

Comprehensive Review of Sports Wagering and Gambling Addiction

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Executive Summary

Given significant technological advances, the recent U.S. Supreme Court ruling permitting States to offer and regulate sports wagering (2018), international governments already regulating and licensing sports wagering operators, and the U.S. major professional sports leagues all partnering with gambling operators, there is little doubt that sports wagering will continue to grow exponentially.

The following represent the significant findings of this review:

- Sports are a paramount part of American culture. In the Spring of 2017, professional sports were viewed on television by an estimated 104 million individuals. This figure excludes those individuals streaming the events via their computer, tablet or smartphone.
- Interest in sports gambling is likely heightened by the growing number of sports-related television and cable channels and websites, many offering “expert” advice, blogs, and wagering odds - reaching millions of people.
- Sports gamblers often report that wagering on sports activity heightens their interest in watching the sport.
- Major entertainment and telecommunication companies have invested heavily in sports programs. Sports wagering remains popular among adults, college students and even high school students, with a greater proportion of males engaging in this behavior. . Forty-five percent of adults report having placed a sports wager at least once in their lifetime (Statista, 2017) and 4% do so regularly (Statista, 2018).
- Research reports from Australia, which has legalized online sports wagering for some time, suggest that 59% of gamblers wagering online were sports bettors. In Europe the betting of online sports accounts for 37% of the total online gambling.
- Excessive sports wagering has been consistently associated with problem gambling-related problems.

- Professional and former professional athletes score higher on measures of gambling problems.
- The characteristics of typical sports gamblers and problem sports wagers are that they are male, younger, unmarried, have peers who gamble on sports, have a perception and belief that they are knowledgeable about sports, have an increased likelihood of substance use (alcohol and drugs), and engage in multiple forms of gambling.
- Mobile wagering, allowing for instantaneous and immediate gambling, has been shown to be related to problem sports wagering.
- Significant concern remains for the potential problems associated with online sports gambling, micro-betting, live propositional betting and fantasy sports wagering. Other concerns remain about the widespread advertising of sports wagering and websites and blogs related to the advertising of odds for sports wagering.
- Ease of accessibility and increased availability will likely increase sports wagering and related gambling problems, at least for the near future.
- Sports wagering can be an alluring path for some to the onset, maintenance and/or acceleration of gambling problems.
- Additional funding and research are necessary before a clearer picture of problem sports gambling emerges.

The current review suggests that we should expect a significant increase in sports wagering in the U.S., along with its concomitant related problems. Current prevention, treatment and public health policies will likely need to be adjusted. The report's findings suggest several health-related policies:

- Because the U.S. is witnessing a rapid expansion of sports betting, there is credence for the need to regularly monitor this emerging form of gambling.

- Policy makers and regulators should be prepared for live, rapid decision-making on sports events. Banning micro event betting is worthy of consideration, given that this feature of sports betting appeals to bettors with gambling problems. Such a ban would represent a highly targeted intervention to help reduce gambling-related harm.
- The expectation of a significant increase in sports wagering in the U.S., along with its concomitant related problems, places attention on the need to adjust current prevention, treatment and public health policies. Assessment and treatment approaches will need to be adjusted in order to meet the growing needs of this “newest generation” of individuals with a gambling disorder resulting from sports betting. With respect to treatment, characteristics of sports bettors with a gambling problem suggest that interventions should target young adult males and take into account the higher educational and income levels of this group. Also, interventions should discourage frequent betting, in-play betting, micro-betting and challenge beliefs that one can earn money from sports gambling.
- Responsible gambling PSAs and messages will need to be tailored for sports betting. Given that the sports betting industry will most certainly target young, educated males, appropriate responsible gambling messages about sports betting suitable for this group will be necessary.
- The National Council on Problem Gambling's list of responsible gaming principles for sports gambling legislation provides a useful guide for regulators: ensuring the expansion of sports gambling includes dedicated funds to prevent and treat gambling addiction; ensuring that sports gambling operators implement responsible gambling programs (e.g., staff training, self-exclusion, the ability of individuals to establish time and money limits, self-exclusion programs, and appropriate messaging); establishing a regulatory agency to enforce all regulations implemented; and the establishment of a consistent minimum age for sports gambling and related fantasy sports.

- Additional funding and research are necessary before a clearer picture of problem sports gambling emerges. Numerous epidemiological, clinical and public health questions merit research.

1. Introduction

Generally speaking, the sports betting literature can be roughly divided into older (published more than a decade ago) and contemporary studies (published within the past decade). The older literature represents a sport betting landscape quite different than modern times. The prevalence studies from this period most certainly provide estimations of sports gambling that cannot be generalized to current era. Thus, by placing a particular emphasis upon contemporary research, this report's contribution to informing the debates and addressing concerns about the public health impact of sport betting will be heavily based on a limited, but more relevant, research.

Background

With the recent U.S. Supreme Court's decision permitting states the right to offer sports wagering (2018), as well as the Canadian Gaming Association and Provincial governments lobbying for the removal of sports wagering from the criminal code of Canada, it appears that the commercialization of sports wagering will grow exponentially (yet State's rights to offer sports gambling may encounter some conditions. As of this writing, a draft of a federal sports betting bill has appeared in Congress in which the federal government would have to approve state laws legalizing sports gambling). This expectation has been fueled by the recent agreements between each of the four major U.S. professional sports leagues (MLB, NBA, NHL and NFL) and a casino/internet gaming industry partner.

