

From adolescent to adult gambling: An analysis of longitudinal gambling patterns in South
Australia

Associate Professor Paul Delfabbro

School of Psychology

University of Adelaide

South Australia

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Independent Gambling Authority
Level 4
45 Grenfell Street Adelaide
Post Office Box 67
Rundle Mall South Australia 5000
+ 61 8 8226 7233 (voice)
+ 61 8 8226 7247 (facsimile)
www.iga.sa.gov.au
iga@iga.sa.gov.au

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Executive Summary

Overview

- In 2005, the South Australian Department for Families and Communities interviewed 745 young people aged 16-19 years as part of a South Australian gambling prevalence study.
- 684 of these young people agreed to be contacted again.
- Telephone interviews were conducted by Harrison Research in conjunction with the Population Research and Outcomes Unit (S.A. Department of Health) with young people in 2007, 2008 and 2009 to obtain longitudinal data concerning the gambling habits and problem gambling status of the sample.
- In 2010, the Independent Gambling Authority of South Australia commissioned the University of Adelaide to conduct further longitudinal analyses of the data.
- The study involved the analyses of data collected from 256 young people (50% male, 50% female) who had been aged 16-19 years in 2005 and who agreed to be interviewed in all 3 follow-up surveys.

Methodology

- The study examined a subset of the variables included in the follow-up surveys. These included: gambling participation rates in individual activities, reported gambling-related problems, and early experiences and motivations for gambling.
- The study had the capacity to examine the stability of gambling for individual respondents rather than cross-sectional comparisons of group gambling habits.
- Some analyses were based on the entire sample, but it was also possible to examine the longitudinal development of gambling for those who were aged < 18 years vs. 18-19 years in the original 2005 survey.

Results

- The results were generally consistent with previous studies that have examined the transition from adolescent to adult gambling.
- On the whole, young people showed little stability in their gambling. Relatively few reported gambling on the same individual activities consistently over time.

- Gambling participation rates increased rapidly as young people made the transition from adolescence to adulthood and then were generally more stable.
- Gambling at 15-16 years was generally not associated with gambling at age 20-21 years, although those who gambled on scratch tickets and racing when they were adolescents were more likely to do so as adults
- Very low levels of problem gambling were reported by the sample.
- There was little evidence that those reporting problem gambling symptoms in any one year were likely to report similar problems in other years
- Those who reported problem gambling symptoms in the 3rd follow-up survey were more likely to report having obtained a large win when they started gambling and to have started gambling earlier.

Project Background and Literature Review

1.1 Project Background

In 2005, the Department for Families and Communities conducted a telephone survey of 17,745 South Australians aged 16 years and older. The aim of this study was to assess the prevalence of gambling and problem gambling in the State over the previous 12 months and to provide a baseline against which future surveys could be compared. A particular feature of this 2005 survey was that it included a sample of young people under the age of 18 years. Given interest in the possible links between early gambling and adult gambling activity, the Department asked the 684 participants aged 16-19 years if they would be interested in being contacted again. Just over 600 (n = 614) young people agreed to be contacted and follow up surveys were conducted. The first follow-up survey occurred two years later in 2007; a second followed in 2008 and a third in 2009. This made it possible to examine how gambling patterns changed over time.

The findings from both the original survey as well as the 3 follow-up surveys have been summarised in reports prepared by the Population Research and Outcome Studies Unit of S.A. Health (South Australian Department of Families and Communities, 2005; S.A. Health, 2008, 2009, 2010). Each of these reports provides cross-sectional data concerning: the prevalence of gambling within the successive samples; estimates of the prevalence of problem gambling; awareness of familial gambling and problem gambling treatment services; and, detailed demographic details of the sample.

Following the completion of these reports, the Independent Gambling Authority commissioned the University of Adelaide to conduct an additional series of analyses to examine the findings from the four different surveys in a longitudinal context. Longitudinal data, in the form of data from participants who had been interviewed at all four survey points, was requested and provided by S.A. Health to the University. The following report provides a summary of the findings from these analyses. Included in the report are analyses of the:

- Stability of gambling participation rates over time at a group level;
- Stability of gambling participation rates for specific activities amongst the same individuals sampled repeatedly over time;
- Gender differences in the development of gambling behaviours over time;

- The relationship between early (adolescent, < 18 years) gambling and subsequent gambling participation rates by activity (both general participation as well as the frequency of participation);
- The stability of problem gambling symptoms over time;
- The relationship between early gambling experiences (e.g., big wins, losses, age of first gambling) and subsequent gambling involvement during adulthood

1.2 Adolescent gambling and longitudinal analysis: an overview

Since the late 1990s, there have been a number of national and international studies that have investigated the nature and prevalence of gambling in adolescents and young adults. The consistent finding from this research is that young people, as with their older counterparts, have an interest in gambling and can develop problems if they gamble excessively (Griffiths, 1995). Although some controversy surrounds the appraisal of gambling-related problems in populations under the age of 18 years (Derevenky, Gupta, & Winters, 2003), it is generally accepted that younger people are one of the highest risk groups for problem or pathological gambling. Studies of adolescents have shown that pathological and problem gambling prevalence rates are higher in adolescent samples than in adult populations (Hardoon & Derevensky, 2002; National Gambling Impact Study Commission, 1999; National Research Council, 1999). Such findings have been obtained in studies conducted in the United Kingdom (Fisher, 1993, 1999; Wood & Griffiths, 1998), in the United States (Lesieur & Klein, 1987; Shaffer & Hall, 1996, 2001; Volberg & Moore, 1999), Canada (Derevensky & Gupta, 2000; Gupta & Derevensky, 1998; Ladouceur, Dube, & Bujold, 1994; Ladouceur & Mireault, 1988; Wynne et al., 1996) and Australia (Delfabbro, Lahn, & Grabosky, 2005; Delfabbro & Thrupp, 2003; Moore & Ohtsuka, 1997). Moreover, in support of these findings, research involving adult populations has consistently shown that the highest levels of gambling involvement and problem gambling are usually observed in younger age cohorts (18-30 years) (Delfabbro & LeCouteur, 2011).

The typical results of studies involving adolescents show that between 60-80% of young people aged 13-17 years gamble at least once per year and that around 3-5% of young people report behaviours indicative of pathological gambling (Derevensky & Gupta, 2000; Derevensky, Gupta, & Winters, 2003; Fisher, 1992; Lesieur & Klein, 1987; Shaffer & Hall, 1996; Winters, Stinchfield, & Kim, 1993). These behaviours include: chasing losses, a preoccupation with gambling, overlooking important commitments (e.g., friendships or school) to continue gambling and lying to friends or family about the extent of their gambling. A summary of the major Australian and New Zealand studies is provided in Table 1.1. Studies have ranged from

modest sized surveys of 500-600 adolescents to large studies involving several thousand young people (typically of 13-17 years of age). Almost all with the exception of one study (the original study described in this present report) were undertaken using pencil and paper surveys completed under supervision in classrooms. Each of the studies included a standardised measure of pathological gambling.

