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Adolescent Land-Based and Internet Gambling: Australian and International Prevalence Rates and Measurement Issues

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Abstract

Purpose of Review This review summarizes recent studies of adolescent gambling in Australia and overseas. Its purpose is to examine variations in participation in gambling activities, including land-based and Internet gambling, and in measurement approaches to studying gambling-related problems.

Recent Findings Between 15 and 80% of young people report past-year gambling participation, typically involving scratch cards, lotteries, card games and sports betting. Around 5% report past-year Internet gambling. Estimates of problem gambling among adolescents vary, with Australian figures generally between 1 and 5%, and studies in the USA, Canada, UK, Italy and Finland generally reporting rates of 1 to 7%. Simulated gambling involvement (e.g., gambling-like apps, social casino games) appears more prevalent but its relationship to monetary gambling and problem gambling risk requires further research.

Summary Youth gambling and exposure to gambling-like activities via digital technologies is a global phenomenon that warrants continuing research. Research is required at the conceptual level, for example, to identify relevant harms and map links to other risk behaviours, and at the methodological level to identify optimal measurement approaches. This includes considering respondents' level of involvement in reported gambling (active vs passive), recall issues and clearly distinguishing monetary from simulated gambling. Understanding youth gambling is particularly relevant as new digital technology-based gambling activities and promotions become more prevalent and available to young people with the means to access them.

Keywords Adolescent gambling · Problem gambling · Prevalence · Measurement · Tool

Introduction

Research interest in young people's exposure to, and active participation in, gambling has grown substantially over the last two decades [1•]. This attention has increased in response to concern among academics, policymakers and parents that gambling is pervasive and widely promoted, including across many digital channels [2, 3]. Gambling products and promotions may be found across websites, television, radio and social media, and new gambling forms have emerged such as esports, loot boxes and fantasy sports that may be particularly attractive to young people [4•, 5]. Gambling activities have also become much more accessible over the last decade, with an abundance of opportunities afforded by low-cost access via smartphones and other portable online-enabled devices. Smartphones and similar devices also afford access to games with simulated gambling activities that are freely and widely available to young people [5•]. These environmental and structural changes have enabled gambling activities to be highly visible, socially connected and accepted, and accessible. Gambling activities also intersect with other popular leisure pastimes such as video gaming and sport, which may facilitate the migration of young people to other forms of gambling in later life [6••]. Particularly among young people with pre-existing vulnerabilities (e.g., depression, anxiety) and difficult life circumstances (e.g., stressful life events, lack of social support), having greater opportunities to gamble may facilitate habitual patterns of gambling that can have negative life consequences, including problem gambling during adolescence or adulthood [7•, 8, 9].

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Many adult gamblers report developing a familiarity and interest in gambling prior to adulthood. However, the extent to which young people are actively involved in gambling and experience problems as a result has been debated for years [10•, 11]. For example, uncertainty exists regarding the veracity of young people's self-reported gambling involvement, with some reported figures prompting queries about how young people gain access to, and money for, these activities [12]. Similarly, young people often report higher rates of problem gambling than adults but also lower insight into these behaviours [13••]. This raises questions as to the nature and extent of harm or distress experienced by this population.

This narrative review summarizes recent survey research on young people's involvement across various forms of gambling. Attention is directed to Australian studies conducted over the last two decades, followed by recent youth gambling studies across other regions, including the UK, USA and Canada. This paper then discusses some considerations in measurement approaches to inform future studies of youth gambling and problem gambling.

Australian Studies of Youth Gambling

Table 1 presents a summary of 13 studies of adolescent gambling conducted in Australia between 2000 and 2016. These studies have primarily been conducted via recruitment from secondary schools and targeting young people aged between 12 and 17 years. The two most common problem gambling measures have been the South Oaks Gambling Screen-Revised for Adolescents (SOGS-RA) [26••] and the Diagnostic Statistical Manual-IV-Multiple Response Format for Juveniles (DSM-IV-MR-J) [27••]. Many of these Australian studies are not nationally representative and thus reported figures should not be considered true prevalence rates. Compared with some other regions, such as Canada and Italy, there have been fewer and less regular studies of youth gambling, with some recent large-scale investigations of gambling in Australia not including younger people (i.e., those under 18 years) within the sampling frame [28, 29].

Delfabbro and Thrupp [14] surveyed 505 adolescents (aged 15–17 years) from a secondary school in South Australia. Their survey examined the major forms of legal gambling available in the state, including cards, slot machines, racing, sports, lotteries, bingo and scratch cards, and any gambling on the Internet. They reported that 62% of adolescents had gambled in the past year, which included 14.7% who gambled on a weekly basis. Lotteries, scratch tickets and sports betting were the most popular gambling forms with between 5 and 7% of participants having weekly involvement in these activities. Males were more likely to report involvement in these activities and to agree that they could not wait to turn 18 to go to gambling venues, would gamble more when they turned 18 years, and would definitely like to gamble more in the future. Overall, 3.5% of the sample scored in the problematic range on the DSM-IV-J. Approximately 9.0% reported one difficulty with gambling, 4.3% reported two difficulties and 1.9% reported three difficulties. More frequent gambling was associated with parental and peer gambling and pro-gambling attitudes, but unrelated to adolescents' attitudes towards economic concepts (e.g., money management, budget-keeping).

