambling, gambling expenditure and ARP gambling in Brisbane, Australia. We have taken a life course perspective with a focus on early childhood and early adolescence to determine the extent that influences occurring over the life course might be associated with gambling and ARP gambling. In the current chapter we discuss the research findings and present the conclusions based on these findings, along with their implications for public policy. This is the first time the CPGI has been used to assess gambling and its predictors among young adults in Brisbane. The abundance of information gathered from this study can be used to provide baseline measures for future studies, in addition to providing insights into the impact, correlates and precursors, of gambling and ARP gambling. The organization of this chapter corresponds with the four main research questions and objectives.

Gambling among young adults in Brisbane

We found that 40.8% of over 21 year old respondents had participated in at least one gambling activity. There are several interesting patterns to the gambling behaviour of young adults. For example, males were more likely (48.9%) than females (36.3%) to gamble. Those with higher incomes constituted a greater proportion of the gambling group and individuals with a higher level of education (tertiary education and university) were less likely to gamble relative to the less educated groups. We also found that gambling activity up to 21 years of age was associated with young adults' concurrent substance use. While an increased quantity of cigarettes smoked and illicit drug use was related to engagement in gambling activities, heavier drinkers of alcohol were *less* likely to participate in gambling activities. In addition, young adults who reported having gambled at 21 years were more likely to have externalising behaviour (including aggression and delinquency), risk-taking beliefs/behaviour, and to be living in an area with social problems. Participation of the young adults in church activities was related to a lower prevalence of engagement in gambling activities. Our findings are largely

consistent with previous research, including the QHGS (2003-04)[28] reviewed in the introductory section.

Childhood predictors of gambling

In regard to childhood predictors of young adult gambling, our findings show that both mother and child factors are related to gambling behaviour in young adulthood. Maternal education at the time a child was born was prospectively related to gambling in early adulthood. More highly educated mothers were less likely to have children involved in gambling as young adults. Maternal smoking and alcohol consumption at 5 years appears to be associated with gambling such that children whose mothers smoked more cigarettes or drank more alcohol were more likely to gamble compared with those whose mothers are non-smokers or non-drinkers. Of several problem behaviours studied at the 5-year follow-up, child aggression at 5 years was the only one associated with later gambling. Children whose mothers reported symptoms of aggression in early childhood were more likely to participate in gambling activities as young adults. By means of logistic regression models we found that gender, maternal education, maternal smoking and alcohol consumption at 5 years were significantly associated with the rate of gambling by young adults, although the magnitude of associations (odds ratios) for these variables was not strong.

Adolescent predictors of gambling

We also examined the influence of adolescent factors on young adult gambling behaviour. Our data shows that some familial, individual and social background variables in early adolescence were associated with young adult gambling. For instance, we found that the marital status of the mother when the child was 14 years old was significantly associated with later gambling by young adults. Children whose mothers were in a de-facto relationship were more likely (49%) than those of married mothers (40%) and single mothers (35%) to gamble as young adults. Consistent with childhood associations of gambling, children of smoking and/or alcohol drinking mothers reported a higher rate of gambling in early adulthood. We also found that the presence

of problems in mother-youth communication at 14 years was associated with young adult gambling. Regarding the influence of adolescent problem behaviours at 14 years we found that symptoms of externalizing behaviour at this stage of development (including aggression and delinquency) were related to later gambling.

Risk of gambling by childhood and adolescence factors

In an aggregated logistic regression model we examined the independent influence of each childhood and adolescence factor that was associated with young adult gambling. We found that mothers who reported light (< 10) or heavy (20 or more cigarette per day) smoking when the child was 5 years of age had an increased risk of having a child who gambled at 21 years. Further, the pattern of maternal alcohol consumption was directly related to young adult gambling behaviour. Adolescents who had problems of communication with their mothers at the 14 year follow-up were at greater risk of gambling in early adulthood (OR = 1.4; 95% CI: 1.1-1.7) compared to those who experienced good communication with their mothers.

Our logistic regression analyses showed that symptoms of externalising behaviour and the pattern of adolescent cigarette smoking and alcohol consumption at 14 years predict gambling behaviour at 21 years. The more frequently adolescents smoked cigarettes or consumed alcohol at 14 years of age the greater the risk for gambling in young adulthood. Using the self-report of participants at the 21-year follow-up we also examined gambling activity according to the age substance use began. Our findings show that early initiation to substances predicted young adult gambling. For example, participants who reported onset of alcohol consumption earlier than 15 years of age were observed to have nearly five times the risk of gambling in adulthood (OR = 4.8; 95% CI: 3.1-7.4) of those who never started to drink. Most of the associations remained significant after adjustment for other covariates, although there was some attenuation of effect.