Table 1.1 Australian and New Zealand adolescent gambling research

Author	Year	Sample size	Location	Method	Measure
Delfabbro & Thrupp	2000-01	505	South Australia	Classroom	DSM-IV-J
Delfabbro, Lahn & Grabosky	2003	926	ACT	Classroom	DSM-IV-J
S.A. Department for Families and Communities	2005	605	South Australia	Telephone	DSM-IV-J
Delfabbro, Lambos, Pulgies, & DECS	2007	2669	South Australia	Classroom	DSM-IV-J
Splevins et al.	2010	252	NSW	Classroom	DSM-IV-MR-J
Dowling et al.	2010	612	Victoria	Classroom	DSM-IV-MR-J
Sullivan	2001	547	New Zealand	Classroom	DSM-IV-J
Rossen	2008	2005	New Zealand	Classroom	DSM-IV-MR-J

The results of the different studies are summarised in Table 1.2 and show that around 60-70% of adolescents gamble at least once per year. The only exception to this was the telephone survey conducted in South Australia in 2005 (the current study) which is disproportionately lower and the Sullivan study in New Zealand which is disproportionately higher. Telephone surveys differ from classroom studies in that it may be difficult to obtain a representative sample of young people because many have mobile phones or do not respond to surveys directed to their parents' residential address. Conversely, there may be dangers in some classroom surveys of only obtaining responses from participants who have an interest in gambling, so that (as Sullivan's study indicates), it may be possible to obtain what appears to be a particularly high proportion of young people with an interest in gambling. Similar variability can be observed in relation to the pathological gambling estimates. Most indicate a rate of

between 2.5 to 4% with lower estimates for the telephone survey and the recent Victorian study conducted by Dowling et al. (2010). It is unclear why the Dowling et al. study obtained a figure so much lower than other studies, but there several possible explanations. One factor is that it used a more conservative measure of pathological gambling. A second is that the study was conducted several years after the other Australian studies at a time when there was already an emerging downward trend in both gambling participation figures and growth in responsible gambling promotions across many different Australian States. It is also known from personal communication with the researchers that considerable difficulties were experienced in recruitment so that it is possible that the final sample may have not been representative of all young people attending school.

Table 1.2 Findings from Australian and New Zealand adolescent gambling surveys

	Participated previous 12 months	% Pathological gambling
Delfabbro & Thrupp	62	3.5
Delfabbro, Lahn & Grabosky	70	4.4
S.A. Department for Community Services	43	1.0
Delfabbro, Lambos, & Pulgies	56	2.4
Dowling et al.	68	0.7
Sullivan	65	13.0
Splevins et al.	81	6.7
Rossen	68	3.8

Apart from the growing awareness of the prevalence of gambling in this age group, adolescent pathological and problem gambling has also been of interest because it known to be linked with other developmental problems such as increased involvement in risk-taking behaviours, reduced educational performance (Gupta & Derevensky, 1998; Fisher, 1995, 1999; Ladouceur & Mireault, 1988; Lesieur & Klein, 1987), as well as poorer psychosocial adjustment (Dickson, Derevensky & Gupta, 1999; Hardoon, Gupta, & Derevensky, 2004; Jacobs, 1987;

Stinchfield, 2000). Adolescents with gambling problems have been found to have higher rates of delinquent behaviours including petty criminal behaviour and truancy (Fisher, 1992, 1993; Griffiths & Sutherland, 1998; Gupta & Derevensky, 1998; Shaffer & Korn, 2002; Yeoman & Griffiths, 1996). Those who gamble as adolescents have also been shown to be more likely to engage in other high risk behaviours, including risky driving and underage drinking (Burnett, Ong, & Fuller, 1999; Griffiths & Sutherland, 1998; Jackson, 1999). Delfabbro, Grabosky and Lahn (2005) reported that, among adolescent problem gamblers in Australia, smoking rates were four times higher, marijuana use was six times higher and hard drug use was 20 times higher than in their non-problem gambling counterparts. Although it is unclear whether such problems are a consequence of or contributor to problem gambling, the strong association indicates that pathological gambling is often, at the very least, symptomatic of broader difficulties in adolescent wellbeing and development.

Another important principal assumption underlying much of this research is that patterns of behaviour established during adolescence may have significant implications for the longer-term wellbeing of young people as they progress into adulthood. In much the same way that smoking, drug-taking and excessive alcohol consumption during adolescence is often seen as a foundation stone for similar behavioural patterns during adulthood, it is possible that the same argument might apply to gambling. Those who gamble when they are younger, and particularly those who gamble to excess, are thought to be more prone to developing problems with gambling as adults. These views are supported, for example, in studies by Shaffer and Hall (2001) as well as Abbott, McKenna and Giles (2000) who found that people who experience problems as adults often retrospectively report having gambled when they were adolescents and that the earlier the onset of gambling, the greater the likelihood of subsequent problems. Similar results are reported in a recent Australian study by Dowling, Jackson, Thomas and Frydenberg (2010) which interviewed a sample of problem gamblers in treatment to examine their family history and early gambling experiences. The results showed that people who were raised in homes where family members had gambling problems were significantly more likely to experience similar problems themselves as adults. Presumably, this may have resulted from these people being exposure to gambling from an early age or because these people shared similar characteristics to their parents that made them more likely to gravitate towards activities such as gambling.

To a large extent what is known about the links between adolescent and adult gambling has been based upon retrospective self-report studies. As Winters, Stinchfield, Botzet and Slutske (2005) and Slutske, Jackson, and Sher (2003) point out, a limitation with studies of this

nature is that they do not allow one to examine the association between adolescent gambling and adult gambling over time. As a consequence, many of the conclusions drawn about the longer-term effects of adolescent gambling need to be confirmed using more refined research designs that allow more detailed longitudinal comparisons.

Some studies have sought to examine gambling trends using follow-up surveys to compare the rates of youth gambling observed at different points in time (e.g., different random cohorts obtained in 1992 and 1995 from the general population) (Moore & Ohtsuka, 2001; Stinchfield, 2001; Stinchfield, Cassuto, Winters, & Latimer, 1997; Volberg & Moore, 1999; Wallisch, 1993, 1996). Such studies have yielded useful insights into the stability of gambling patterns over time, but are limited because it is not possible to rule out the existence of sampling differences in the different cohorts being compared. More rigorous and genuine longitudinal designs require that the same cohort of individuals be tracked over time (Abbott & Clarke, 2007; Stinchfield, 2001; Vitaro, Arseneault and Tremblay, 1999; Winters, Stinchfield, Botzet, & Anderson, 2002). A design of this nature was used by Winters, Stinchfield, and Fulkerson (1993) who reinterviewed 532 young people (originally aged 15-18 years) from a previous telephone survey in Minnesota. The results showed that overall gambling participation rates, as well as rates for particular activities, remained very stable from one year to the next. Vitaro et al. (1999) showed that young Canadian adolescents (age 12-13 years) with higher impulsivity scores and who gambled at this early age were significantly more likely to report problems with gambling at the age of 17 years. Similar findings were reported in studies conducted by Slutske, Jackson and Sher (2003) that examined the stability of gambling patterns in a cohort tracked from the age of 18 to 29 years, and also in adolescent research conducted by Winters, Stinchfield and Kim (1995) and Winters, Stinchfield, Botzet, and Anderson (2002). In Winters et al.'s (2002) study, 305 young people were tracked from mid-adolescence (age 15 years) through to early adulthood so that it was possible to examine how rates of at-risk gambling changed over time. Once again, the results showed evidence for stability over time. The proportion of young people displaying problematic levels of gambling remained very stable from adolescence to adulthood.

All of these studies concluded that gambling patterns were generally stable over time and this is broadly consistent with the view that adolescent gambling may be a reliable predictor of subsequent rates of gambling during adulthood. However, as Winters et al. (2005) have pointed out, a persistent limitation in this research (Winters et al., 2002; Winters et al., 1995) was that the findings were only presented in aggregate form. In other words, although it was possible to show how the group as a whole compared over time, it did not show how stable

individual behaviour had remained. Some young people may have stopped gambling altogether, while a similar number may have commenced gambling, but such changes would have been masked by the overall figures. In adult populations, it is known that problem gambling is often transitory or episodic (Slutske et al., 2003; Winters et al., 2005). Those who report being problem gamblers at one point in time often report having no difficulties when interviewed at another point (Shaffer & Hall, 2002). Haworth (2005), for example, in an Australian study, successfully re-contacted 1748 people who had originally been surveyed as part of the 2003-2004 Queensland Household Gambling survey (56% response rate). All of these people were readministered the Canadian Problem Gambling Index 12 or 18 months after the original survey to determine how stable their 'status' had remained over time. The results showed that 72.6% of people remained in the same CPGI category as in the previous survey, 14.3% had moved into a higher risk group, and 13.1% had moved into a lower risk group. Only 52% of people who had previously been classified as problem gamblers were still problem gamblers at the follow-up point, whereas 14% of the moderate risk group moved into the problem gambling group (Haworth, 2005). Similar analyses undertaken by Winters et al. (2005) involving 305 young people tracked since mid-adolescence showed that only 29% of problem gamblers at time one were still problem gamblers by early adulthood (age 18+ years), although early problem gambling was still moderately associated with later problem gambling.