One of the most significant recent changes in gambling activities has been the alignment of gambling with other culturally valued activities. Sports are a paramount part of American culture. In the United States, collegiate and professional sports were viewed via television by an estimated 104 million people during Spring of 2017 (Statista, 2018a), and these numbers do not take into consideration individuals viewing sports events on their computer, smartphone or

tablet, which is the medium often used by a majority of individuals under the age of 34 (Spider Marketing, 2016). It has been estimated that college students alone watch an average of 5 to 6 hours of sports weekly, with 47% of student-athletes preferring to watch sporting events and 45% viewing sports-related highlights (Markovits & Smith, 2007). Thus, sports wagering, whether in the form of betting on individual games or contests, through fantasy sports (seasonal or daily), or even on individual players through propositional bets, remains popular. Sports bettors commonly cite that this activity heightens interest in watching the sport (Statista, 2018b). Whether gambling amongst peers, through a bookmaker, or online sites there is ample evidence that sports wagering has grown in popularity, individuals are engaging in sports wagering more often, and that total amount of money wagered is tending to increase (Productivity Commission, 2012). A U.S. consumer survey in 2017 by Statista indicated that 45% of respondents had placed a bet at least once in their life on a sporting event (although only 4% do so regularly) (Statista, 2018a). The market share of online gambling worldwide in 2015 contributed by sports wagering is estimated to be 45%, by far the most among other online gambling options (second place is casino online gambling, 24%) (Statista, 2018a).

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The debates about the potential personal and social harms associated with sports gambling abound; a range of stakeholders have begun to speculate about sports wagering within the popular press, public policy and public health domains and scientific circles (e.g., Gainsbury et al., 2016; General Accounting Office, 2002; Griffiths & Parke, 2002; Hing et al., 2018; Ladd & Petry, 2002; McBride, 2006; Mitka, 2001). There is a growing concern among some experts that sports betting can be an alluring path for some to the onset, maintenance and/or acceleration of gambling problems, including among adolescent and young adult gamblers (e.g., Hing et al., 2016). Identifying characteristics of sports bettors, and those factors that promote problem

gambling linked to sports betting, is an important endeavor for prevention, early intervention and treatment initiatives (Hing et al., 2014).

In this light, the present report provides a description of sports gambling behavior, including factors associated with problem gambling among sports bettors and wagering by athletes. We highlight new issues that are surfacing, particularly concerning the potentially detrimental effects of the interaction between online betting, sports viewing, live betting, mobile technology and sports fantasy gambling. Also, we address several marketing/advertising and policy issues.

2. General Sports Bettors: Prevalence and Characteristics

Prevalence

A long-standing conclusion from decades of surveys of gambling behavior is that sports betting is a relatively common form of gambling. Welte's representative national survey of 2,630 U.S. adults (Welte et al., 2002) found that 20% reported sports betting in the prior 12 months. Among youth and young adults, sports gambling is usually cited in survey results as one of the more prevalent gambling activities (e.g., Huang & Boyer, 2007; Winters et al., 1998). Yet more recent surveys conducted in the internet era, a different picture emerges. For example, in a nationally representative telephone survey of Australian adults (N = 15,006), whereas sports betting was reported by 13.3% of the sample, among bettors that used the internet to place bets, 59% engaged in sports wagering via this mode (Gainsbury et al., 2015b).

Characteristics

As we discuss in a later section, there is a sizeable literature pertaining to risk factors associated with sports bettors who report gambling programs as compared to non-problem sports bettors. Yet the general prevalence literature is quite sparse when it comes to characteristics that differentiate sports gambling involvement from other types of gambling involvement, with one exception: females report lower levels of sports betting compared to

males (Wood & Williams, 2011).

An examination of the promotional and advertising campaigns in Australia, which exploit demographic characteristics of sports bettors based on market research, suggest that the target group are not only males, but are young, single, upwardly mobile, professional, and tech-savvy young men (Hing et al., 2015a; Milner et al., 2013)

3. Problem Gambling Sports Bettors (PGSBs)

Prevalence

Gambling type, when controlled for other factors, has not always been a significant predictor of problem gambling (LaPlante et al., 2009). Yet the mode of accessing a sporting event can significantly impact its “harm potential”. The recent attention afforded to structural features of individual games can alter the extent to which the game contributes to gambling-related harms (Griffiths & Auer, 2011). In particular, online wagering is now a common way to access many sports gambling products. The prevalence of online sports betting has increased in many different jurisdictions over the past few years (Rodríguez et al., 2017), and betting on sports amounts to 40.31% of the annual online gambling market in Europe (European Gaming and Betting Association, 2018). This acceleration of sports wagering is requiring researchers and public health officials to re-think the relationship between gamblers, gambling and the nature and extent of gambling-related harm (e.g., Gainsbury et al., 2015a, 2015b; Gray et al., 2012; McCormack et al., 2013; Nordmyr et al., 2014).

A striking finding from recent prevalence studies that have measured or screened for problem gambling among contemporary sports bettors with the option of internet-based wagering, is the prevalence rates of reported problem gambling are remarkably higher compared to population-wide estimates. Based on data from across the world, approximately 1% of those who gamble have experienced at some time in their life a serious gambling problem (e.g., Gambling

Disorder), and about an additional 2-3% have experienced a less-severe gambling problem (Winters, 2016). These figures are in stark contrast of estimates of PGSBs when more modern-day sports bettors in countries with electronic wagering options are surveyed. For example:

- U.K.: The 2010 British Gambling Survey ($N = 7756$) asked respondents to report on gambling involvement across 15 types of games and to indicate the presence of problem gambling symptoms. Among those who reported sports betting in the prior 12 months, 4.4% met either DSM-IV or PGSI criteria for problem gambling. This figure was roughly the median number; the highest PG rates were for among those who reported poker playing (12.8%), online slots (9.1%), or fixed-odds betting terminals (8.8%) (Wardle et al., 2011).
- Bwin data (primarily Germany or Austria): Based on data collected in 2005-2007 from bwin, a major European internet sports gambling service provider, among the 679 bettors who self-reported the reason for closing their account during the study period, 32% indicated it was due to gambling-related problems (LaBrie & Shaffer 2011; LaPlante et al. 2008). In a subsequent study based on customers using this gambling service, the Brief Biosocial Gambling Screen (BBGS) was administered to 1,422 self-selected gamblers. Approximately one quarter of gamblers (27%) were identified as having gambling-related problems (LaPlante et al., 2014).
- Spain-1: A 2015 online survey with 500 individuals who had *gambled online* during the past 12 months were administered the DSM Screen for Gambling Problems (NORC, 1999). Among those indicating some type online sports betting, 16.2% were pathological gamblers and 13.2 % were problem gamblers (Dirección General de Ordenación del Juego, 2016). These figures were only surpassed by online poker and other online card games. Spain-2: In a recent survey of 659 sports bettors (online and land-based, and including sports fantasy gambling), PGSI-defined groups were as follows: non-problem gamblers (39%), low-risk gamblers (27%), moderate-risk gamblers (16%), and problem gamblers (19%) (Lopez-Gonzalez et al., 2018).