Young adult gambling expenditure

Some 60.4% of the cohort of young adults reported no money spent on gambling at all. Of the cohort of 1480 young adults who reported gambling at 21 years, 48% spent less than $7.00 per week, 41% spent between $7.00 to just under $35.00, and 11% spent over $35.00 per week. The mean (average) reported monthly expenditure per young adult was $27.50 per month. A range of individual and environmental factors measured at 21 years were found to be associated with young adult gambling expenditure, including gender, level of education, having a paid job, level of income, substance use, age of initiation to substances, problem behaviours, religious activities and living in lower quality neighbourhoods.

Male participants and those who had a lower level of education, or had a paid job and higher income, were more likely to spend a greater amount of money on gambling. Those who reported smoking cigarettes or using cannabis or other illicit drugs were more likely to spend a larger amount of money on gambling. By contrast, there was an inverse association between alcohol consumption and gambling expenditure in young adulthood. In addition, we found that initiation to licit and illicit substance use in early adolescence was associated with greater levels of gambling expenditure. Symptoms of externalizing problems, delinquent behaviour, risk-taking beliefs and higher levels of problems within the neighbourhood area were also associated with larger expenditure on gambling. Finally, those who were more religious and involved in church activities were less likely to spend large amounts of money on gambling.

Childhood predictors of gambling expenditure

From the analyses we conducted that have examined childhood influences, we found that maternal education at the time the child was born was prospectively related to the cost of gambling in early adulthood. Highly educated mothers were less likely to have children categorized in high expenditure groups as young adults. Depressed and/or anxious mothers when the child was 5 years of age were more likely to have children spending a greater amount of money on gambling. Maternal smoking and alcohol consumption at 5 years appeared to be associated with gambling expenditure,

although this pattern was not clear. Thus far it has been demonstrated that maternal behaviours can influence the offspring's subsequent gambling behaviour. In line with this, just under one-fifth of young adults reported that they had close relatives who were problem gamblers. This raises the possibility that gambling behaviour is acquired within the family environment, at least for a proportion of gamblers.

Adolescent predictors of gambling expenditure

Further, our findings suggested that a change in maternal marital status between the age of 5 and 14 predicts the amount of money individuals spend on gambling as young adults. Children of mothers who reported changes in marital status were more likely to be categorised in the high expenditure groups. We also found that problems in mother-child communication at 14 years were associated with a higher gambling expenditure at early adulthood. The association between maternal smoking behaviour, alcohol consumption and gambling expenditure became unstable and non-significant when controlled for other variables, suggesting that their effects might be explained by other individual or family factors. On the other hand, adolescent smoking and alcohol use at the 14 year follow-up predicted risk of gambling expenditure at 21 years. Our analyses also suggested that age of initiation to different substances such as cigarettes, alcohol and cannabis are the strongest predictors for gambling expenditure by young adults. Those who reported licit and illicit substance use in early adolescence were more likely to spend more money on gambling as young adults. While one might advance a number of explanations for this finding, consistent with the suggestion of a causal link between illicit substance use and gambling, it is equally plausible that both illicit substance use and gambling are a consequence of another factor.

At risk and problem gambling

Our last objective was to describe the prevalence of young adult ARP gambling and to examine childhood and adolescent influences that were related to ARP gambling. We used the Canadian Problem Gambling Index (CPGI) to distinguish sub-types of gamblers. In the primary analyses, we found that of 1025 young adults who responded

to CPGI questionnaire, 58.3% did not gamble at all and 30.3% had no symptoms of problem gambling. Some 6.4%, 3.7%, and 1.2% of the young adults were categorised as low risk, moderate risk and high risk gamblers respectively. In order to examine the associations between selected explanatory variables and young adult ARP gambling, we aggregated these three categories of at-risk gambling and developed a new category named ARP gambling (low to high risk), which included 11.3% of our sample. From the present survey, it is concluded that even though approximately 42% of Brisbane young adults reported having gambled at some time, the great majority of them (88.6%) have never experienced any of the symptoms or gambling-related problems included in the CPGI. These prevalence estimates are slightly higher than those reported in the QHGS (2003-04) [28], however our population included only young adults, whereas the QHGS (2003-04) included adults of all ages. It is widely acknowledged that the prevalence of problem gambling is higher in young adults than in the general population [10,29,51] thus this would account for the difference in prevalence rates. Our reported prevalence estimates are consistent with those obtained in other studies of gambling behaviour in Central Queensland [37], Australia [10], and in other Western countries [46].