So far only one Australian study has been conducted to examine the association between adolescent and adult gambling. Delfabbro, Winefield and Anderson (2009) examined the gambling habits of 578 15-16 year olds who were tracked over four years (until all were adults of 18-19 years of age). The study examined the stability of gambling on specific activities over time as well as the relationship between adolescent and adult gambling. The results showed that gambling habits are very unstable over time. Young people who gamble in one year on a particular activity do not necessarily gamble on that same activity in other years. For example, only 14% of young people who gambled on scratch tickets (the most popular activity in the sample) reported doing so in all four years of the study. Less than 5% of those who reported gambling on card games, racing or sports reported a consistent involvement in these activities. In a similar vein, only around 10% of the sample reported gambling both during adolescence and adulthood on individual activities. Participation in individual activities at the age of 15-16 years generally did not predict involvement at 18-19 years, but stronger associations were obtained for gambling at 16-17 years and adult gambling.

In effect, this present study replicates the findings of the Delfabbro et al. study using a similar range of measures and a similar time-frame. Although the sample size is smaller, a

strength of this current study is that it contains a wider range of gambling measures and involves a sample of young people drawn from the community using probability sampling.

2. Methodology

2.1 Sampling

As indicated above, this project was based on a secondary analysis of data collected for the Independent Gambling Authority of South Australia by the Population Research and Outcome Studies Unit, S.A. Health. Data were drawn from the original survey as well as the 3 subsequent telephone surveys. A summary of the surveys is provided in Table 2.1. As indicated in Table 2.1, the number of respondents to the surveys gradually decreased over time, although much of the sample attrition occurred from Time 1 to 2 (63% retention rate). The final sample (n = 299) represented 49% of the original sample of 614 that agreed to be recontacted.

Table 2.1. Survey schedule and outcomes

	Year	Age of sample	Sample obtained
Time 1	September 2005	16-19 years	684*
Time 2	June-July 2007	17-21 years	386
Time 3	September 2008	18-22 years	299
Time 4	November 2009	19-23 years	256

* 614 agreed to be recontacted. 341 of the original 2005 sample were aged < 18 years.

The analyses described in this report are based on the 256 cases for which there is complete data at all 4 time-points. This sample comprised 50% female and 50% male participants and was very similar to the original sample of 341 adolescents in terms of demographics, problem gambling scores as well as gambling participation rates for all forms of gambling.

The survey was conducted by Harrison Health Research using a computer assisted telephone interview (CATI). Up to 10 callbacks were allowed to each household. In the original 2005 survey, the data were weighted by the gender, age, household size so that the total sample reflected the broad demographic characteristics of the South Australian population as based on the most recent Australian Bureau of Statistics Census.

2.2 Measures

The larger 2005 survey and the subsequent follow-up surveys contained a variety of measures, although not all of these are summarised in this current report because not all were amenable to longitudinal analysis. The variables of interest in this report were as follows:

(a) Gambling Participation

All respondents were asked to indicate whether and how often they had participated in a range of gambling activities in the previous 12 months. These activities ranged from lotteries, keno, scratch tickets and bingo, to EGMs, racing, casino table games, sports betting and private card games. The frequency of gambling was determined by asking respondents how many times per year, month or week they had gambled on each activity.

(b) Problem or Pathological Gambling

At time 1, 16-17 year old participants completed the DSM-IV-J (Fisher, 1992), a standardised checklist designed to measure pathological gambling in adolescents as based on the DSM-IV criteria. The DSM-IV-J is a 12-item scale that includes gambling behaviours such as a preoccupation with gambling, being restless or irritable when not able to gamble, chasing losses, spending lunch money on gambling, stealing to fund gambling and the presence of social conflict. The items are scored using a yes/no format with a total score of 4 or more indicative of problem gambling. The internal reliability of this scale has been found to be very good in other South Australian studies (Delfabbro & Thrupp, 2003). Adult participants (aged 18+ years) were administered the Problem Gambling Severity Index (PGSI) from the Canadian Problem Gambling Index (Ferris & Wynne, 2001). The PGSI is a 9-item scale in which respondents rate their endorsement of a series of statements on a 3-point scale, where 0 = Never, 1 = Some of the time, 2 = Most of the time, 3 = Almost always.

(c) Early Experiences and Motivations

Respondents were asked to indicate whether they had obtained a big win or loss when they had first started gambling. They were also asked at what age (in years) they first gambled for money and their principal motivations for gambling (e.g., for enjoyment, to win money, to escape problems).

3. Results

3.1 Prevalence of gambling participation over time

An initial analysis examined the percentage of respondents who reported gambling at each of the four interview points. A summary of these data is provided in Table 3.1. Table 3.1 shows how participation rates change over time as the sample made the transition from adolescence into early adulthood. From Time 1 to Time 4, the rate of lottery participation increased by 2.5 times, a third more purchased scratch tickets, 3 times as many respondents gambled on sports betting, and 2.5 times as many gambled on racing. Reported EGM participation rates doubled over this four year period. By contrast, there was relatively little change in keno, bingo, or private card games. Much of the change in participation occurred from Time 1 to Time 2. McNemar Change Tests applied to these data showed significant increases in participation from Time 1 to Time 2 for lotteries, private card games, sports betting, EGMs and racing. As might be expected, the participation rates for Time 3 and 4 were most similar because the entire sample was aged over 18 by this time and therefore legally able to gamble on all the activities listed.

Table 3.1 Longitudinal participation patterns (n = 256)

	Time 1 2005 N (%)	Time 2 2007 N (%)	Time 3 2008 N (%)	Time 4 2009 N (%)
Lotteries	33 (12.9)	52 (20.3)	66 (25.8)	79 (30.9)
Scratch Tickets	81 (31.6)	115 (44.9)	107 (41.8)	109 (42.6)
Keno	26 (10.2)	27 (10.5)	29 (11.3)	27 (10.5)
Bingo	15 (5.9)	13 (5.1)	7 (2.7)	11 (4.3)
Private card games	35 (13.7)	68 (26.6)	49 (19.1)	47 (18.4)
Sports betting	16 (6.3)	44 (17.2)	46 (18.0)	52 (20.3)
EGMs	74 (28.9)	24 (48.4)	146 (57.0)	143 (55.9)
Casino table games	22 (8.6)	44 (17.2)	57 (22.3)	52 (20.3)
Racing	32 (12.5)	50 (19.5)	58 (22.7)	75 (29.3)

3.2 Gender differences in participation

A second analysis involved an examination participation trends for males and females separately. These results are displayed in Figures 3.1 to 3.9.