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Overview of Characteristics Associated with PGSBs

There is an emerging set of studies that has begun to identify the profile of a typical, contemporary “indulgent sports bettor”. Common features of individuals who engage in sport betting frequently and classified as meeting a definition of problem gambling (typically based on PGSI score) include the following: male, young (young adults upwards to approximately age 35), not married, full-time employed or studying, high level of education, engage in poly-gambling, have Significant Others and peers that also favor sports betting, frequent user of several on-line accounts with different operators, frequent use of different types of promotions, and high-end impulsiveness (Hing et al., 2016; Delfabbro & King, 2012; Russell et al., 2018b; Wood & Williams, 2011).

Given that sports bettors often gamble via the internet, the profile noted above aligns with common characteristics of those who use the internet to gamble in *non-sports games* (i.e., more likely to be male, better educated, studying or working full-time in managerial or professional occupations, and earning above average salaries) (Gainsbury et al., 2012; Gainsbury et al., 2014). On the other hand, the profile of a typical PGSB appears to be distinct from common features observed in older studies of individuals receiving treatment for a gambling problem (i.e., casino game typically preferred; middle age; variable in terms of highest level of education achieved; more likely married, and a narrower male-female gap (e.g., Stinchfield & Winters, 2002).

Below we discuss in more detail the demographic characteristics noted above, as well as other risk factors linked to problem gambling sports bettors.

Being Male and Young

Being a young adult male has consistently been identified as a risk factor for problem gambling in general (Johansson et al., 2009; Williams et al., 2012; Hing et al., 2016). These traits are also robust risk factors with respect to sports betting (e.g., among on-line PGSBs, 98% were males, with an average age about 10years younger than non-PGSBs; Hing et al., 2017) and suggest this group of sports bettors face heightened risks of related gambling problems (Lamont et al., 2011; Milner et al., 2013; Russell et al., 2018b). It should come as no surprise that where sport wagering is legal (in particular, parts of Europe and Australia), this activity is heavily marketed to young males (Hing et al., 2013). Whereas much of the focus has been on male PGSBs, it is important to note in some studies the proportion of females in PGSB samples is not negligible. For example, in Lopez-Gonzalez's (2018) Spain study, 32% of PGSBs were women.

Marital Status

Several life-style features of being single have been linked to PGSB; fewer financial and family responsibilities that might help to restrain their gambling; they are more likely to watch and bet on sports with friends that also favor sports wagering; likelihood of frequenting social settings, such as bars, where sports betting among male peers is common (Gordon et al., 2015).

The Influence of Peers and Significant Others

Among all sports bettors, the most common "sports betting event" was to have placed a bet with a friend on a sporting event (47%) (Statista, 2018a). With respect to PGSBs, frequenting social environments with peers and significant others may lead to exposure to settings in which sports betting is normative and there are pressures to wager on sports. Also, this risk factor may be linked to PGSB due to the sports bettor's tendency to gravitate towards friendship groups which are supportive of this activity (Gordon et al., 2015; Thomas et al., 2012). Among all sports bettors, the most common "sports betting event" was to have placed on bet with a friend on a sporting event (47%).

Perceptions of Knowledge and Skill

Online sports bettors and sports fantasy gamers in particular, and to lesser degree offline-based sports bettors, perceive their gambling as more determined by their own skills, knowledge, and analysis and less by chance or luck (Auer & Griffiths, 2017; Gordon et al., 2015; Mercier et al., 2018). This pattern aligns with the common profile noted above that sports gamblers are likely to be highly educated and tech-savvy (e.g., Hing et al., 2014), and believe that accumulating information on past statistics or bets will confer advantages when seeking profitable bets (Mercier et al., 2018). These results are consistent with the idea that gamblers who play games of skill overestimate their personal ability to win (e.g., Toneatto et al., 1997; Walker, 1992). Such 'delusions of expertise' (Browne et al., 2015) may be mediated by cognitive distortions observed in other problem gamblers (Ladouceur et al., 2001) and an enabling force that maintains or accelerates involvement in sports betting to the point of developing a gambling problem (Hing et al., 2016).

Substance Use

Hing and colleagues (2017) observed that among PGSBs there was an elevated likelihood of alcohol or illicit drug use while gambling, compared to non-PGSBs. This finding dovetails with the general problem gambling literature (Castrén et al., 2013; Dannon et al., 2006; Petry, 2007; Welte et al., 2004). A recent concern from a public health standpoint is that online sports betting and substance use are particularly a bad mix, with sports wagering in private increasing the ease of substance use while gambling, which may negatively impact decision-making.

Multiple Game Playing

There is the general tendency of gambling problem severity to increase the more the individual employs multiple forms and platforms for their gambling (Potenza et al., 2008), and online gambling may be particularly conducive to this issue (e.g., Hing et al., 2017). Given the high

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proportion of sports bettors who place bets via the internet, sports gamblers may be at risk for more severe gambling problems (Gainsbury et al., 2012).