Young adult correlates of gambling

In examining the associations between selected individual and environmental factors and gambling behaviour we found that males are more likely than females to have reported ARP gambling. While young adults in paid employment constituted a higher proportion of non-problem gamblers, unemployed individuals were more likely to be in the ARP gambling group. ARP gamblers were more likely however to have middle to high incomes, than low incomes. Our findings indicated that heavy-smoker young adults were more likely to report ARP gambling, whereas non-drinkers constituted the highest proportion of ARP gamblers. In addition, those who had used illicit drugs reported a higher rate of ARP gambling, with the pattern of current use of illicit drugs suggesting a direct relationship between the frequency of illicit drug use and the proportion of respondents reporting ARP gambling. In additional analyses we

found that young adults who were affected by the negative impact of alcohol or illicit drugs on their quality of life were more likely to be categorized as ARP gamblers.

In the analyses of young adult ARP gambling according to their current mental health and problem behaviours at 21 years, we found that individuals who had symptoms of externalising behaviour (highest decile scores based on delinquency and aggression items combined) and more risk-taking beliefs/behaviours were more likely to experience ARP gambling. Risk-taking behaviour is very similar to sensation seeking behaviour, and this association between risk-taking and gambling behaviour is consistent with previous research [22,85]. This provides some support for the personality model of gambling behaviour. Respondents who reported attending church constituted a lesser proportion of those categorised as non-problem gamblers, while there was no difference in rates of ARP gambling between church attendees and non-attendees. Finally, living in a neighbourhood with multiple social problems was associated with an increased rate of ARP gambling. Of course, it is not clear whether those with gambling problems move to geographic areas that have more social problems or whether there is a process of social "infection" which encourages particular forms of gambling behaviour in these geographic areas.

Childhood and adolescent predictors and ARP gambling

Our final objective was to identify antecedents of ARP gambling. We examined the influence of childhood and adolescence factors on the presence of ARP gambling in young adulthood. We found that higher levels of maternal education at the time the child was born, and light or moderate maternal alcohol consumption at 5 years diminished the risk for ARP gambling in young adulthood. The highest rate of ARP gambling was reported by children whose mothers consumed more than one glass of alcohol per day when the child was 5 years of age. This association was not consistent with that observed when the child was 14 years of age. Our data show that maternal smoking and alcohol consumption at the 14 year follow-up were not related to young adult ARP gambling. By contrast, adolescents who smoked cigarettes at 14 years were more likely to report symptoms of ARP gambling as young adults. Externalising

problems at 14 years was also found to be associated with higher rates of ARP gambling at 21 years.

Risk of ARP gambling by childhood and adolescent factors

In order to test the influence of each childhood and adolescent factor in young adult ARP gambling, we conducted univariate and multivariate logistic regressions. Our analyses indicated that male individuals were significantly more likely to experience ARP gambling (OR = 1.9; 95% CI: 1.2-2.9) than females. This association did not alter after adjustment for other childhood covariates. In contrast to the findings on young adult gambling, consumption of a moderate quantity of alcohol (less than one glass per day) was associated with a lower risk for ARP gambling in young adulthood. The significant association found between maternal education and ARP gambling was no longer significant after statistical adjustment for other factors.

Analysis of data from the adolescent period showed that mothers living in a de facto relationship at 14 years were more likely to have children who reported ARP gambling as young adults. Youth with externalising behaviour had a greater risk of involvement in ARP gambling when they became young adults and those who smoked at 14 years were more likely to be ARP gamblers. Our previous findings suggested that an early age of starting use of illicit substances was associated with an increased rate of gambling and gambling expenditure. Our findings confirm that early initiation to various substances such as tobacco, alcohol and cannabis also predicted a risk for ARP gambling, although the magnitude of the associations did not remain stable after adjustment for other confounding factors.

There are two main conclusions that derive from these findings. First, it is unlikely that adolescent use of cigarettes, alcohol and cannabis lead to gambling. Rather, it is more realistic to interpret these findings as an indication that the personal characteristics which might lead a young person to smoke tobacco and drink alcohol, also have an impact on that person's gambling behaviour. While it may not be accurate to think in terms of an addictive personality, it may be accurate to suggest that people gamble more often because they are less tied to some social norms, and because they

have biological characteristics that predispose them towards risk-taking behaviours. This is consistent with personality and biological models of problem gambling. Secondly, our efforts to construct a multiple risk factor model which predicts a propensity to gamble was largely unsuccessful. This suggests that, as a general rule, people who gamble or who gamble to a point where their behaviour becomes a problem/risk, do not greatly differ from their non-gambling counterparts. It is not likely to ever be possible to predict the social or personal characteristics of those who become ARP gamblers.