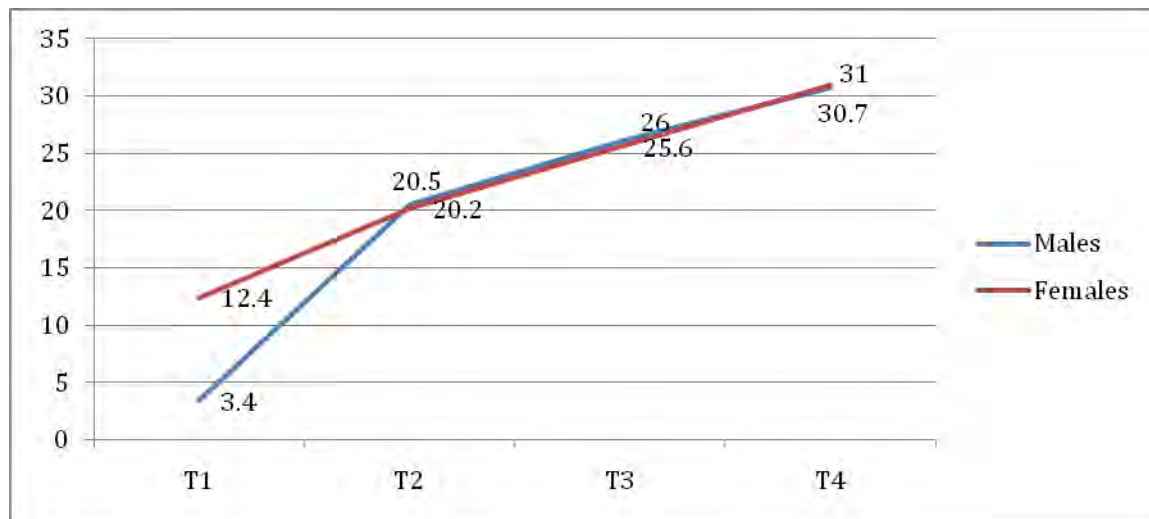


Figure 3.1 Lottery participation trend for males and females

The results in Figure 3.1 show that females start off having a higher lottery participation rate (almost 4 times higher) when the respondents were younger, but the participation rates rapidly converge thereafter and show a consistent rate of growth over the ensuing three years.

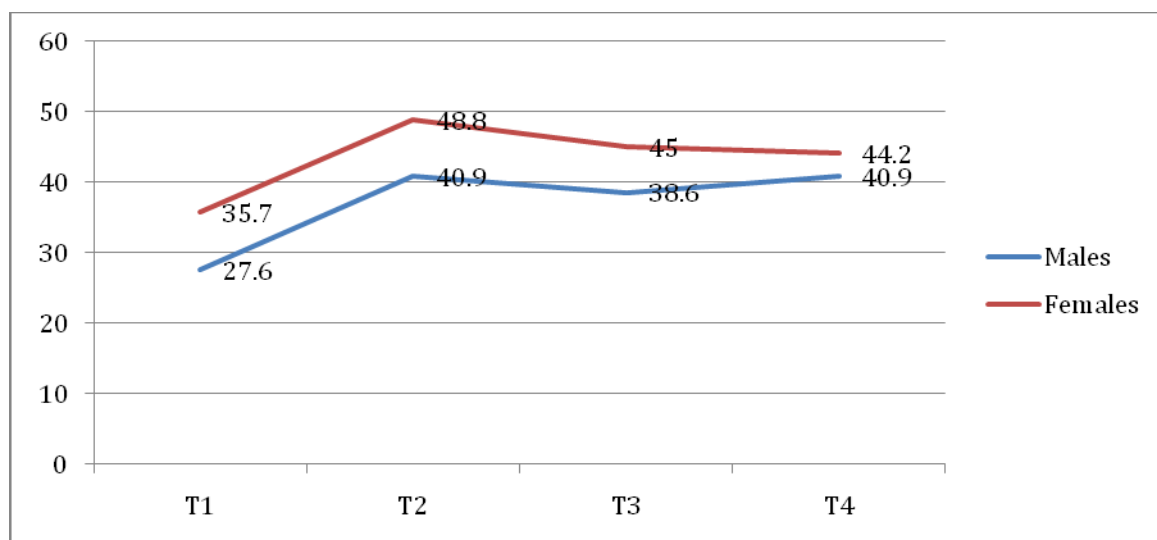


Figure 3.2 Scratch ticket participation trend for males and females

Figure 3.2 shows that the females in the sample were more likely to purchase scratch tickets than males for the duration of the tracking period, although this difference was not significant at the 4th survey point. For both groups, there was evidence of an initial increase in participation rates as the majority of the sample made the transition from adolescence to early adulthood, but then the rate of participation was very consistent thereafter.

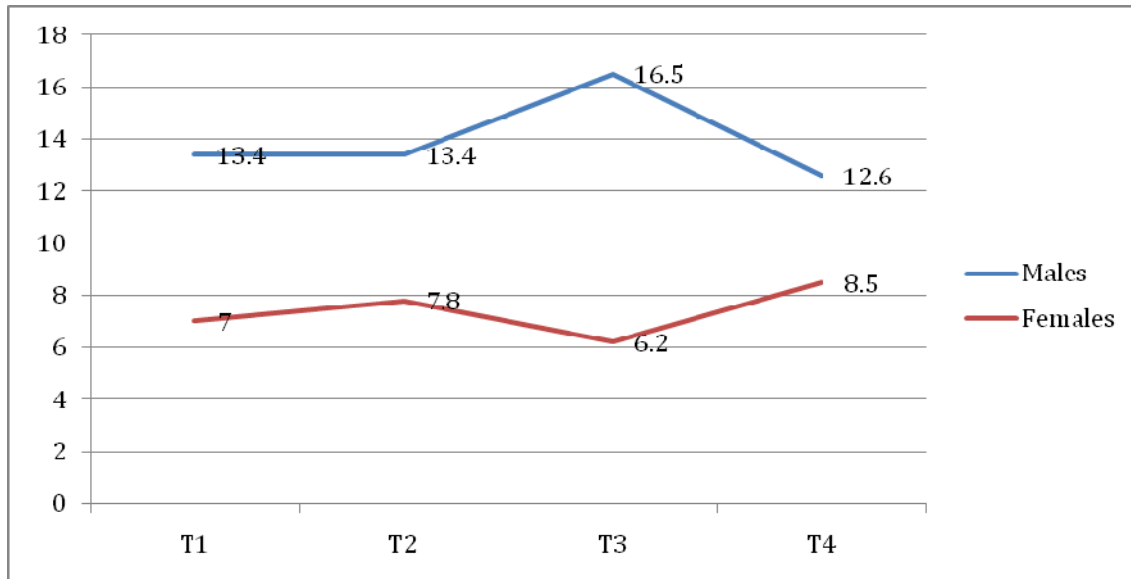


Figure 3.3 Keno participation trend for males and females

As Figure 3.3 indicates, keno was consistently more popular amongst male respondents with the greatest difference being observed at the 3rd survey point (age 18-22 years). By Time 4, the participation rates had started to converge.

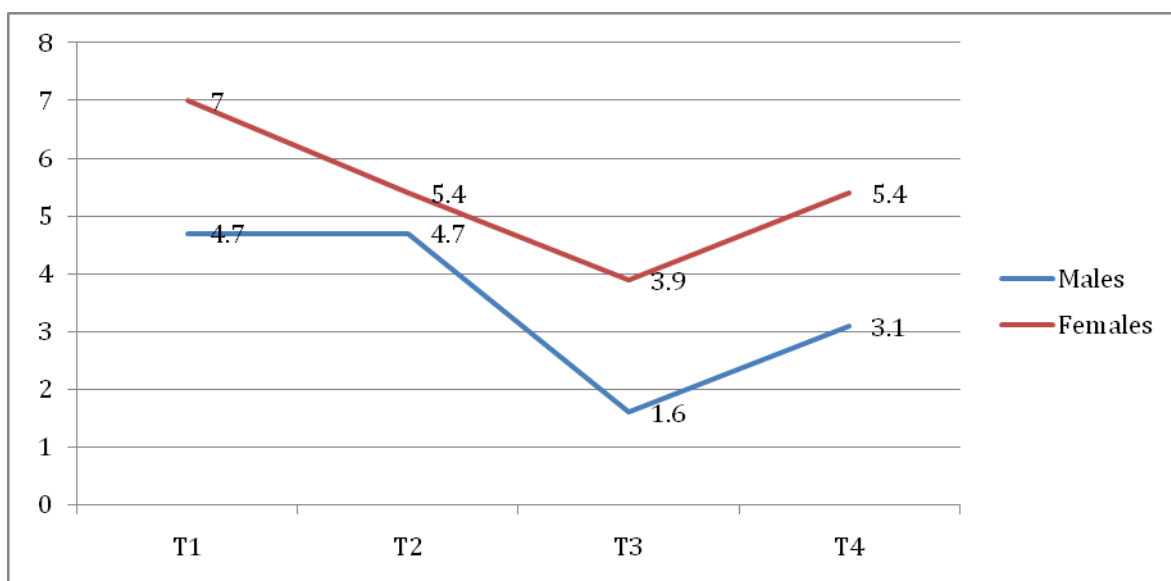


Figure 3.4 Bingo participation trend for males and females

Figure 3.4 shows that bingo was generally (although not significantly) more popular amongst female respondents. There was some evidence for a loss of interest in this form of gambling from adolescence into adulthood, but some evidence of increasing interest as the sample got older.