4. Mode and Related Features of Sports Betting

Overview

There are public health concerns that availability and accessibility to new structural characteristics of gambling opportunities are contributing to increased levels of gambling problems (Gainsbury et al., 2016; Reith, 2012). Technological advances and innovation led by the gambling industry has translated to new gambling products being available continuously via mobile and other computer-related devices. These advances have enabled several gambling options to evolve, including live-in play betting. [Internet/Online Gambling](#)

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The greater availability of and other reinforcing properties associated with internet gambling, including sports betting via the internet, has raised concerns about gambling harms associated with this mode of gambling. Whereas it is premature to claim that gambling via the internet creates an inherent propensity to engage in excessive gambling (e.g., population level statistics of the European bwin subscribers indicated that gambling activity levels were, for the most part, moderate; LaBrie & Shaffer, 2011), the unsettling health risk of internet sports betting is justified. Internet-based gambling is increasingly being viewed as a conduit for problem gambling (Philander & MacKay, 2014; Gainsbury et al., 2012; Griffiths et al., 2009; Kairouz et al., 2012; Wood & Williams, 2011; Wu et al., 2014), and core risk factors for problem gamblers who engage in internet-based gambling are beginning to be identified (e.g., Hing et al., 2016; McBride & Derevensky, 2009; Potenza et al., 2011; Wood & Williams, 2009;). It is noteworthy that in Australia, young men in particular are increasingly seeking treatment for difficulties in controlling their online sports betting (Blaszczynski & Hunt, 2011). If online betting is done sporadically or in a social context (e.g., watching a sporting event with peers), online play may represent minimal extra risk when compared to venue-based play. On the other hand, if online sports

betting facilitates different patterns of use (e.g., solitary betting in extended sessions late at night), then this would provide further evidence that the online product presents a greater risk.

Hing and colleagues (2017) reported the first peer-reviewed publication of a study that examined risk factors specific to problematic gambling as a function of different forms of online gambling. This Australian study considered only on-line gamblers ($N=4,594$), who were identified as a problematic gambler (PGSI score in either the moderate-risk or problem gambling range), and who specifically attributed their gambling problem to online EGMs, race betting or sports betting. Background characteristics for *problematic online sports* betting were very similar to those for *problematic online race* betting, with both groups being significantly younger, more educated, and engaged in significantly fewer forms of gambling than online EGM players. All problematic groups, compared to their respective non-problematic group, reported significantly greater psychological distress, a finding consistent with the larger problem literature that frequent gamblers report higher rates of psychological distress and mental health issues compared to non-frequent gamblers and may suggest that gambling is a way to cope with negative mood states (Blaszczynski & Nower, 2002; Nower & Blaszczynski, 2010; Thomas et al., 2013). Individuals motivated to alleviate psychological distress may find online gambling to be particularly convenient, provide more privacy and less socially demanding than attending a physical venue, allow greater ease of substance use while gambling, and allow solitary betting in extended sessions late at night (Corney & Davis, 2010; Griffiths, 2003; Griffiths & Parke, 2002; Monaghan, 2009).

Live In-Play Betting

Live action betting on brief bet cycles during play has been identified as an important risk factor for problem gambling (Braverman et al., 2013; Gray et al., 2012; LaPlante et al., 2008, 2014; Nelson et al., 2008). The live in-play method greatly reduces the delay between bet and reward

found in traditional sports betting (Griffiths & Auer, 2013).

This literature provides convergent evidence that impulsive betting, and the provision of betting options that enable this, pose substantial risks for some gamblers. A brief descriptor of supporting studies is provided below:

- An experimental study found that problem gamblers were particularly tempted by live action micro-bets (Hing et al., 2014).
- Live in-play betting was one of the most recurrent characteristics of problem gamblers studied in the bwin sample, even after controlling for gambling participation and gambling type (LaPlante et al., 2014).
- Higher problem gambling severity was associated with a less planned approach to betting, and a higher PGSI score was significantly related to both higher frequency of sports betting and higher sports betting expenditures (Hing et al., 2016).
- Lopez-Gonzalez and colleagues (Lopez-Gonzalez et al., 2018), in a recent study of 659 sports bettors, found that all individuals categorized in one of the PGSI-defined “problem” groups (low-risk, moderate-risk or problem) reported significantly more preference for in-game betting and more frequent use of the cash-out option than the non-problem gambling group.

Micro-betting is when players are able to bet on almost immediate outcomes during a live sports event, such as the next point in tennis. A recent survey of Australian sports bettors (Russell et al., 2018a) focused on this practice. Based on PGSI-defined groups, among those who bet on such micro events, 78% were considered problem gamblers with only 5% being non-problem gamblers. Among non-micro-bettors, the problem gambling rate was 29%. Micro-bettors were found to be younger, well educated, single, participate in multiple types of gambling, and to be highly impulsive.

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It is likely that bettors who experience more problems with in-sports betting are attracted to the immediate and impulsive-type of features (e.g., rewards offered in a short amount of time) that this type of betting offers (Griffiths & Auer, 2013; iGaming Business, 2016; Lamont et al., 2016). Moreover, live wagering features may expose a person's cognitive biases (Lopez-Gonzalez et al., 2017b; Lopez-Gonzalez & Griffiths, 2016). In a study with 161 sports bettors from France, participants with time constraints in placing their bets resorted more frequently to heuristic processing featuring less cognitive activity instead of the more intensive analytical processing, leading to theoretically less reasonable bets (d'Astous & Di Gaspero, 2015).

Mobile Wagering

Early indications are that the prevalence of problems among those who engage in mobile-based betting tend to be higher than those who prefer land-based betting, and many of the risk factors of problem gambling associated with internet-based gambling may be heightened for gamblers who use mobile devices. Gainsbury and colleagues (2016) examined the differential association of PGSI scores as a function of different preferred ways to access internet-based gambling (offline, PC, mobile device). Mobile device bettors had a higher proportion of problem gambling (22%) compared to individuals using other modes of betting (18% offline, 16% PC).

As noted earlier, Lopez-Gonzalez and colleagues (2018) compared three modes of sports wagering (mobile, internet and land-based) in a convenience sample ($N=659$). Bettors who preferred mobile gambling did so more frequently and scored significantly higher on the PGSI compared to sports bettors who preferred to wager at a land-based venue. 25% of bettors who preferred mobile were in the problem gambling group, compared to much lower rates among laptop (18%) and land-based bettors (11%).