From a policy perspective our findings confirm that many social characteristics over a person's early life course predict their propensity to gamble but that such predictions are of little practical value. It is worth noting that the age at which a person begins to consume alcohol is one of the strongest and most consistent predictors of not only gambling behaviour, but also the level of gambling expenditure and evidence of ARP gambling in young adulthood – that is, early life course use of alcohol precedes gambling behaviour. Thus, one might suggest attention be given to alcohol policies as an option, although it is plausible that alcohol use and gambling behaviour have common origins.

Blaszczynski and Nower [86] have argued for a causal pathway based, in part, on a market segmentation model. They suggest that there are three "types" of people who gamble; they describe behaviourally conditioned gamblers, emotionally vulnerable gamblers and anti-social/impulsive gamblers. Their model raises questions about the contribution of ecological, emotional and biological contributors to gambling behaviour. Our findings partly confirm the concept advocated in their model. Ecological, emotional and biological factors all contribute to gambling behaviour. This model (and the cognitive model) also proposes that problem-gamblers are subject to faulty cognitions, which help maintain gambling behaviour. There was some evidence of this in the present study. Some gamblers endorsed the view that a win is ensured after many losses (22.4%) and that having a system makes one a more successful gambler (16.5%). But, this was not the majority's view. However, these estimates are based on responses from all adult gamblers, and it may be that problem gamblers have a higher incidence of faulty cognitions. Furthermore, nearly half of all adult gamblers remembered an early big win, thus the experience and memory of a big win at the time

gambling activity commenced may serve to encourage further gambling activity, at least for some people.

However, while ecological, emotional and biological predictors are generally statistically significant predictors of gambling behaviour, they are weak. In practical terms such predictors are not a useful guide to policy. Most gamblers have few risk exposures and most of those with high risk exposure (high risk categories) do not manifest problem gambling. This is a common problem confronted by such risk factor research. Although risk factors are strong predictors of outcomes, intervening on the basis of risk is generally not an efficient nor effective strategy [115]

Primarily, policy initiatives may need to focus on exposure and opportunity variables. Because the proportion of people willing to gamble is so high and because the numbers who get into difficulties with their gambling is so low, it will be difficult to develop effective policies. While a focus on therapeutic responses represents one category of policy response, it is likely to be a category of response that is best described as too little and too late. Perhaps what are needed are new types of responses which focus on early intervention for those experiencing the early stages of problem gambling given that there is considerable pressure to increase opportunities to gamble in contemporary societies.

APPENDIX 1

Data collection

The 21- year follow-up of the MUSP study children took place between 2002 and 2004, and represents the seventh phase of data collection conducted by the MUSP research team. Previous waves of data collection took place as follows:

- Phase 1- enrolment of study mothers during the prenatal period
- Phase 2- 3 – 5 days after the birth of the child
- Phase 3- 6 months after the birth of the child
- Phase 4- medical records of the birth accessed
- Phase 5- 5 years after the birth of the child
- Phase 6- 14 years after the birth of the child

During phase 7, the MUSP was successful in gaining initial agreement from a target sample of over 5,131 of the study children (aged between 18 and 24 years at the time of the 21-year follow-up).

By the end of phase 7, a total of 3,845 young adults had completed their participation either via fieldwork interviews held in participants' homes (N= approx. 2,700), or via mail-returned questionnaires. A total of 1,296 young adults, who had agreed to participate in the 21-year follow-up via mail-returned questionnaires, and who had subsequently been sent questionnaires by mail, failed to return these to the project site at the Mater Misericordiae Hospital, Brisbane.

Various strategies were used to maximise the return of completed questionnaires by mail including the sending of reminder letters, making reminder telephone calls, as well as offering the option for researchers to collect completed questionnaires in person from participants' homes. Second mail-outs were also posted to those participants who reported that they had inadvertently lost the first questionnaires sent to them via mail.

In regard to the current project, the two gambling items measuring gambling behaviour and the amount of money spent on gambling per week were completed by the whole sample (in the period between 2000 and 2004) while the Canadian Problem Gambling Index was completed by all those who participated from August 2003 to December 2004 (Queensland Treasury grant was awarded in November 2003).

Analyses for the current project were conducted firstly, on the total sample using the two gambling items, and secondly, on the proportion of the sample that responded

to the CPGI items, with each of these sets of analyses involving data gathered on mother and child during previous phases of the MUSP study.