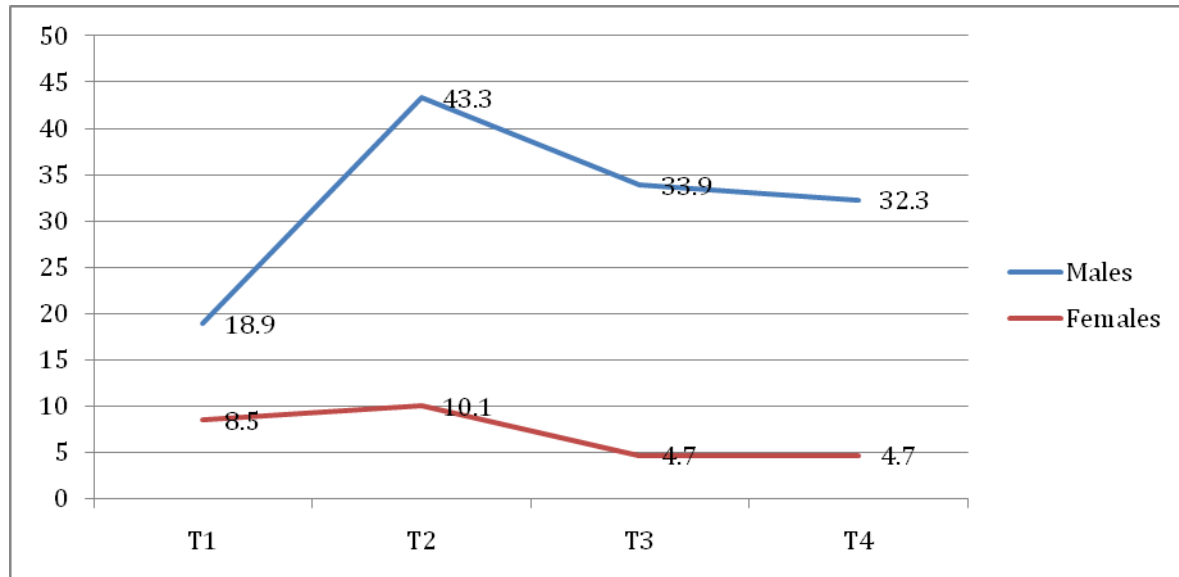


Figure 3.5 Private card game trends for males and females

Figure 3.5 shows that playing private card games was significantly more likely to be reported by male rather than female respondents. At Time 1, males were over twice as likely to engage in this form of gambling, but around 7 times more likely by the time of the fourth survey. Involvement in this activity remained consistently low for females, initially increased for males, but then stabilised once the sample had reached adulthood.

Sports betting (Figure 3.6) participation rates were consistently higher amongst males at all time points, although participation rates steadily increased over time for both groups. This rate of increase was very consistent amongst males (almost monotonic).

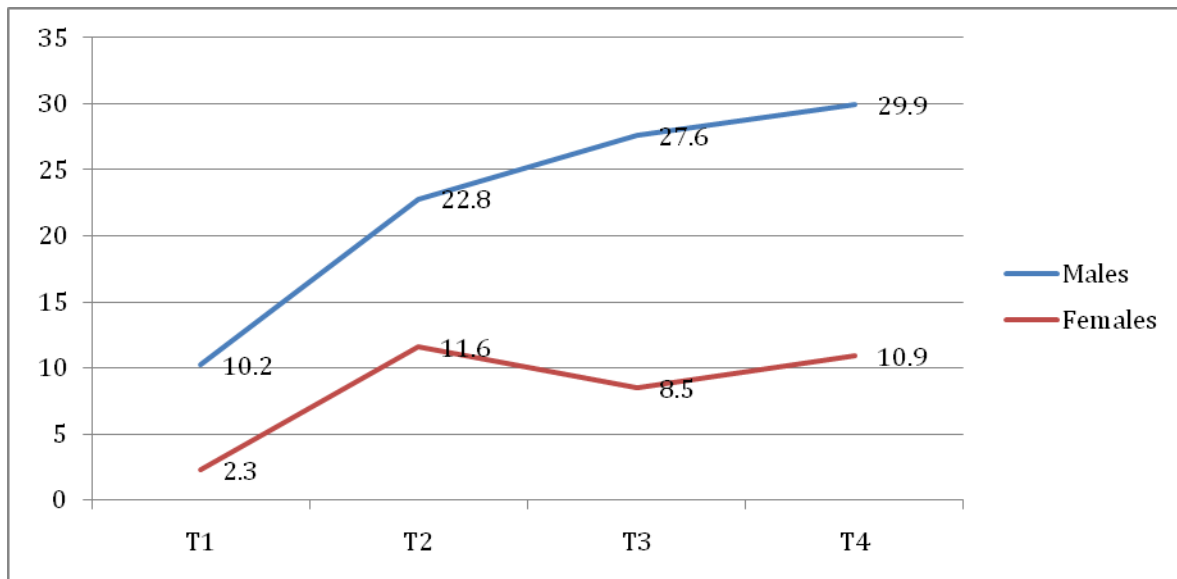


Figure 3.6 Sports betting trends for males and females

As Figure 3.7 shows, EGM participation rates were very similar for males and females. Participation rates were very similar at every time point and there was a steady increase in participation rates across time.