As experts have noted, mobile betting, with its one touch, easily accessible wagering options, allows for even more instantaneous and immediate gambling than that offered by non-mobile internet-based wagering (Deans et al., 2016; Lopez-Gonzalez et al., 2018; Griffiths & Auer 2013). Correspondingly, it has also been observed that bookmakers promote mobile betting over other modes of gambling in their promotions and advertisements by over emphasizing its ease of access and how mobile wagering promotes the illusion of control (Lopez-Gonzalez, Estevez & Griffiths, 2017b).

5. Fantasy Sports Gambling

Recent reports from the Fantasy Sports Trade Association (FSTA, 2018) estimate that 57.4 million people participated in fantasy sports in the U.S. and Canada, compared to 13.5 million in 2004. The widespread participation in daily fantasy sports may have been exacerbated by the near \$206 million dollars spent on advertising by the two largest daily fantasy sports operators in 2015 alone (Derevensky & Marchica, 2018; Kludt, 2015).

Although there is still debate concerning whether fantasy sports wagering can be legally considered “gambling” (Rose, 2015), there are indications that fantasy players share some behavioral similarities with sports gamblers in general. Factors associated with participation in fantasy sports were frequent watching of live sports, sports wagering on real games, in-play betting and identification with a team (Drayer et al., 2010), and daily fantasy players were characterized by the belief that game is more about skill than chance (Dwyer & Weiner, 2018).

Experts argue that “sports fandom” features (e.g., identification with a team; wagering on real games) increase the person’s vulnerability to the promotions and marketing strategies of fantasy gambling products addressed at them (Deans et al., 2016; Lopez-Gonzalez et al., 2017b). Those who engage in frequent fantasy sports are characterized by high-end problem severity and comorbid problems, including suicidal ideation (Nower et al., 2018). In the Spain multi-mode

study (Lopez-Gonzalez et al., 2018), fantasy sports involvement was significantly higher within the moderate risk and problem gambling groups (62% and 94%, respectively). Also, continuous scores on degree of fantasy game participation was significantly associated with severity scores on the PGSI. Nower and colleagues (Nower et al., 2017) reported that 22.4% of a sample of 1,500 adults in New Jersey engaged in daily fantasy sports (DFS), with the majority being between the ages of 25-34 (61%), married or living with a partner (62.7%), and reported having a college or post-graduate degree (46%). It should be noted that while most DFS players also engage in other forms of gambling activities, 95% of DFS players were high frequency gamblers and were identified as high-risk problem gamblers. In a study of college-student athletes participating in fantasy sports wagering, Marchica and Derevensky (2015) reported that among fantasy sport players, 48.1% of males and 25% of females were in the at-risk/pathological gambling category. More recently, Martin and colleagues (Martin et al., 2018) reported among a college sample that Fantasy Sports gamblers wagered in general more frequently than those who did not, and those who engaged in Fantasy Sports wagering endorsed more DSM-5 gambling disorder criteria. In yet another study, Marchica, Zhao, Derevensky and Ivoska (2017), with over 7,000 High School students from Ohio, reported that 13.5% of youth reported wagering money on sports teams, 7.3% wagered money on fantasy sports, and 5.1% had bet money on DFS. Among individuals who participated in DFS more than once per month, 36% of males and 59% of females were considered at risk for a gambling problem. As adolescents got older they were also found to be more likely to engage in both seasonal Fantasy Sports and DFS.

6. Exposure to Marketing

Product marketing enabled, promoted by internet gambling providers, is shaping the sports betting environment (Lopez-Gonzalez et al., 2017a, 2017b). The impact of wagering promotions on altering risk factors of PGSB is only beginning to be studied.

The extant literature examining the role of betting advertising exposure and betting behavior is limited to correlational data, and thus causal associations cannot be claimed (Lopez-Gonzalez et al., 2017a). For example, Hing and colleagues reported that bettors who scored higher on the PGSI were more likely exposed to gambling advertising and viewed them favorably (Hing et al., 2013), and yet Hanss and colleagues noted that problem gamblers who report stronger advertising impacts on their gambling behavior were equally exposed to advertising than non-problem gamblers (Hanss et al., 2015). Some experts have argued that promotions may have specific effects on problem gamblers. Hing and colleagues (Hing et al., 2015) found that problem bettors indicated that watching betting commercials curtailed their capacity to discontinue betting. When asked about the betting promotions with highest impact on them, problem gamblers noted these features: on-screen displays (i.e., integrated into the narration of the game); a message that emphasized the ease in placing a bet; and an offer of risk-free kind of bonus (Hing et al., 2014).

7. Clinical Research

Historically, clinical studies indicate that it is very rare for those with a Gambling Disorder to identify sports betting as the individual's preferred game (e.g., Stinchfield & Winters, 2001). It is likely that as more clinical studies are published, the link between sports betting and harms will be more prominent. Most recently, an evaluation study of the efficacy of the Florida Council on Compulsive Gambling treatment program with 269 treatment-seeking individuals (92.8% had severe gambling problems, 5.2% had moderate gambling problems, 1.2% had mild gambling problems) found that 6.3% of the problem gamblers reported monthly sports wagering, 3.7% reported weekly sports wagering, and 6.3% daily sports wagering at the time of their intake assessment. Overall, 8.6% of disordered gamblers reported that their preferred form of gambling was sports wagering (Derevensky, 2018). As noted earlier, Australia is seeing an increase among young men seeking treatment due to problems resulting from online sports

betting (Blaszczynski & Hunt, 2011). Recent research analyzing gambling disorder patients under treatment in a Barcelona area hospital (in Spain) compared online to offline sports bettors; online sports bettors made greater maximum bets, incurred financial debts sooner than offline-only bettors, and gambling debts tended to be larger (Estévez et al., 2017).