APPENDIX 2

Analyses of moderate and problem gamblers as a combined group

As discussed in Chapter 2, the Canadian Problem Gambling Index (CPGI) [102] was used to identify young adult problem gambling. Of 1025 young adults who were administered the CPGI questionnaire, 42% gambled at 21 years of whom 30.3% had no gambling-related problem, 6.4% were categorized as low risk gamblers, 3.7% as moderate risk gamblers, and just over 1% met the criteria for problem gambling. Due to the small number of people showing problematic gambling behaviours, in preliminary analyses moderate and high risk gamblers were combined into one group. These analyses are presented below. These tables and analyses are identical to those presented in Chapter 5, with the key exception that instead of combining low, moderate and high risk gamblers into one group, only moderate and high risk gamblers have been combined. Results using both methods were compared. There is no substantial difference in results in terms of significance levels.

Another way to compare results is to look at the proportion of each gambling group which engage in certain behaviours, or fall into certain demographics. One would expect that the moderate-high risk gamblers would demonstrate a high incidence of other problematic behaviours (e.g. substance abuse) than low-risk gamblers. However, in the current study this was not always the case. At times, associations between moderate-high risk gambling and other problematic behaviours were stronger than associations between low risk gambling and the same behaviours, however it was often the reverse. This could potentially lead to a confusing interpretation of the data. However, it is likely that these spurious findings are an artefact of the data, i.e. because there are a very small numbers of participants in the moderate-high risk gambling group, results become unstable. Nonetheless, in some instances results were similar for the low risk and moderate-high risk gambling groups. Upon consideration of these issues, the decision was made to use the combined low to high risk gambling group for the analyses in the body of the report, since this provided more stable estimates and results, and was based on a larger number of people.

Table 6.1: Sub-types of gambling and gambling expenditure

Gambling expenditure ($ per week)	N	Gambling sub-types				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
0.0	620	96.5	1.1	1.5	1.0	<0.001
< 7.0	183	0.0	88.0	9.8	2.2	
7.0 – 34.9	177	0.0	71.2	16.9	11.9	
35.0 +	41	0.0	34.1	19.5	46.3	

(Corresponds to Table 5.8 above)

Table 6.2: Gambling and socio-economic status at 21 years

Variables	N	Gambling sub-types (N = 997)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Gender						<0.001
Male	438	51.1	34.0	7.8	7.1	
Female	559	63.7	27.9	5.2	3.2	
Young adults education						0.174
Below high school	190	53.2	30.0	7.9	8.9	
Complete high school	501	60.9	29.9	5.8	3.4	
Tertiary education	245	58.0	31.0	6.5	4.5	
University	61	52.5	36.1	4.9	6.6	
Young adults job						0.017
Paid job	785	56.8	32.9	5.9	4.5	
No job	212	63.2	22.2	8.0	6.6	
Young adults income						0.006
Low income	226	68.6	21.7	5.3	4.4	
Middle income	478	57.5	32.4	5.6	4.4	
High income	293	51.2	34.5	8.2	6.1	

(Corresponds to Table 5.9 above)

Table 6.3: Gambling behaviour and young adult substance use

Variables	N	Gambling sub-types (N = 1014)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Cigarette smoking						<0.001
Non smoker	653	62.9	29.6	4.7	2.8	
Light smoker	172	58.1	29.7	6.4	5.8	
Moderate smoker	136	44.1	36.8	8.8	10.3	
Heavy smoker	53	37.7	24.5	22.6	15.1	
Alcohol consumption						<0.001
Abstainer	318	51.9	31.1	10.1	6.9	
≤ 1 drink per day	607	59.5	31.8	5.1	3.6	
> 1 drink per day	89	73.0	16.9	3.4	6.7	
Cannabis ever use						<0.001
No	520	63.3	30.4	3.8	2.5	
Yes	494	53.0	30.2	9.3	7.5	
Pattern of cannabis use						<0.001
Never used	520	63.3	30.4	3.8	2.5	
Occasional use	378	55.3	30.7	7.7	6.3	
Frequent use	116	45.7	28.4	14.7	11.2	
Use of other illicit drugs						<0.001
No	730	60.8	30.5	4.7	4.0	
Yes	284	51.8	29.6	11.3	7.4	

(Corresponds to Table 5.10 above)

Table 6.4: Young adult gambling behaviour by age of starting to use drugs

Variables	N	Gambling sub-types (N = 998)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Age of starting cigarette smoking						<0.001
Never started	494	66.6	27.9	3.8	1.6	
< 15 years	168	49.4	29.2	11.3	10.1	
15 – 17 years	251	51.8	32.3	8.4	7.6	
≥ 18 years	85	50.6	40.0	5.9	3.5	
Alcohol consumption						0.001
Abstainer	52	86.5	9.6	0.0	3.8	
< 15 years	182	54.9	28.6	8.8	7.7	
15 – 17 years	604	57.0	31.8	6.8	4.5	
≥ 18 years	160	60.0	33.1	4.4	2.5	
Cannabis use						<0.001
Never started	515	63.1	30.7	3.9	2.3	
< 15 years	126	50.5	26.2	16.7	7.1	
15 – 17 years	247	53.0	30.8	7.3	8.9	
≥ 18 years	110	60.0	31.8	4.5	3.6	