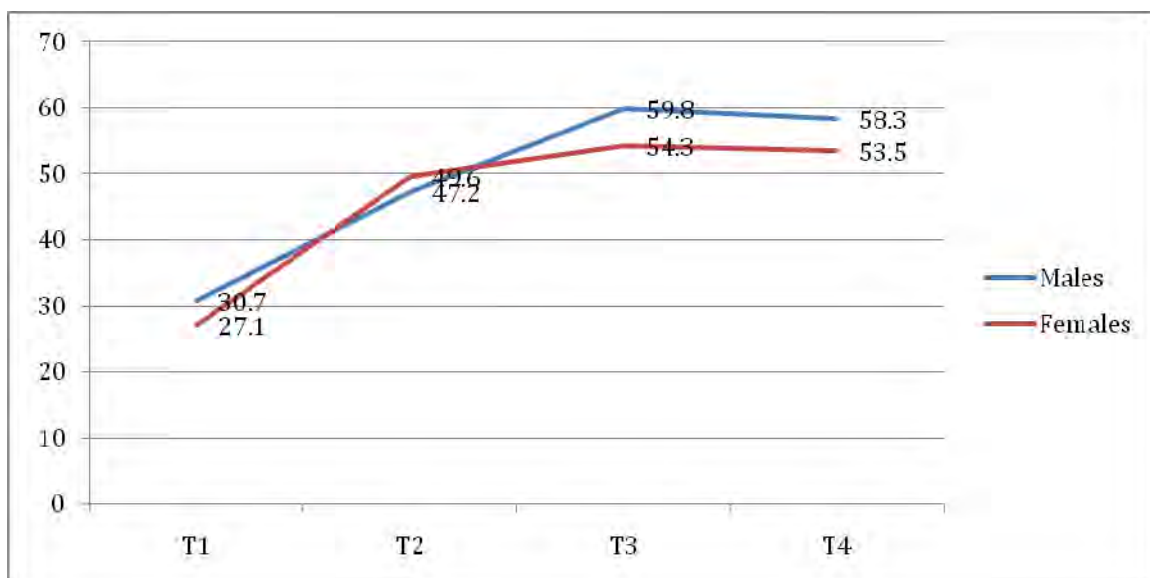


Figure 3.7 EGM participation trends for males and females

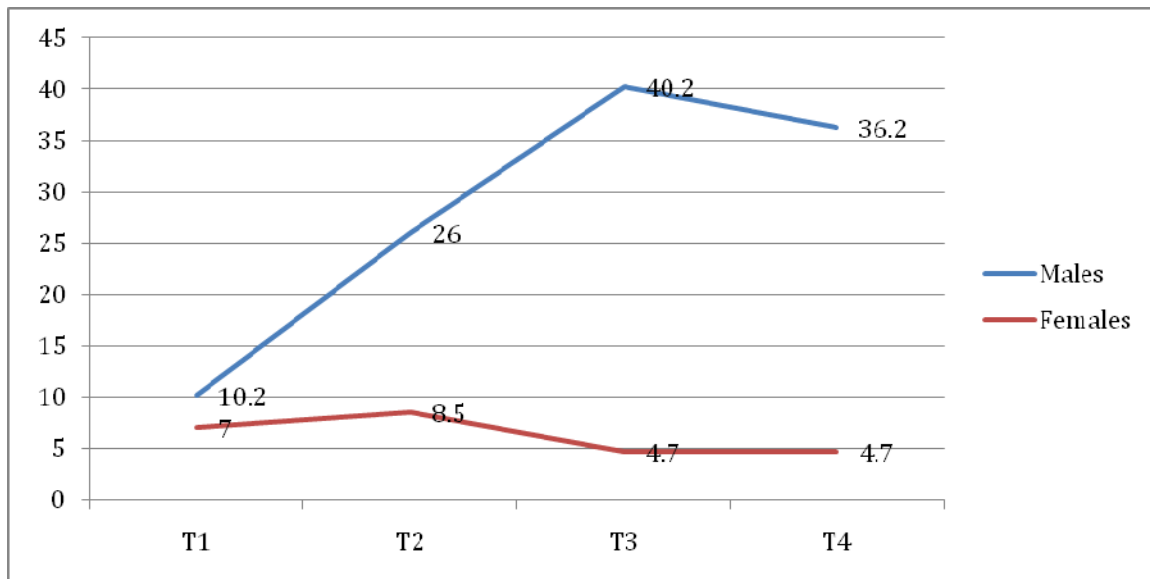


Figure 3.8 Table game participation trends for males and females

There were significant differences in the participation patterns observed for casino table games (Figure 3.8). Although both groups started off relatively similar, the two rates rapidly diverged as more and more of the sample made the transition into adulthood. By Time 3 (age 18-22 years), male participation rate were over 9 times higher than for females and a similar difference remained at Time 4.

Racing participation rates were generally similar when the respondents were 16-17 years of age, but rapidly diverged once the sample reached adulthood. Male participation rates were around 8-10% higher throughout the course of the study (Figure 3.9).

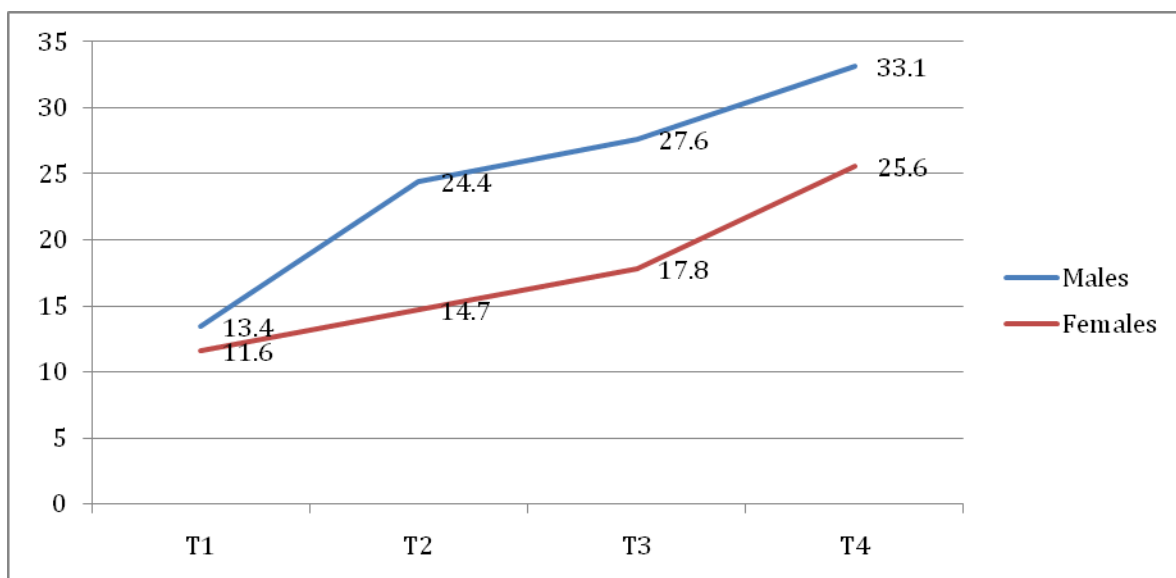


Figure 3.9 Racing participation trends for males and females

3.3 Consistency of gambling involvement over time

Given the availability of data from the sample respondents across multiple time points, it becomes possible to ascertain the consistency of participation in individual activities. In other words, if a person gambled on a particular activity in one survey, did they also gamble on the same activity when surveyed a year or two later? Consistency can be determined deriving counts for each individual across each activity: 0 = The person never gambled on the activity, 1 = The person gambled on the activity at only one point in time, 2 = Gambled at 2 points in time, 3 = Gambled at 3 points in time, and 4 = Gambled at all 4 points in time. A summary of the results of this analysis are presented in Table 3.2.

Table 3.2. Consistency of participation in individual activities

	0 times	1 time	2 times	3 times	4 times
Lotteries	131 (51.1)	63 (24.6)	34 (13.3)	13 (5.1)	15 (5.9)
Scratch tickets	83 (32.4)	49 (19.1)	43 (16.8)	47 (18.4)	34 (13.3)
Keno	192 (75.0)	37 (14.5)	15 (5.9)	6 (2.3)	6 (2.3)
Bingo	218 (85.2)	32 (12.5)	5 (2.0)	0 (0.0)	1 (0.4)
Private card	159 (62.1)	49 (19.1)	31 (12.1)	16 (6.3)	1 (0.4)
Sports betting	164 (64.1)	46 (18.0)	31 (12.1)	10 (3.9)	5 (2.0)
EGMs	47 (18.4)	62 (24.2)	50 (19.5)	63 (24.6)	34 (13.3)
Table games	161 (62.9)	42 (16.4)	29 (11.3)	21 (8.2)	3 (1.2)
Racing	142 (55.5)	54 (21.1)	30 (11.7)	19 (7.4)	11 (4.3)

Table 3.2 provides a summary of overall participation rates across the 4 measurement points, so by subtracting the figures in the second column from 100% it becomes possible to determine what percentage of the sample reported gambling on the different activities throughout the study. As indicated, by far the most commonly reported activity was EGM playing. Only 18% of the sample never played EGMs. Two-thirds of the sample gambled on scratch tickets, almost half on lotteries and just under a half on racing. By contrast, only 25% ever played keno and only around a third gambled on table games, cards, or placed sports bets. Table 3.2 shows that only a relatively small proportion of the sample reported gambling on the same activity at every time point. Thirteen percent gambled on EGMs and scratch-cards at all four survey points, 6% consistently on lotteries, but all other figures were below 5%. In other words, the results suggest that people's gambling habits are quite variable from one year to the next.