8. Gambling, Sports Betting and Youth

Overview

There is converging evidence indicating that gambling begins early (Productivity Commission, 2020; Derevensky, 2012; Volberg et al., 2010). Moreover, young adults, an age group we have already noted as at high-risk for sports gambling-related problems, gamble in general more frequently and have higher rates of gambling problems than their adult counterparts (Calado & Griffiths, 2016; Calado et al., 2017; Welte et al., 2015). Qualitative studies of Australians' sports betting behavior suggest an overlap of sports participation and sports betting (Deans et al., 2016), especially for younger bettors and children who identify betting as a safe way of winning quick money (Pitt et al., 2016). Given that gambling has the potential to evolve from a recreational social pastime to an uncontrollable, excessive and functionally impairing disorder (Derevensky, 2012; Gupta et al., 2004), special attention needs to address sports wagering among this age group.

Sports Betting and Adolescents

In a study of 6,818 adolescents from Wood County, Ohio, Marchica and colleagues (2017) reported that 13.5% of youth reported wagering money on sports teams, 7.3% wagered money on Fantasy Sports, and 5.1% had bet on DFS. When examining their data by gender, once again it is quite clear that males are more likely to engage in this behavior (see Table 2). Responses suggest that among males, 4.5% engage in Fantasy Sports at least weekly with 4.0% engaging in DFS at least weekly. Individuals betting on sports or fantasy sports more than

once a month was associated with both male and female adolescents being significantly more likely to have a gambling problem. Of those individuals who participated in DFS betting more than once a month, 36% of males and 59% of females were considered to be at risk for a gambling problem. These results were even more pronounced for older students. For older students, the probability of being identified as a problem gambler increased with Fantasy Sports and DFS gambling involvement.

Gambling Among College Students

College or university students represent one of the largest group of young adults in the United States (Vespa, 2017), with over 20 million individuals attending collegiate institutions in 2017 (National Centre for Education Statistics, 2018). Young adulthood, as a developmental stage, is marked by pronounced identity development, self-exploration, increased individual autonomy and greater responsibility (Arnett, 2004; Ladouceur, 2004). In exploring their newly-acquired independence, college students engage in multiple potentially risky activities including alcohol use or heavy episodic/binge drinking, illicit drug use, cigarette smoking and gambling (Derevensky, 2012; Laska et al., 2009; LaBrie et al., 2003; Mohler-Kuo et al., 2003; Volberg et al., 2010; Wechsler et al., 2002; Weinstock et al., 2007).

Prevalence and Risk Factors for Problem Gambling Among College Students

A number of large-scale epidemiological prevalence studies suggest that 75-80% of college students report having gambled within the past year (Barnes et al., 2010; Blinn-Pike et al., 2007; Lostutter et al., 2014). College students have been found to engage in virtually all forms of regulated and non-regulated gambling including lotteries, card games, sports wagering, games of skill, fantasy sports wagering, casino gambling, online gambling and even wagering on *esports* (Derevensky, 2012). Beyond having increased rates of past year gambling, a recent meta-analysis reports that 6% of college students can be identified as probable pathological gamblers and an additional 10% could be identified as problem gamblers (not yet reaching the clinical criteria for disordered gambler) (Nowak, 2017). Blinn-Pike et al.'s (2007) earlier meta-

analysis suggested a disordered gambling rate of 7.89% among college students (prevalence data ranged from 5.37% to 10.41%). As a result, approximately 3 million undergraduate students in the United States are experiencing some gambling-related problem. . Popular gambling activities among college students include lottery purchases (scratch tickets and lottery draws), card playing and sports wagering (including fantasy sports), with a growing number of college students reporting gambling online via their computer or smartphone. With more and more States approving and passing sports wagering legislation there is little doubt that sports wagering amongst this population is likely to increase. Notably, these young adults have become especially vulnerable to gambling problems, with rates significantly higher than the general adult population (Calado et al., 2017; Shaffer et al., 2005; Nowak & Aloe, 2014).

Fantasy sports participation is also another form of gambling among college students. In a study of 1,556 American college students, 12.9% of males and 0.6% of females had participated in wagering on fantasy leagues in the prior year, and that especially in women, a positive correlation was found between gambling-related problems and fantasy gambling (Martin & Nelson, 2014).

Developmentally, college students may be particularly susceptible to developing gambling problems given their age, the availability and accessibility of multiple forms of gambling, the social acceptability and glamorization of gambling, their access to money through student loans, credit cards and scholarships, their general risk taking, technological advances which make online gambling easy, and their perceived invulnerability (Derevensky, 2012; Nowak & Aloe, 2014; Shead et al., 2010), all of which suggests easy engagement in widespread gambling opportunities (Volberg et al., 2010).

Similar to adults, male college students appear to be more likely than females to experience gambling-related problems, with gender being one of the strongest predictors of gambling disorder (Barnes et al., 2010; Derevensky & Marchica, 2018; Marchica et al., 2017). Other risk

factors for gambling and addictive behaviors among college-students include impulsivity, maladaptive coping strategies, high sensation seeking, risk-taking and social anxiety (Demaree et al., 2008; Nower et al., 2004; Wong et al., 2013; Worthy et al., 2010). Research results suggest that males tend to prefer more competitive and skill-based forms of gambling (Thomas & Moore, 2001), whereas females prefer more luck based/non-strategic forms of gambling, particularly slot machines and casino gambling (Hing & Breen, 2001; Holdsworth et al., 2012; Nower & Blaszczynski, 2006).

9. Sports Betting and Athletes

Gambling Behaviors Among College Student-Athletes

Student-athletes represent a significant subpopulation of college students in North America. In the United States alone, there are over 485,000 college students participating in National Collegiate Athletic Association (NCAA) sanctioned athletics each year (National Collegiate Athletic Association, 2016). Similar to their peers, college student-athletes have been reported to engage in a wide variety of interrelated high-risk behaviors, including heavy alcohol use, substance-use and gambling (Ellenbogen et al., 2008; Huang et al., 2007b; Huang, Jacobs & Derevensky, 2010; 2011; Weiss, 2010). NCAA guidelines are quite clear about gambling: no direct or indirect involvement in betting of any kind is permitted by a collegiate athlete (NCAA, 2016). These “zero tolerance” guidelines include prohibitions of soliciting or accepting a bet, providing information concerning intercollegiate athletics about a person or group who may use it for gambling purposes, involvement in betting “pools” and fantasy sports.