(Corresponds to Table 5.11 above)

Table 6.5: Young adult gambling behaviour and the impact of substances on quality of life

Adverse impact on life due to:	N	Gambling sub-types (N = 1012)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Alcohol consumption						<0.001
No alcohol drink	51	82.4	11.8	2.0	3.9	
No impact	769	59.3	30.9	6.1	3.6	
Mild to severe impact	192	48.4	32.3	9.4	9.9	
Illicit drug use						<0.001
Not user	585	60.7	30.4	5.0	3.9	
No impact	286	58.4	29.4	9.1	3.1	
Mild to severe impact	141	48.9	31.2	7.8	12.1	

(Corresponds to Table 5.12 above)

Table 6.6: Young adult gambling and maternal substance use at 21 years

Maternal substance use	N	Gambling sub-types (N = 814)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Cigarette smoking						0.110
Non-smoker	592	60.0	30.4	5.4	4.2	
Light smoker	56	55.4	30.4	10.7	3.6	
Moderate smoker	65	50.8	33.8	9.2	6.2	
Heavy smoker	101	48.5	33.7	6.9	10.9	
Alcohol consumption						0.194
Abstainer	55	61.8	21.8	9.1	7.3	
Light drinker	440	58.4	32.3	6.4	3.0	
Moderate drinker	32	53.1	31.3	6.3	9.4	
Heavy drinker	287	55.7	31.0	5.6	7.7	

(Corresponds to Table 5.13 above)

Table 6.7: Young adult gambling and problem behaviours at 21 years

Young adult's behaviour	N	Gambling sub-types (N = 988)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Externalizing						<0.001
No	879	61.1	29.9	5.8	3.2	
Yes	109	38.5	32.1	11.0	18.3	
Delinquency						<0.001
No	687	63.6	29.7	4.2	2.5	
Low level	255	48.2	31.0	11.8	9.0	
High level	46	41.3	32.6	8.7	17.4	
Risk-taking						0.089
No	191	57.6	33.5	5.2	3.7	
Low risky	555	58.0	31.9	5.6	4.5	
High risky	242	60.7	23.6	9.1	6.6	

(Corresponds to Table 5.14 above)

Table 6.8: Young adult gambling and church attendance and problems in the neighbourhood at 21 years

Variables	N	Gambling sub-types (N = 1001)				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Church attendance						0.012
Yes	223	65.9	22.0	5.8	6.3	
No	778	55.9	32.8	6.8	4.5	
Neighbourhood						0.002
No problem	362	64.4	29.0	3.9	2.8	
Low problem	392	55.6	32.4	6.6	5.4	
Moderate to high Problem	247	53.0	29.1	10.5	7.3	

(Corresponds to Table 5.15 above)

Table 6.9: Young adult gambling and early childhood background

Variables	N	Gambling sub-types				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Mother's education						0.035
Incomplete high school	149	61.7	26.8	6.7	4.7	
Completed high school	663	55.1	32.6	7.2	5.1	
Post high school	204	68.6	24.0	3.4	3.9	
Child aggression						0.159
No	821	60.9	29.1	5.7	4.3	
Yes	88	48.9	36.4	9.1	5.7	
Maternal smoking						0.064
Non smoker	600	61.3	29.7	5.8	3.2	
Light smoker	73	50.7	38.4	8.2	2.7	
Moderate smoker	96	53.1	39.2	8.3	9.4	
Heavy smoker	142	61.3	26.8	4.9	7.0	
Maternal alcohol consumption						0.021
Abstainer	199	57.3	26.6	9.5	6.5	
Light drinker	569	61.9	29.3	5.1	3.7	
Moderate drinker	85	60.0	35.3	3.5	1.2	
Heavy drinker	59	44.1	39.0	8.5	8.5	
Maternal supervision						0.925
Low	63	55.6	33.3	4.8	6.3	
Moderate	778	59.8	29.8	6.2	4.2	
High	47	61.7	27.7	4.3	6.4	

(Corresponds to Table 5.16 above)