Another school-based study by Delfabbro, Lahn and Grabosky [15] surveyed 926 adolescent gamblers across several schools in the ACT. Similar results were reported, with 70% of the sample reporting gambling in the previous 12 months. A slightly lower number (10%) reported weekly gambling, compared with the 2003 South Australian sample. However, this figure was much higher (35.5%) for Aboriginal students. The most popular forms of gambling among all adolescents were private card games (39.8%) and bingo/scratch tickets (40.5%). Betting on racing (32%) and sporting events (26%) was also popular. Commercial gambling activities such as casino card games, poker machines and Internet gambling attracted the least participants (5, 13 and 6%, respectively). The survey also examined the respondent's means of access to gambling. Card games were predominantly played with friends, whereas poker machine and Internet gambling were most commonly undertaken alone, and racing, lottery gambling and scratch tickets with parents. Overall, 41 (4.4%) participants were classified as problem gamblers using the DSM-IV-J measure.

Another study in South Australia by Lambos, Delfabbro and Puglies [16] involved 2669 students aged 12 to 17 years from six co-ed government schools. Participants were asked to indicate how often they had gambled on the following activities: card games (e.g., poker, blackjack for money), poker-machines, racing, sports, lotteries, keno, scratch tickets, bingo and Internet gambling. Participants were also asked to indicate whether they gambled on each of the major gambling forms using their own money, and, if so, how much was spent. A methodological improvement on previous studies was asking participants to report the gambling context, including the following categories: 'By yourself (no one noticed you go in)', 'By yourself using an ID card', 'With the help of other adults', 'With other friends' and 'Other (specify)'. Overall, most respondents (56.3%) had gambled in the last 12 months. Males and older students were more likely to report gambling, but there were no differences according to Aboriginal status or school region. Only 6.3% of the total sample indicated gambling at least once a week. Respondents were most likely to gamble regularly on card games, sports gambling and instant scratch tickets, and least likely to gamble regularly on EGMs and Keno. Among past-year gamblers, 61.1% indicated gambling with their own money. Internet gambling had the highest mean expenditure per session ($18.74) compared with other activities (e.g., $9.75 on card games). Adult assistance was the

Table 1 Summary of Australian studies of adolescent gambling ($n = 13$), in order of publication date (2003–2016)

Author	Sample	PG tool	Prev. of PG (% problem only)	Prev. (past-year gambling: any activity)	Past-year prevalence: Online/ simulated gambling? Video gaming?
Delfabbro and Thrupp (2003) [14]	$N = 505$ Aged 15 to 17	DSM-IV-J	3.5	60% (highest for scratch tickets)	Internet gambling (2.4%, $n = 12$)
Delfabbro et al. (2005) [15]	$N = 926$ Grades 7 to 12	DSM-IV-J	4.4 to 5.4	70.4% (highest for sports betting)	–
Lambos et al. (2007) [16]	$N = 2669$ Aged 12 to 17	DSM-IV-J	2.4	56.3% (highest for card games, scratch tickets, sports)	Internet gambling (4%, $n = 106$) Regular video gaming (majority)
Jackson et al. (2008) [17]	$N = 2788$ Grade 8 students	–	–	41% (highest for lottery and racing/sports)	Internet gambling (4%, $n = 100$) 'Poker machines or video games' (13%, $n = 357$)
Kassulke et al. (2009) [18]	$N = 114$ Aged 15 to 19	SOGS-RA	5.3	75.6% for < 18 years (highest for scratch lotto, raffles, poker machines)	Internet gambling (3.7%, $n = 14$)
Dowling et al. (2010) [19]	$N = 612$ Aged 12 to 18	DSM-IV-MR-J	0.7	67.5% (highest for card games)	Internet gambling (4.1%, $n = 36$)
Splevins et al. (2010) [20]	$N = 252$ Aged 12 to 18	DSM-IV-MR-J	6.7	81% (highest for coin tossing, sports, lottery)	Internet gambling (0.3%, $n = 1$)
Purdie et al. (2011) [21]	$N = 1253$ Aged 10–14 $N = 1551$ Aged 15 to 17	DSM-IV-MR-J	3.6 (10–14) 2.7 (15–17)	64% (highest for scratch cards, private card games)	Internet gambling (13–16%)
Nitschke et al. (2013) [22]	$N = 182$ Grades 9 and 10	–	–	51% (highest for dare or challenge, scratch tickets)	Internet gambling (2%) Free computer gambling games (3%) Computer gambling games for money (1%)
King et al. (2014) [23•]	$N = 1287$ Aged 12–17	DSM-IV-MR-J	1.0	At least 15.3% (highest for scratch tickets)	Simulated gambling (13%)
Gainsbury et al. (2015) [5•]	$N = 561$ Aged 12–17	Modified PGSI	Unclear	18% (highest for lottery products, sports betting)	Social casino games (23%)
King and Delfabbro (2016) [24]	$N = 824$ Aged 12 to 17	5-item screener	Unclear	At least 25.1% (highest for scratch tickets)	Internet gambling (> 2.1%) Simulated gambling (14.2%)
King et al. (2016) [25]	$N = 555$ Aged 12 to 17	PGSI	Unclear	At least 37% (highest for sports betting and lottery games)	Social casino games (23.4%)