A number of studies have measured prevalence rates of problem gambling among student-athletes. Overall, these studies suggest that rates of problem or disordered gambling among college student-athletes are significant, ranging from 2.9% to 15% (Bourn, 1998; Engwall et al, 2004; Ellenbogen et al., 2008; Huang et al., 2007a; Kerber, 2005; Nowak & Aloe, 2014), with men having considerably higher rates of problem or disordered gambling than women

(Ellenbogen et al., 2008). In a recent cross-sectional study, Paskus and Derevensky, 2017 and Richard, Paskus and Derevensky (2018), examining four large samples of National Collegiate Athletic Association (NCAA) student-athletes in 2004 ($N=20,587$), 2008 ($N=19,942$), 2012 ($N=22,935$) and 2016 ($N= 22,388$) found gender differences in participation rates of gambling with men consistently engaging in all gambling activities at higher rates than women (55% of men versus 38% women in 2016). Gambling participation rates were generally found to have decreased over the twelve-year span as had the proportion of student-athletes at-risk or meeting criteria for pathological gambling between 2004 and 2016 among men (4% in 2004 versus 1.8% in 2016) while remaining relatively consistent among women (<1% across all years).

Student Athletes, Gambling and Sports Wagering

As previously noted the onset of gambling often begins during adolescence. This finding is also the case for college student athletes. In the 2016 study of college student athletes, Paskus and Derevensky (2017) and Richard, Derevensky and Paskus (2018) reported that the majority of males who had gambled in the past year first report gambling either before or during high-school. Among women, the majority report first gambling in high-school or in college. With respect to the first activity in which student-athletes report participate, men most frequently endorsed cards/poker (35%), sports betting (26%), and games of personal skill (14%). Women typically reported lottery or scratch tickets (27%), cards/poker (18%), and slots (18%) as the most popular initial gambling activities..

Moreover, sports wagering, including fantasy sports playing, have been viewed by several experts as a significant risk-factor for gambling problems among student athletes (Derevensky, 2012; Gainsbury et al., 2012; Marchica & Derevensky, 2015; Shead et al., 2014). Nearly a quarter of men wagered on sports over the past year in the NCAA studies from 2004 to 2016 (against NCAA regulations), and both intramural and Division I athletes were found to more likely

play fantasy sports (49% and 31%, respectively) than non-athletes (13%) (although not all players admitting to wagering) (Martin et al., 2016).

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Gambling Activities, Sports Wagering and Problem Gambling Among Male Student-Athletes

Overall, participation in gambling among male student-athletes decreased over the past twelve-year span (Paskus & Derevensky, 2017; Richard et al., 2018). In 2016, 55% of men reported engaging in some form of gambling for money in the past year, compared to 57% of men in 2012, 66% in 2008, and 71% in 2004. This overall reduction in gambling participation rates was observed across the majority of gambling activities (see Table 1 for the distribution of male student-athlete gambling behaviors). Sports wagering among male student athletes were most recently reported to be the second most frequently reported activity with almost a quarter (24.4%) of male athletes reporting engaging in sports wagering during the past year, and 8.9% report doing so monthly. The activity that showed the largest decrease over time was playing cards for money, with 46.8% of men engaging in this activity over the past year in 2004 and 22.9% in 2016. Monthly engagement in playing cards for money on a monthly basis also decreased drastically over the twelve-year span. Furthermore, although rates of past year internet casino gambling increased from 2004 to 2008, there has been a steady decrease from 2008 to 2016. Interestingly, although rates of past year sports wagering did not increase in 2016 compared to 2012, rates of monthly engagement in sports wagering increased since 2012, albeit marginally.

Table 1. NCAA male participation in gambling activities between 2004 and 2016 (Paskus & Derevensky, 2017; Richard et al., 2018)

Gambling activity	Past year gambling (%)				Monthly gambling (%)			
	2004	2008	2012	2016	2004	2008	2012	2016
Lottery tickets	36.2	31.4	35.2	36.4	11.1	9.1	11.1	10.3
Played cards for money	46.8	45.9	27.4	22.9	20.6	14.3	6.1	5.7
Bet on games of personal skill	39.7	33.1	25.4	23.3	16.3	13.0	9.9	9.5

Table 1. NCAA male participation in gambling activities between 2004 and 2016 (Paskus & Derevensky, 2017; Richard et al., 2018)

Gambling activity	Past year gambling (%)				Monthly gambling (%)			
	2004	2008	2012	2016	2004	2008	2012	2016
Bet on horse/dog races	9.8	8.5	6.5	6.3	2.0	1.4	1.5	1.2
Played the stock market	10.2	9.2	7.4	8.5	4.7	4.5	3.6	4.1
Commercial bingo	6.5	6.9	5.3	5.0	0.9	1.1	1.2	1.3
Gambled in casino	--	22.9	18.7	18.6	--	3.8	3.3	3.2
Internet casino games	6.8	12.3	7.5	6.7	2.8	4.7	1.9	1.8
Shot dice/craps	13.4	11.7	7.8	7.7	4.3	3.9	2.5	2.7
Slot machines	19.8	15.1	11.9	11.8	3.6	2.0	1.8	2.0
Sports wagering	23.5	29.5	25.7	24.4	9.6	9.6	8.3	8.9