3.4 Adolescent vs. Early Adult Trajectories

The original sample of young people interviewed in 2005 comprised both adolescents (< 18 years) as well as some young people who were 18-19 years old. Since adolescents cannot legally gamble on commercially available forms of gambling, it may therefore be somewhat misleading for participation figures to be presented at each time point without separating out these two groups. It is also important example how participation rates develop over time from a true adolescent sample as they age into adulthood and whether this shares any similarities with the patterns observed during early adulthood. To conduct these analyses, two groups were created. Group 1 (adolescents, n = 142) comprised those who were 16-17 years old at the time of the first survey and Group 2 (adults, n = 114) comprised those who had been 18-19 years when first interviewed. These two groups did not differ in their gender composition. Participation rates were determined both of these groups at the different time points and then compared over time.

The first set of comparisons conducted using the 2005 data (Time 1) is presented in Table 3.3 and shows that young adult participation rates were significantly higher than for the adolescents. In fact, very few adolescents reported gambling on anything other than scratch tickets. The largest difference was for EGMs, with young adults being over 11 times more likely to report this form of gambling than adolescents.

Table 3.3. Adolescent (n = 142) and adult (n = 114) participation comparisons (Survey 1, 2005)

	Adolescents (16-17 yrs) N (%)	Adults (18-19 yrs) N (%)	X ²
Lotteries	9 (6.3)	24 (21.1)	12.19***
Scratch tickets	41 (28.9)	40 (35.1)	1.13
Keno	9 (6.3)	17 (14.9)	5.10*
Bingo	6 (4.2)	9 (7.9)	1.54
Private card games	14 (9.9)	21 (18.4)	3.92*
Sports betting	6 (4.2)	10 (18.8)	2.23
EGMs	7 (4.9)	67 (58.8)	89.2***
Table games	4 (2.8)	18 (15.8)	13.5**
Racing	12 (8.5)	20 (17.5)	4.78*

Table 3.4 shows that the participation rates amongst both groups increased over time for many of the activities, but that the increases were greater for the adolescent group as they

made the transition to adulthood. By the second survey, there are now only four activities (lotteries, EGMs, table games and racing) that are more commonly reported by the adult group.

Table 3.4. Adolescent (n = 142) and adult (n = 114) participation comparisons (Survey 2, 2007)

	Adolescents (17-19 yrs) N (%)	Adults (20-21 yrs) N (%)	X ²
Lotteries	19 (13.4)	33 (28.9)	9.47**
Scratch tickets	67 (47.2)	48 (42.1)	< 1
Keno	14 (9.9)	13 (11.4)	< 1
Bingo	7 (4.9)	6 (5.3)	< 1
Private card games	34 (23.9)	34 (29.8)	1.21
Sports betting	21 (14.8)	23 (20.2)	1.29
EGMs	59 (41.5)	65 (57.0)	6.06*
Table games	18 (12.7)	26 (22.8)	4.56*
Racing	19 (13.4)	31 (27.2)	7.68**

When one reaches the third survey, a time when both groups are all adults, there are no longer any significant differences in participation. In other words, the two groups end up being very similar in their gambling preferences. Almost identical figure were obtained at the fourth survey point so these results are not presented.

Table 3.5. Adolescent (n = 142) and adult (n = 114) participation comparisons (Survey 3, 2008)

	Adolescents (18-20 yrs) N (%)	Adults (21-22 yrs) N (%)	X ²
Lotteries	30 (21.1)	36 (31.6)	3.61
Scratch tickets	56 (39.4)	51 (44.7)	< 1
Keno	14 (9.9)	15 (13.2)	< 1
Bingo	5 (3.5)	2 (1.8)	< 1
Private card games	26 (18.3)	23 (20.2)	< 1
Sports betting	29 (20.4)	17 (14.9)	1.30
EGMs	84 (59.2)	62 (54.4)	< 1
Table games	29 (20.4)	28 (24.6)	< 1
Racing	28 (19.7)	30 (26.3)	1.57

3.5 Frequency of Gambling at Time 4 as Predicted by Adolescent Gambling

A potentially important policy issue is whether earlier involvement in gambling is related to subsequent gambling (four years later). This issue is particularly important when considering the results for the adolescent group in determining whether under-aged gambling relates to subsequent adult gambling. To examine this question, a series of analyses were conducted using the two groups identified above (Adolescents and Young adults). For each type of gambling, respondents were divided into groups based on whether they did, or did not, gamble on that particular form of gambling in the Time 1 survey. The dependent measure for each of the analyses was the level of participation in each form of gambling at Time 4 (expressed as a rate per year). Thus, the analysis involved a 2 Group (Adolescent vs. Young Adult) x 2 Baseline Involvement (Yes/ No) Analysis of Variance for each type of gambling. For example, for EGMs, this mean that the analysis examined whether participation at Time 1 (yes/ no) was related to the frequency of gambling on EGMs at Time 4. This relationship was, in effect, analysed for both the original adolescent and young adult group.

The frequency of gambling on each activity in Time 4 is summarised in Table 3.6. As indicated, there are mean rates for all four cells of the design. For almost all of the activities, the participation rates at Time 4 are higher if the respondent had gambled on that activity at Time 1 (the Yes columns). This effect was significant for: lotteries, scratch tickets, keno, private card games, and racing. None of the 2 Group x 2 Participation Time 1 interactions were significant, so this was not necessarily an effect that was any more strongly observed in adolescents. For both groups, having an involvement at Time 1 for the activities listed above was associated with more frequent participation at Time 4.

Table 3.6. Annual frequency of participation (Time 4) in relation to age-group and participation at Time 1

	Original Adolescent Group (n = 142)		Original Young Adult Group (n = 114)	
	Yes	No	Yes	No
Participation 2005? →	M (SD)	M (SD)	M (SD)	M (SD)
Lotteries	3.44 (8.50)	1.23 (3.46)	7.87 (17.27)	1.64 (6.27)
Scratch tickets	5.34 (6.66)	1.65 (3.94)	4.27 (16.40)	1.60 (6.39)
Keno	1.89 (4.37)	0.66 (2.95)	1.83 (3.28)	0.12 (0.67)
Private cards	5.71 (8.42)	1.12 (4.15)	4.57 (12.26)	1.89 (6.85)
Sports betting	2.17 (5.31)	1.28 (6.08)	4.30 (6.03)	0.57 (1.68)
EGMs	6.29 (9.81)	4.82 (11.85)	5.18 (8.90)	4.00 (11.20)
Table games	0.75 (0.96)	0.85 (2.55)	1.16 (3.07)	0.69 (3.01)
Racing	16.83 (34.37)	1.09 (5.20)	2.01 (9.05)	9.30 (25.04)

3.6 Multivariate Modelling of Time 4 Gambling Involvement

To determine how well earlier gambling involvement predicted gambling at Time 4, a series of logistic regression models was completed for each type of gambling. For each analysis, the dependent measure was participation at Time 4 (e.g., Lottery 0 = No, 1 = Yes) and the predictors were participation variables (0 = No, 1 = Yes) from each of the previous three surveys. A simplified version of the final analyses is provided in Table 3.7. The table shows the odds-ratios for significant predictors and the percentage of cases correctly satisfied (an indicator of the strength of the model). Each odds-ratio indicates the influence of each variable on participation at Time 4, e.g., 2.70 at Time 2 would indicate that a person who participated in that activity at Time 2 was 2.70 times more likely to participate at Time 4.

Table 3.7 indicates that, for some forms of gambling (e.g., lotteries, scratch tickets, private cards, EGMs and table games), the best predictor of participation at Time 4, was what the person had been doing the year before (Time 3). Participation at Time 1 was generally not predictive of participation at Time 4 except for scratch tickets and racing. Participation two years prior to Time 4 was also generally predictive of subsequent participation, but not as strongly as for reported behaviour at Time 3.