DSM-IV-J, Diagnostic Statistical Manual-IV-Juveniles; *DSM-IV-MR-J*, Diagnostic Statistical Manual-IV-MR-J (adapted-multiple response format for juveniles); *PG*, problem gambling; *PGSI*, Problem Gambling Severity Index; *Prev*, prevalence; *SOGS-RA*, South Oaks Gambling Screen-Revised for Adolescents

predominant way in which young people accessed casino, venue-based gambling and lottery gambling. Respondents predominantly played poker machines (at a hotel or club) on their own and were able to do so unnoticed, without having to show ID. Furthermore, 15.4% of underage respondents reported gambling at a casino by showing fake ID. In total, 2.4% of respondents were classified as problem gamblers.

Another major study of secondary school students ($N = 2788$, grade 8 only) by Jackson, Dowling, Thomas, Bond and Patton [17] was conducted across four randomly selected schools in Melbourne, Victoria. This study involved a linkage with the Gatehouse Survey which is a broader project on the demographics of adolescent mental health and risk behaviours. While this study did not include a measure of problem gambling, participants were asked if they gambled in the past year with money or possessions (where relevant) on five types of gambling: card games; lottery tickets (e.g., scratch cards, lotto tickets, keno); racing or sports; poker machines or video games; or on the Internet. Respondents were also asked whether they agreed or disagreed with the following statements: gambling (with money or possessions) *is good entertainment*, *is a waste of time*, *is a way to make money*, *makes you feel better*, *is OK as long as you do not overdo it*. Overall, 41% of adolescents had gambled on at least one activity in the past year, and 8% reported engaging in three or more activities. Although the rate of gambling involvement was lower than in previous Australian studies, the rate of Internet gambling (4.4%) among participants was similar or

higher. Boys were more likely to believe that gambling is entertaining, a way to make money, has the ability to improve mood and is acceptable at moderate levels.

Kassalke, Allen, Madden and Brooks [18] surveyed a group of 395 young people aged 15 to 25 years in south-east Queensland, including 114 participants aged 15 to 19 years. Among this subgroup, 75.6% reported past-year involvement in gambling activities using money or possessions. This included 53% of those under 18 years who used scratch tickets. Participation rates in other gambling activities were considerably lower, ranging from 2 to 8%. About a quarter (24.4%) of adolescent respondents reported practice play on the Internet (24.3%). Notably, the proportion of those under the legal gambling age was not significantly different from the proportion of those over the legal age, for any other type of gambling. According to SOGS-RA scores, 5.3% of adolescents aged 15 to 17 years were considered problematic, with an additional 15.9% considered to be at risk.

Dowling, Jackson, Thomas and Frydenberg [19] surveyed 612 high school students at multiple sites across Victoria. This study is noteworthy for its examination of family history of gambling involvement and problems. Overall, 67.5% of participants reported gambling at least once in the previous 12 months, most frequently on scratch cards (48.4%), card games played at home or school (41.7%) and sports betting (18.6%). Participants gambled more often with friends on sports, Internet gambling, table/card games at the casino, poker machines, and card games at home or school. Participants most often gambled with their parents on scratch cards/lotteries (59.8%), horse or dog racing at a land-based venue (62.2%) and horse or dog racing at the racetrack (55.4%). Gambling occurred less frequently in a solitary manner. Overall, 0.7% were classified as problem gamblers (i.e., at a much lower rate than other studies) and 4.4% were classified as at-risk gamblers. Further analyses of family gambling indicated that youth with a family history of problem gambling (parents or siblings) were 3.5 times more likely to report at-risk gambling and 4.5 times more likely to report problem gambling than their peers.