Table 6.10: Young adult gambling and early adolescent background

Variables	N	Gambling sub-types				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Maternal marital status						0.048
Married	701	59.6	30.8	5.6	4.0	
Single	22	63.6	22.7	9.1	4.5	
De-facto	87	47.1	33.3	12.6	6.9	
S/D/W	136	63.2	24.3	4.4	8.1	
Maternal smoking						0.247
Non smoker	674	60.8	29.1	5.9	4.2	
Light smoker	55	49.1	41.8	7.3	1.8	
Moderate smoker	82	54.9	28.0	8.5	8.5	
Heavy smoker	138	56.5	31.2	5.1	7.2	
Maternal alcohol consumption						0.116
Abstainer	178	56.2	30.9	5.6	7.3	
Light drinker	548	62.0	28.5	5.3	4.2	
Moderate drinker	122	58.2	32.8	6.6	2..5	
Heavy drinker	100	48.0	34.0	11.0	7.0	
Problem in family communication						0.040
Few	756	60.2	29.4	6.3	4.1	
Moderate	100	56.0	33.0	7.0	4.0	
Many	96	52.1	33.3	3.1	11.5	

(Corresponds to Table 5.17 above)

Table 6.11: Young adult gambling and substance use and problem behaviours during adolescence

Variables	N	Gambling sub-types				P value
		Non-gamblers (%)	Gamblers (%)			
			No problem	Low risk	Mod to high risk	
Adolescent smoking						<0.001
Non smoker	837	60.7	30.7	4.9	3.7	
Light smoker	67	47.8	22.4	14.9	14.9	
Moderate smoker	19	47.4	21.1	21.1	10.5	
Heavy smoker	26	42.3	38.5	7.7	11.5	
Adolescent alcohol consumption						0.075
Abstainer	623	61.3	28.7	5.9	4.0	
Up to one glass	316	55.1	32.6	5.7	6.6	
More than one glass	9	33.3	44.4	22.2	0.0	
Adolescent externalizing						<0.001
No	865	59.8	30.5	6.1	3.6	
Yes	86	50.0	25.6	7.0	17.4	
Adolescent SAT						0.005
No	863	59.1	30.5	6.4	4.1	
Yes	88	56.8	26.1	4.5	12.5	
Adolescent aggression						0.004
No	882	60.0	29.7	6.1	4.2	
Yes	69	44.9	34.8	7.2	13.0	
Adolescent delinquency						<0.001
No	869	60.0	30.3	5.9	3.9	
Yes	82	47.6	28.0	9.8	14.6	

(Corresponds to Table 5.18 above)

Table 6.12: Risk of sub-types of gambling by childhood factors

Variables	Gambling sub-types[1] (N = 905)					
	No problem gamblers		Low risk gamblers		Mod to high risk gamblers	
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Child's gender						
Female	1.0	1.0	1.0	1.0	1.0	1.0
Male	1.5 (1.1-2.1)	1.6 (1.2-2.1)	1.6 (0.9-2.9)	1.6 (0.9-2.9)	2.2 (1.1-4.3)	2.2 (1.2-4.3)
Mother's education						
Incomplete high school	1.0	1.0	1.0	1.0	1.0	1.0
Completed high school	1.3 (0.8-2.0)	1.3 (0.8-2.0)	1.1 (0.5-2.5)	1.2 (0.5-2.6)	0.8 (0.3-2.0)	0.8 (0.4-2.1)
Post high school	0.8 (0.5-1.3)	0.8 (0.4-1.3)	0.5 (0.2-1.5)	0.5 (0.2-1.6)	0.6 (0.2-1.8)	0.6 (0.2-1.9)
Maternal alcohol consumption						
Abstainer	1.0	1.0	1.0	1.0	1.0	1.0
< ½ drink	1.0 (0.7-1.5)	1.1 (0.7-1.5)	0.5 (0.3-0.9)	0.5 (0.3-0.9)	0.5 (0.3-1.1)	0.5 (0.3-1.1)
½ - 1 drink	1.3 (0.7-2.3)	1.3 (0.7-2.3)	0.4 (0.1-1.2)	0.4 (0.1-1.3)	0.2 (0.2-1.4)	0.2 (0.0-1.4)
> 1 drink	1.9 (1.0-3.6)	2.0 (1.0-3.8)	1.2 (0.3-3.4)	1.2 (0.4-3.6)	1.7 (0.5-5.1)	1.8 (0.6-5.4)

[1] Non-gamblers are the reference category

(Corresponds to Table 5.19 above)