Table 3.7 Multivariate predictors of participation at Time 4 (odds-ratios)

	Time 1 Participation	Time 2 Participation	Time 3 Participation	% cases correctly classified
Lotteries	-	4.77	5.18	77.6
Scratch tickets	2.07	3.00	5.45	75.8
Keno	-	5.35	4.36	90.6
Private cards	-	3.68	10.09	87.1
Sports betting	-	2.78	4.73	86.9
EGMs	-	2.07	5.71	73.0
Table games	-	-	10.38	82.0
Racing	2.42	4.20	-	76.6

Note: - = Not significant predictor

3.7 Consistency in gambling-related problems

Very few of the 256 respondents reported difficulties with gambling in any of the four surveys. At time 1, only 2 respondents could be classified pathological gamblers. At Time 2, 2 were moderately at risk on the PGSI, 6 were moderately at risk at Time 3, and 7 were moderately at risk at Time 4. No problem gamblers were identified at Times 2-4. An analysis was undertaken to determine whether those who reported at least one symptom on the screening instruments also reported problems at other times. In total, 33 (12.9%) scored 1 or more on a screen at once during the course of the study (i.e., across the 4 surveys). Of the 16 who scored at least one point at time 4, 12 of them had scored previously (75%), but none of these 16 scored a point in the first survey. In other words, there was very little consistency in the reporting of gambling-related problems. In particular, there was little evidence that young people who scored positively at Time 4 had any history of having reported similar problems as adolescents.

3.8 Gambling-related problems at Time 4

An analysis of the 16 respondents who scored at least 1 point on the PGSI at Time 4, showed that all but 1 of these people were male, but that there were no significant age differences. When their gambling habits at Time 1 were compared to those who scored 0 on the PGSI at Time 4, it was found that the group of 16 were significantly more likely to have played keno at Time 1 (31.3% vs. 8.8%), played private card games (31.3% vs. 12.5%) and to have

gambled on racing (31.3% vs. 11.3%), all $p < .05$. A further analysis examined whether the 16 differed in the number of different activities reported at Time 1. There was a trend towards the 16 having engaged in a larger number of activities ($M = 2.06$, $SD = 1.88$ for the 16 $M = 1.25$, $SD = 1.65$ for the rest of the sample), but this only approached significance, $t(254) = 1.89$, $p = .06$. Those who had non-zero PGSI scores at Time 4 did, however, report one important difference. This group was significantly more likely (62.5%) to have recalled having experienced a large win when they started gambling as compared with the other group (25.1%), $\chi^2(df = 1, N = 256) = 10.39$, $p < .01$. They were also more likely to have started gambling earlier ($M = 16.63$ years, $SD = 1.63$ vs. $M = 17.62$, $SD = 1.75$), $t(254) = 2.22$, $p < .05$. Other analyses showed that the two groups did not differ in their likelihood of reporting a large loss when they started gambling, or with whom they first gambled, in their motivations for gambling, or in how they family members gambled.

4. Discussion

The purpose of this study was to examine the stability of gambling patterns as young people progressed from adolescence to adulthood as well as the association between adolescent and adult gambling. On the whole, the findings were generally consistent with a very similar study conducted by Delfabbro et al. (2009). Young people's gambling habits varied considerably from one year to the next. Only a relatively small proportion of the sample reported gambling any one type of gambling in all four surveys. There were also few significant associations between gambling participation at age 16-17 years and participation four years later. While there was evidence that early gambling on racing and scratch cards predicted subsequent gambling, this was not found to be so for all the other forms of gambling. Instead, the best predictor of participation in specific activities during adulthood was what the respondents had reported doing in the previous year. A further series of analyses similarly found little consistency in respondents' reporting of problems related to gambling. Once again, it often did not follow that those who reported difficulties with gambling in any one year necessarily reported problems in subsequent years. Nevertheless, it was possible to identify some adolescent precursors that were associated with gambling-related problems during adulthood. Those who reported having at least some problems with gambling at the age of 20-21 years were more likely to have gambled on a number of activities at the age of 15-16 years, tended to start gambling at an earlier age and also were more likely to report a larger win when they first started gambling.

The finding that gambling habits are not stable over time highlights the importance of using longitudinal rather than cross-sectional studies in this area of research. The vast majority of young people in South Australia do not have regular gambling habits, but engage in gambling in a casual and infrequent manner. Although this study did not specifically examine the detailed social context underlying gambling participation, it is likely that this inconsistency could reflect a variety of factors. For example, it may be possible that much of the reported gambling was opportunistic. In other words, gambling may have occurred only because young people happened to be in the proximity of a gambling venue or site (e.g., newsagent, hotel) while engaged in other activities, rather than the gambling being the primary motivation for going out. Others might have gambled because others around them (e.g., families or friends) were gambling or because of the occurrence of a particular event (e.g., a high profile sporting event or race, large lottery jackpot). If so, then much of the gambling observed would be subject to the

same variations as these activities and opportunities, so it would therefore be less likely that respondents would gamble on the same activity over time. Not only would their frequency of gambling vary from one year to the next, but there would also be differences in the likelihood of them developing any problems associated with gambling because of the varying level of involvement.

Although some evidence was found to support an association between early gambling involvement and subsequent gambling problems, the balance of evidence provides little support for the view that gambling at age 15-16 years is a risk factor for subsequent problems. Very few young people reported gambling problems in this sample and most positive scores on the PGSI were in the low-risk range. Moreover, as indicated above, other analyses showed that gambling at 15-16 years of age was generally not associated with gambling four years later (except for racing and scratch tickets).

The study also provided useful insights into gender differences in gambling involvement and how gambling involvement developed over time. To a large extent, males reported a significantly higher degree of involvement in gambling than females for most activities and these differences were maintained over time. For both genders, there was a rapid increase in involvement once young people made the transition from adolescence to adulthood and were able to gamble legally on commercially available activities. The rates of growth were generally similar for most activities, but there was clear evidence of a divergence of interest for both sports betting and casino table games. For both of these activities, the proportion of males who reported involvement was disproportionately higher during adulthood than during adolescence which is consistent with the view that these activities still remain much more popular amongst young men than younger women. These findings are generally consistent with the results obtained in other Australian studies (e.g., S.A. Department for Families and Communities, 2005) and very likely reflect broader gender differences in activity preferences, motivations for gambling and preferences for different gambling environments (Delfabbro, 2000; Delfabbro & LeCouteur, 2010).

The finding that reported gambling difficulties or symptoms of problem gambling during adulthood were associated with early wins and an earlier commencement with gambling is entirely consistent with other research that has examined the same variables (Delfabbro & LeCouteur, 2011). It is known that early wins can have what is termed a 'priming effect'. Not only are such wins more reinforcing for gamblers, but they are also more likely to be remembered and to be influential in shaping how people perceive themselves as gambling.

Those who obtain early wins are more likely to develop positive expectations about their chances of winning and to develop mental schemas that are associated with successful outcomes.

In conclusion, as with most studies of this nature it is important to take a number of methodological limitations into account when interpreting the results. First, although this study was based on participants who had originally been selected using probability sampling from the broader community, many of the original participants did not respond, or could not be contacted, in subsequent waves of the survey. It is possible, therefore, that those who chose to participate in the survey at all four time points may have differed in some systematic way from others who did not respond. These concerns are partly allayed by the fact that comparisons of base-line characteristics indicated no systematic biases in relation to the gender composition of the follow-up sample, nor in their original gambling habits, but it is not possible to rule out the possibility that the subsequent gambling habits of the retained sample may have differed from that of the non-retained sample. Second, this study is limited by the fact that the sample is relatively small and only contained very few respondents with gambling-related problems. Thus, it was not possible to conduct a detailed analysis of the stability of classifications of risk as based on the PGSI. Finally, while the sample was drawn using an appropriate sampling strategy, it is recognised that young people who take part in telephone surveys may differ significantly from those who do not. The prevalence of gambling problems in the original sample of 15-16 year old was significantly lower than almost every school-based survey conducted in Australia over the last decade. While it is not inconceivable that the school surveys may also be subject to biases in the opposite direction (i.e., inflation of prevalence rates due to less random selection methods), there remains the possibility this telephone survey was unable to sample many young people with a stronger interest in gambling. If this were the case, then this present study may not have been well positioned to examine the early gambling careers of those young people who are most at risk at developing subsequent gambling problems as adults.

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