Splevins, Mireskandari, Clayton and Blaszczynski [20] surveyed 252 students, aged 12 to 18 years, recruited from four private schools in Sydney. The authors assessed the frequency of gambling on commercial and non-commercial forms of gambling, net expenditure (defined as the difference between money taken to, and remaining, after each gambling session), changes in expenditure over time and estimated income. They also provided participants with a short definition of gambling for clarification. The majority (81%, $n = 205$) of the sample reported gambling within the past year with slightly less than half ($n = 109$; 43%) having commenced prior to age 11. The median age for onset of gambling was 13 years. Coin tossing, sports betting and lotteries were the most frequent forms of gambling. Adolescents reported using pocket money and part-time jobs to fund their gambling, with no differences found according to gambling status. A total of 17 participants (6.7%), all male, met criteria for problem gambling. However, only 1.2% ($n = 3$) of the sample reported personally recognising having a gambling problem, including only 1 of the 17 problem gamblers.

Purdie et al. [21] conducted a national survey of gambling among youth aged 10 to 24 years, using distinct sampling methodologies across three age groups. This major project funded by Gambling Research Australia is, to our knowledge, the largest Australian study of young people's gambling participation. School-based sampling was used to recruit 10–17-year-olds, with the final age distribution including 1253 participants aged 10 to 14 years, and 1551 participants aged 15 to 17 years. The authors were attentive to what activities students considered to be gambling, to help ensure that only respondents who had participated in some form of gambling were presented with the measure of potential problem gambling. For example, picking numbers for a lottery ticket purchased by someone else and buying raffle tickets were not considered to be gambling, while younger students did not consider sweeps or footy tipping competitions to constitute betting. Overall, 64% of the 15 to 17 age-group had participated in at least one gambling activity in the past year, most commonly instant scratch cards, lotteries and playing card games in private homes with friends or relatives. Very few participants reported participating in any gambling activity on a daily or even weekly basis. Overall, 30% reported gambling with friends, 20% with non-parent others, 12% alone and only 1% with parents. In terms of problematic gambling, as determined by DSM-IV-MR-J scores, 3.6% of participants aged 10 to 14 years, and 2.7% of participants aged 15 to 17 years, were considered problematic gamblers.

Nitschke [22] surveyed 182 students in grades 9 and 10 in Ballarat, Victoria. This study was novel for its inclusion of parent report measures for comparison with the student surveys. However, the surveys were not matched to each parent and child. In total, 51% of students reported participating in at least one gambling activity in the previous 12 months. The most frequently reported was 'a dare or a challenge' in which one-third of the students had participated, followed by scratch tickets and horse racing. Only 2% of students had participated in Internet gambling or gambling through Facebook, 3% in free computer gambling games and 1% in computer gambling games for money. When parents were asked whether they had ever participated in any of the gambling activities for money with their child, just over half indicated they had not done so. The most commonly reported activities they were involved in with their child included raffle tickets for fundraising (32%), scratch tickets (17%), lotto/draw tickets (12%) and horse race betting (11%). Of the parents who participated with their children in gambling activities for money, 20% reported that they had shared a joint lotto/draw ticket with their child once or

twice a year, while about 10% played card games for money with their child. When lotto/draw tickets were examined separately, 94% of parents had never given their child a lotto/draw ticket as a gift. This study did not examine problem gambling behaviours among adolescents or parents.

King, Delfabbro, Kaptsis and Zwaans [23•] surveyed 1287 students aged 12 to 17 years in schools in South Australia. Adolescents reported their past-year involvement in the following gambling activities: card games (e.g., blackjack, poker, etc.), electronic gaming machines, wagering on races or sports, lotteries, scratch cards or 'other'. For each activity, participants indicated whether they had (1) played with money (i.e., financial gambling), (2) played without money involved (i.e., simulated gambling) and (3) for relevant activities (e.g., cards, gaming machines) whether they gambled via the Internet. The most common past-year activity was card games (11.9%). Based on DSM-IV-MR-J scores, the overall prevalence of problem gambling was 1.0%. Additional studies by King and colleagues [5•, 24, 25], have recruited modest samples of young people (i.e., $N = 500$ to 800) and reported comparable figures for past-year gambling involvement, including participation in online gambling and gambling-like activities. The most popular gambling activities in these studies were similar to those reported previously, including scratch cards, lottery and sports betting. In general, these studies reported lower rates of past-year gambling involvement. These studies employed brief problem gambling screeners which may have provided a less valid estimate of problem gambling.

In summary, the Australian research evidence over the past two decades indicates that most young people surveyed reported past-year involvement in at least one gambling activity. Gambling frequency estimates appear to vary based on methodological approach. In particular, some adolescents may have difficulty in determining whether certain activities constitute gambling (e.g., raffles, dares/challenges, card games with mock chips). Certain activities may blur boundaries (e.g., appear similar to gambling without involving any meaningful stakes) and affect the accuracy or confidence of reporting. Additionally, some surveys may compound this issue by not clearly defining gambling, or the conditions that determine 'active' involvement (as opposing to simply observing or accompanying someone to a venue). These issues affect prevalence rates. There is also limited evidence that some adolescents, like adults, who meet the criteria for problem gambling (using standard screening tools) perceive that gambling is not actually a problem for them. Whether this reflects an issue of insight or instrument oversensitivity is not clear. Notwithstanding these issues, the Australian research literature suggests that most young people aged 12 to 17 years have had some recent experience with gambling activities, usually in the form of scratch tickets or lottery products, and that 1 to 4% report symptoms that may indicate problem gambling.