Table 6.13: Risk of sub-types of gambling by factors in adolescence

Variables	Gambling sub-types[1] (N = 905)					
	No problem gamblers		Low risk gamblers		Mod to high risk gamblers	
	OR (95% CI)		OR (95% CI)		OR (95% CI)	
Adolescence factors	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
Maternal marital status						
Married	1.0	1.0	1.0	1.0	1.0	1.0
Single	0.6 (0.2-1.7)	0.6 (0.2-2.0)	1.6 (0.4-7.4)	1.8 (0.4-8.8)	1.2 (0.1-9.2)	0.7 (0.8-6.8)
De-facto	1.3 (0.8-2.2)	1.2 (0.7-2.1)	3.1 (1.5-6.5)	2.1 (0.9-4.6)	2.4 (0.9-6.2)	1.9 (0.6-5.2)
S/D/W	0.7 (0.5-1.1)	0.7 (0.5-1.1)	0.7 (0.2-1.7)	0.5 (0.2-1.3)	2.1 (1.0-4.4)	1.5 (0.7-3.3)
Externalising behaviour						
No	1.0	1.0	1.0	1.0	1.0	1.0
Yes	1.0 (0.6-1.7)	1.0 (0.6-1.7)	1.5 (0.6-3.6)	0.7 (0.3-1.9)	6.3 (3.1-12.6)	3.4 (1.5-7.6)
Adolescent's smoking						
Non smoker	1.0	1.0	1.0	1.0	1.0	1.0
< 10 cigarettes	0.9 (0.5-1.8)	0.8 (0.4-1.6)	4.1 (1.9-8.9)	2.9 (1.2-7.0)	5.3 (2.4-11.8)	2.1 (0.9-5.3)
10 + cigarettes	1.2 (0.5-2.5)	1.0 (0.4-2.3)	4.1 (1.5-10.9)	2.2 (0.6-6.9)	3.6 (1.1-11.2)	1.2 (0.3-4.6)
Age of initiation to smoking						
Never started	1.0	1.0	1.0	1.0	1.0	1.0
< 15 years	1.3 (0.9-2.1)	1.3 (0.8-2.3)	3.5 (1.7-7.4)	1.3 (0.5-3.6)	7.5 (3.1-18.4)	3.7 (1.2-11.2)
15 – 17 years	1.4 (1.0-2.0)	1.3 (0.9-1.9)	2.7 (1.3-5.4)	1.7 (0.8-3.8)	5.4 (2.2-12.8)	3.0 (1.1-7.9)
18 + years	2.1 (1.3-3.5)	1.9 (1.1-3.2)	2.0 (0.6-6.2)	1.4 (0.5-4.8)	3.1 (0.8-12.3)	2.1 (0.5-9.0)
Age of initiation to alcohol						
Never started	1.0	1.0	*	*	1.0	1.0
< 15 years	4.9 (1.7-14.6)	4.2 (1.4-13.0)	*	*	5.1 (0.6-40.9)	1.1 (0.1-10.5)
15 – 17 years	5.3 (1.9-15.1)	4.5 (1.6-13.1)	*	*	3.1 (0.4-23.7)	1.2 (0.1-10.2)
18 + years	5.0 (1.7-14.9)	4.4 (1.5-13.1)	*	*	1.7 (0.2-15.8)	1.3 (0.1-13.2)
Age of initiation to cannabis						
Never started	1.0	1.0	1.0	1.0	1.0	1.0
< 15 years	1.3 (0.8-2.0)	1.0 (0.6-1.9)	4.7 (2.3-9.8)	3.5 (1.3-9.5)	3.8 (1.5-10.0)	1.1 (0.8-3.9)
15 – 17 years	1.3 (0.9-1.8)	1.1 (0.7-1.6)	2.1 (1.0-4.4)	1.5 (0.6-3.4)	4.7 (2.2-10.0)	2.0 (0.8-5.0)
18 + years	1.3 (0.8-2.0)	1.0 (0.6-1.7)	1.4 (0.5-4.0)	1.1 (0.4-3.9)	1.8 (0.5-6.0)	1.5 (0.4-5.2)

Note: [1] Non-gamblers are the reference category, * It was not possible to calculate the risk because the reference category for this variable was 0%

(Corresponds to Table 5.20 above)

Table 6.14: Risk of young adult ARP gambling by level of exposure to risk factors

Level of risk	Sub-types of gambling at 21 years (N = 829)							
	Non-gamblers		Gamblers					
	N = 505		No problem N = 238		Low risk N = 48		Mod to high risk N = 38	
	%	OR (95%CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Low risk (0-2)	11.5	1.0	4.6	1.0	6.3	1.0	5.3	1.0
3-4 risk	62.0	1.0	66.0	2.6 (1.4-5.2)	50.0	1.5 (0.4-5.1)	55.2	1.9 (0.4-8.5)
5 or more	26.5	1.0	29.4	2.8 (1.4-5.9)	43.7	3.0 (0.9-10.6)	39.5	3.2 (0.7-14.7)

(Corresponds to Table 5.21 above)

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