International Studies of Youth Gambling

Table 2 presents a summary of 26 studies of adolescent gambling conducted in international jurisdictions since 2015. These studies do not constitute the totality of international studies of youth gambling; we are aware of at least 70 studies conducted globally and published since 2012. The studies in Table 2 are from countries that are often compared with Australia (i.e., UK, USA and Canada) despite some differences in gambling opportunities and legal gambling age (i.e., 19 years to gamble legally in Canada; 16 years for the National Lottery in the UK). Overall, rates of problem gambling across jurisdictions are mostly consistent with Australian data (albeit with some higher rates, e.g., Italy). Estimates indicate between 40 and 70% of young people report past-year involvement in gambling activities and around 1 to 6% meet the criteria for problem gambling.

Consistent with Australian data, Internet gambling is being accessed by about 5 to 15% of young people. However, it is not entirely clear which activities are being accessed and how these activities may be funded. There is also inconsistent coverage of non-land-based gambling activities across these studies. Table 2 shows that few studies have measured participation in online gambling or gambling-like activities (e.g., monetized video games, including paid loot boxes). Many studies do not clearly report how these activities are defined (e.g., referring generally to 'gambling on the Internet'), how they are accessed online (i.e., online platform) and what payment method might be involved (e.g., [33••, 36••, 37, 38, 42, 48••, 54]).

Measurement of Problem Gambling

The measurement of problem gambling among young people has been strongly influenced by the approaches used to assess adult problem gambling [56]. Commonly used survey instruments for youth problem gambling have been based on the DSM-IV-TR conceptualisation of gambling disorder. The three most used measures in youth gambling research since 2015 are the DSM-IV-MR-J [56], SOGS-RA [26••] and PGSI [57]. These measures reflect the conceptualization of gambling disorder as an acquired addictive disorder (i.e., a repetitive behaviour characterised by impaired control). There is a strong emphasis on over involvement and escalating involvement in gambling, and overspending/increasing financial commitment. This is evident within items referring to making increasingly large bets, experiencing difficulties as a result of overspending, and needing to borrow or steal to fund gambling activities. These measures also refer to theft from home and outside of the family (shoplifting), whereas measures of adult problem gambling tend to emphasise fraud and embezzlement. However, there are some necessary differences from

Table 2 Summary of selected international studies ($n = 26$) of adolescent gambling, arranged by region and in order of publication date (2015 to 2019)

Author	Sample	PG tool	Prev. of PG (% problem only)	Prev. (past-year gambling: any activity)	Past-year prevalence: Online/simulated gambling? Video gaming?
Canada					
St. Pierre et al. (2015) [30]	$N = 419$ Aged 14 to 17	DSM-IV-MR-J	1.4	50% (last 3 months) (highest for scratch cards, dare/challenge)	Internet poker (7.3%)
Taylor et al. (2015) [31]	$N = 2004$ Aged 14 to 18	DSM-IV-J	Unclear	–	–
Cook et al. (2015) [32••]	$N = 4851$ Grade 7 to 12	SOGS-RA (6 items)	2.0 to 2.8	–	–
Carbonneau et al. (2015) [33••]	$N = 1882$ Age of 15	SOGS-RA	1.1	–	Internet gambling (NR)
Elton-Marshall et al. (2016) [34••]	N = 10,035 Grades 9 to 12	Gambling Problem Severity Subscale (GPSS) of the CAGI	1.2 (land-based) 17.4 (online)	41.6% (last 3 months) (highest for sports pools, slot machines, cards)	Internet poker (9.1%), Internet slots (4.9%), Facebook simulated gambling (9.0%), gambling on video game outcomes (14.5)
McBride and Derevensky (2016) [35•]	$N = 1229$ Aged 16 to 17	DSM-IV-MR-J	.48	52.2% (specific activities not reported)	–
Turner et al. (2018) [36••]	$N = 3369$ Aged 13 to 20	GPSS/CAGI	1	At least 11% (highest for sports pool, lottery tickets, card games)	Internet gambling (4.2%)
			USA		
Weinberger et al. (2015) [37]	$N = 1591$ Grades 9 to 12	MAGS	33.8 (ARPG)	At least 78% (highest for gift scratch cards, card games, social bet)	Internet gambling (19.7%)
Foster et al. (2015) [38]	$N = 1988$ Grades 9 to 12	DSM-IV criteria	15.4 (ARPG)	At least 40% (specific activities not reported)	Internet gambling (14.4)
Simmons et al. (2016) [39]	$N = 1076$ Aged 13 to 20	SOGS-RA	13.0	65.0% (specific activities not reported)	–
Richard and Derevensky (2017) [40••]	$N = 6818$ Aged 10 to 19	NODS-CLiP	6.7	31% (highest for card games, sports betting)	Mobile phone gambling (5%)
Grande-Gosend et al. (2019) [41•]	$N = 7045$ Grades 7 to 12	NODS-CLiP	2.7	30% (specific activities not reported)	–
Rider et al. (2019) [42]	$N = 2168$ Grade 9 to 11	BAGS	1.7	31.7% (highest for card games, sports betting)	Internet gambling (3.1%)
UK					
Calado et al. (2017) [43]	$N = 988$	DSM-IV-MR-J	6.2	79.4% (highest for sports betting, scratch cards)	Gambling in social media sites (7.2%)
UK Gambling Commission (2017) [44••]	$N = 2881$ Aged 11 to 16	DSM-IV-MR-J	0.9	12% (past week) (highest for fruit machines, private bets, scratch cards)	Internet gambling (3.0%) Online gambling-style games (11%), skins betting (11%)
Italy					
Donati et al. (2015) [45]	$N = 1656$ Aged 13 to 24	SOGS-RA	–	74% (highest for scratch cards, sports betting)	Internet gambling (NR)
Gori et al. (2015) [46••]	N = 14,910 Aged 15 to 19	SOGS-RA	3.7	46.8% (specific activities not reported)	–
Cosenza and Nigro (2015) [47]	$N = 1039$ Aged 15 to 19	SOGS-RA	7.1	–	–
Canale et al. (2016) [48••]	$N = 14,778$ Aged 15 to 19	SOGS-RA	6.5	84.7% (specific activities not reported)	Internet gambling (15.6%)
Canale et al. (2017) [49]	$N = 10,063$	SOGS-RA	4.3	–	–

Table 2 (continued)

Author	Sample	PG tool	Prev. of PG (% problem only)	Prev. (past-year gambling: any activity)	Past-year prevalence: Online/simulated gambling? Video gaming?
Canale et al. (2017) [50•]	Aged 15 to 19 N = 20,791 Age of 15 (inc. immigrants)	SOGS-RA	6.0	–	–
De Luigi et al. (2017) [51••]	N = 10,959 Aged 14 to 18	SOGS-RA	5.0	50.6% (highest for sports betting, scratch cards)	Online betting, poker, casino, skill games (NR)
Nigro et al. (2017) [52]	*N* = 1010 Aged 12 to 19	SOGS-RA	7.9	At least 72% (highest for cards and sports betting)	–
Buja et al. (2018) [53]	*N* = 34,746 Aged 15 to 17	SOGS-RA	2.7	48.2% (specific activities not reported)	–
Finland					
Castren et al. (2015) [54]	*N* = 988 Aged 12 to 15	DSM-IV-MR-J	3.0	51.6% (specific activities not reported)	Internet gambling (NR)
Räsänen et al. (2015) [55]	*N* = 101,167	–	–	62.2% (specific activities not reported)	–

ARPG, at-risk or problem gambling; *BAGS*, brief adolescent gambling screen; *CAGI*, Canadian Adolescent Gambling Index; *DSM-IV-J*, Diagnostic Statistical Manual-IV-Juveniles; *DSM-IV-MR-J*, Diagnostic Statistical Manual-IV-MR-J (adapted-multiple response format for juveniles); *GPSS*, Gambling Problem Severity Subscale (of the CAGI); *PG*, problem gambling; *PGSI*, Problem Gambling Severity Index; *Prev*, prevalence; *MAGS*, Massachusetts gambling screen; *NODS-CLiP*, NORC diagnostic screen for gambling disorders-loss of control, lying, preoccupation; *SOGS-RA*, South Oaks Gambling Screen-Revised for Adolescents

adult gambling to reflect that gambling-related conflict for young people tends to relate to parental conflict and school interference, and less severe financial consequences which tend to overlap with or implicate delinquent activities (stealing).

Globally, the most frequently used measure of problem gambling appears to be the SOGS-RA, used in almost half (46%) of the recent literature. However, in the Australian context only, the DSM-IV-MR-J has been much more commonly used and therefore may be considered the 'standard' tool for this region. With the increasing recognition of so-called 'behavioural addictions', it is noteworthy that relatively few new psychometric tools have been developed for adolescent gambling in the last decade. This contrasts to some other repetitive behaviours involving digital media, notably problematic gaming which has had at least two new tools per year developed since 2013 (see King et al. [58•]). While this has enabled some consistency in the adolescent gambling field (e.g., researchers across different regions able to compare prevalence rates using the same measures), it may also indicate less progression in this field (i.e., lack of refinement to measurement tools, continuing use of psychometrically imperfect items, etc.).

Measurement approaches have been criticised on several grounds. Shaffer et al. [59], for example, suggested that many existing measures (including those still used today) have three major limitations associated with assessing severity of youth gambling problems: (a) the dimensions within each of the screens are arbitrary, (b) the utility of different self-report timeframes causes confusion (i.e., past 6 months, past year, lifetime) and (c) general problems associated with self-report measures. The lack of weighting of importance of items (i.e., considering all symptoms as equally important) may represent a serious shortcoming. This issue is often raised in discussion of whether prevalence rates of youth problem gambling are truly valid reflections of gambling-related harm in the community [12]. This issue has also been raised in the problematic video gaming literature—with some authors arguing that some items (e.g., preoccupation, tolerance, escape) in the DSM-5 criteria for Internet gaming disorder may be similarly indicative of 'high engagement', but non-problematic use, when not measured correctly [60]. Alternative measures are needed to capture the full range and severity of consequential harms arising from these activities, as distinct from symptoms of the behavioural addiction that is the cause of harm. Improved measures of problem severity may also be needed to establish valid prevalence rates.

Monetary Gambling: Measurement Issues

Survey approaches to measure gambling behaviour among young people often present a list of gambling activities (i.e., in a checklist format) and ask young people to indicate which

of these activities they have engaged in during the last 12 months (e.g., Delfabbro et al., [14]; Jackson et al. [17]). Sometimes these checklists combine several types of gambling into one item, for parsimony or practical constraints as well as to limit participant fatigue (e.g., the *Gatehouse Project Survey* [17]). Typical checklist approaches provide frequency options, such as 'Never' or '1–2 times' for ease of coding or to reduce completion time (i.e., participant does not have to provide a precise number). These types of measures are inherently imprecise. Additionally, some surveys ask about the 'past year', leading to potential misunderstanding of whether this refers to the calendar year or the previous 12 months [11]. In addition, there are inherent challenges (i.e., cognitive limitations) to recalling all behaviours over this time frame, particularly for adolescents.

Another issue with these checklists is the extent to which questions capture the young person's *active* participation in the gambling activity and involvement of their *own money*. For example, a basic checklist may not always differentiate between a young person's active engagement in gambling, compared with being a 'passive' observer to a parent's gambling (e.g., observing the parent's lottery ticket displayed in view of family members) or participating in limited aspects of the activity (e.g., helping the adult scratch off a scratch ticket). Asking 'who else is present' when gambling (see [21]) may not necessarily address this issue because it does not distinguish participation from exposure. In such cases, too, the young person 'participating' may not have used their own money but may be engaging in some of the relevant actions (e.g., scratching a ticket, pushing a button, picking a lotto number) without staking money. Another issue affecting these checklists is the wording of some items, e.g., 'card games' may be interpreted as card games among friends, where a surrogate currency of no financial worth is used (e.g., matchsticks, buttons). These issues are also relevant when referring to online activities where the distinctions between monetary and non-monetary gambling may become less clear, such as using virtual credits purchased with real money in an online game that simulates gambling but money cannot be won and credits cannot be redeemed. Additionally, some checklists include 'Internet gambling' as a separate gambling form (rather than mode of gambling), which leads to double-counting if the young person, for example, reports their online poker play as both poker playing and Internet gambling.

Some researchers have modified these basic checklists to provide greater clarity on how gambling occurs and how certain activities may be facilitated by others. For example, Dowling et al. [19] asked participants to detail the social context of gambling. Their checklist referred to types of gambling activity including: *scratchies/lottery*, *sports* (*not including horse or dog racing*); *horse or dog racing at the TAB*; *horse or dog racing at the racetrack*; *Internet gambling*; *table/card games at the casino*; *poker machines*; *card games at home or school*; *other* (*specified*). On each of the selected types of gambling, the participant was asked to indicate with whom they usually gamble. Response options were *No one*, *I do it alone*; *With parents*; *With brother or sister*; *With other relatives*; and *With friends*. These modifications may provide some useful contextual information when interpreting participation rates, especially for activities with restricted access. Some Australian studies have attempted to assist young respondents to make the important distinction between gambling and non-gambling activities to reduce type I error. For example, Splevins et al. [20] provided a formal definition of gambling at the beginning of their survey (i.e., *betting money, property or something else of value on an activity with an uncertain outcome. It does not include friendly bets or challenges where nothing is won or lost*).

Simulated Gambling: Measurement Issues

Survey questions about non-monetary or 'simulated' gambling are less straight-forward than for land-based gambling. Many of these activities are constantly changing due to technological advances [61•, 62, 63], making it difficult to standardise questions over time. These activities often have different implementations (e.g., across different games or platforms), and certain named products may have only short-term popularity. Whereas land-based gambling products are regulated and tend to be offered in specific venues, online and other digital gambling products are less fixed in their structure and availability. These issues mean that measuring involvement in these activities can be challenging due to the need to properly differentiate the type and context of each activity and to differentiate simulated gambling activities from actual gambling products [64].

Recent surveys have sometimes assessed these activities using separate checklists with clearly displayed headings for monetary versus non-monetary activities. For example, Hayer et al. [6••] examined four *types* of simulated internet gambling (1, social networks; 2, apps; 3, through video games; 4, free to play demo games) and two different *access routes* per type (1, from home; 2, while 'out and about'). The questionnaire asked separately for frequency of participation in each of these eight possibilities over the last 12 months. The five answers available ranged from 'not at all' to 'more than eight times a month'. This approach attempts to maximise accuracy and specificity, but its greater complexity may make it more difficult for younger participants to complete.

Other studies have taken a similar approach of keeping simulated gambling questions separate from questions about monetary gambling. For example, Dussault et al. [65••] asked participants the following screening question: '*Have you ever engaged in online gambling using free demo versions*?', which they defined in the survey as participation in any gambling activities on the Internet, such as video lottery games

(VLT), poker or blackjack via websites or on Facebook, but *without betting real money.* This was followed by additional questions emphasising the term 'real money', which helps to distinguish activities where virtual currency is used, which may in some cases be a virtual representation of real-world currency (e.g., US dollars rather than a fantasy-based currency such as gems or gold coins).

Another important survey issue is the measurement of problematic use of simulated gambling. In some studies where the simulated gambling involves spending (but not winning) money (e.g., Zendle & Cairns, [66]), scores on measures such as the PGSI have been evaluated in relation to activities such as spending on loot boxes. Measures of problem gambling (e.g., SOGS-RA) often refer to *winning* money or attempts to *win back* money lost from gambling. Thus, these types of questions may not be ideally suited to these activities. Gainsbury et al. [67•], for example, adapted the DSM-5 Internet gaming disorder criteria to create a brief screener of problematic simulated gambling, rather than using a standard problem gambling tool.

Improving Quality of Survey Information

This narrative review highlights some practical steps to potentially improve the quality of information yielded in youth surveys. Many of these considerations are likely to depend on practical constraints, such as available time or space to administer survey questions, and brevity is often prioritised. Surveys may benefit from questions that (1) clarify active versus passive involvement in gambling (i.e., participation in the gambling activity versus watching someone play), and checks to clarify co-involvement (e.g., giving a friend some money to gamble); (2) identify mode of access to gambling and its context, and the broader social context of gambling (e.g., with parents, peers, or alone); (3) have an appropriate time frame for questions, particularly for younger respondents (i.e., those 10 to 14 years), given longer time periods (e.g., 12 months) are likely to affect accuracy of recall; (4) clarify expenditure on, and source of funding for, gambling, with clear demarcation of monetary and simulated gambling items to avoid confusion (clear definitions and visual aids [pictures/logos] may assist comprehension); (5) request more detail on Internet gambling and digitally supported activities; and (6) include open-ended responses and consider follow-up contact (e.g., interviews) for verification.

Conclusions

This literature review has shown that, globally, a large proportion of young people report access to, and engage in, a diverse range of gambling activities [67•, 68, 69•, 70]. Large surveys indicate that young people's past-year involvement in gambling typically involves scratch cards, lottery, card games, and sports betting. A small subset (around 5%) of young people report past year experiences with Internet gambling activities but these activities are often loosely defined in surveys. Simulated gambling appears to be more prevalent, but its relationship to monetary gambling and problem gambling risk requires further research [71••, 72, 73•]. The literature would benefit from more in-depth qualitative studies [74] of youth gambling behaviours and continued research efforts [75••, 76•, 77–81] to track youth gamblers into adulthood. Estimates of problem gambling among adolescents vary across regions, with Australian figures tending to fall within 1 to 5%. The screening instruments used aim to measure the severity of the disorder, so the extent to which these estimates reflect the consequent harm arising from the disorder is unclear. As highlighted in Raisamo et al.'s [82] study, the most commonly reported harms among adolescents were feeling guilty or shameful about gambling, relationship problems, and disrupted daily routine. The Australian and international gambling literature suggests that youth gambling is a global phenomenon that warrants continuing research attention [83••, 84, 85]. Youth gambling is particularly relevant as new digital technology-based gambling activities and promotions become more prevalent and available to young people with the means to access them [86]. Further work is needed at the conceptual (e.g., identifying relevant harms, mapping links to other risk behaviours) and methodological (e.g., identifying optimal measurement approaches) levels.

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Compliance with Ethical Standards

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Disclaimer The authors alone are responsible for the content and writing of the paper.

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