Despite the NCAA regulations prohibiting engagement in gambling activities related to intercollegiate or professional sporting events, sports wagering still appears to be a frequent activity among men (Paskus & Derevensky, 2017; Richard et al., 2018). Consistent with results from 2012, wagering on the NFL (65%) was the most common target of sports betting, followed by NCAA basketball (55%). As for betting on college games, the rates of participation remain relatively low, with the lowest level of engagement being present for betting on a college game involving one's own team (this may be the result of strict penalties for student-athletes not adhering to NCAA policies prohibiting sports wagering as well as NCAA prevention efforts). In 2016, only 1.4% of men outside of Division I basketball and football bet on their own team, and 2% report betting on another team at their school. These results have been decreasing since 2004, with the highest rates being reported in 2008 (2.2% betting on their own team; and 2.6% betting on another team at their school). Finally, in regards to participation in fantasy leagues involving entry fees and prize money, 20% of men in the 2016 survey reported engagement, an increase from 19% in 2012, 17% in 2008 and 16% in 2004. Specifically, rates of participation in season long fantasy (17%) were higher than rates of daily/weekly Fantasy (11%) in 2016. When

asked about total money spent on fantasy sports within the past year, the majority of men reported spending less than \$50 (67%) with some spending between \$50 and \$99 (18%) and others wagering in excess of \$100 (15%).

Gambling Activities, Sports Wagering and Problem Gambling Among Female Student-Athletes
Female student-athletes report participating in gambling at much lower rates than men (Richard et al., 2018). While overall rates of gambling participation among women decreased from 2004 (49%), participation rates have remained relatively constant between 2008 and 2016 (39% in 2008; 39% in 2012; 38% in 2016) (see Table 2). Playing cards for money and betting on games of personal skill showed the largest decline in the past year and past month among females. A small decrease was also observable for past year engagement in internet casino games. Rates of engagement in sports wagering are on a continuous decrease, with the lowest rates of past year (4.9%) and monthly (0.5%) participation being reported in 2016.

Compared to men, sports wagering appears to be much less frequent activity among women (Richard et al., 2018). For the few women betting on sports, the most common target of sports betting in 2016 was wagering on NCAA basketball (44%) and on the NFL (44%). Additionally, betting on college games appears to be a relatively rare event for women, with extremely low base-rates being present in 2016. Finally, in regards to participation in fantasy leagues involving entry fees and prize money, 3.1% of women in the 2016 survey reported participation, an increase from 1.8% in 2012, 2.4% in 2008 and 2.7% in 2004. Specifically, rates of participation in season long Fantasy (2.7%) were only slightly higher than rates of daily/weekly fantasy (2.4%) in 2016. When asked about total money spent on fantasy sports within the past year, the majority of women reported spending less than \$10 (57%) or between \$10 and \$49 (37%).

Table 2. NCAA women's participation in various gambling activities between 2004 and 2016 (Paskus & Derevensky, 2017; Richard et al., 2018)

Gambling activity	Past year gambling (%)				Monthly gambling (%)			
	2004	2008	2012	2016	2004	2008	2012	2016
Lottery tickets	29.7	24.0	30.5	30.9	5.4	3.5	5.1	3.7
Played cards for money	19.0	10.7	5.3	4.2	4.4	1.3	0.6	0.4
Bet on games of personal skill	14.1	7.2	4.0	2.8	3.2	1.2	0.7	0.4
Bet on horse/dog races	4.8	3.2	2.8	2.7	0.4	0.1	0.2	0.2
Played the stock market	3.5	2.1	1.1	1.7	1.3	0.6	0.4	0.6
Commercial bingo	7.3	6.8	6.2	5.3	0.8	0.8	0.8	0.7
Gambled in casino	--	11.0	9.4	7.7	--	0.6	0.6	0.4
Internet casino games	2.1	1.9	1.8	1.3	0.8	0.2	0.3	0.1
Shot dice/craps	3.5	2.2	2.0	1.4	0.7	0.3	0.3	0.1
Slot machines	14.3	9.9	8.4	7.2	1.3	0.5	0.6	0.3
Sports wagering	6.7	6.6	5.2	4.9	1.5	0.8	0.6	0.5

Gambling Among Professional and Elite Athletes

The newspapers and internet are filled with professional athletes (e.g., Gilbert Arenas, Charles Barkley, Michael Jordan, Phil Michelson Alex Rodriguez, Pete Rose, Art Schlichter) experiencing significant problems due to their gambling problems. Gambling on sports appears to be a wide-spread phenomenon among athletes outside of collegiate athletics. Grall-Bronnec and colleagues (2016), assessing 1,236 professional athletes in Europe, reported that 56.6% of athletes had gambled at least once during the previous year and the prevalence of problem gambling was 8.2%, with betting on one's team, betting online and gambling regularly being associated with gambling problems. In yet another study comparing current, former, and non-athletes, former athletes (13.0%) and current athletes (7.0%) appear to score higher on gambling severity screens and were identified as disordered gamblers when compared to non-athletes (3.0%) (Weiss & Loubier, 2008). Expanding on this, Weiss and Loubier (2010) found that former athletes were more likely to participate in skill-based forms of gambling including

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sports betting and poker, while also being more likely to wager on the sport in which they participated. An unpublished study conducted in 2014 for the Professional Players' Federation by Heather Wardle in the U.K. reported that among 170 professional footballers and 176 professional cricketers surveyed, 6.1% of them met criteria as problem gamblers, compared with 1.9% in the general population of young men (accessed at <https://www.bbc.com/sport/30308203>, February 18, 2019).

Add Heather Wardle's study for British Players Association, high rates of problems among pro soccer, cricket & rugby players.

Commented [Ken12]: Keith: I do not see that Wardle's work is published. I found a reference to it at <https://www.bbc.com/sport/30308203>

I added suggested text, if we go with this. But not sure if we should include non-published survey results.

10. Summary

Key Findings

Sports wagering, whether among peers, through local bookmakers, in casinos or via the internet and mobile phones remains popular. The rush by gambling operators as well as professional sports teams and sports leagues to capitalize upon this market is significant. Extant prevalence studies regarding the popularity of sports betting is most certainly an underestimation of its popularity, and with easier access and availability, the number of people participating is likely to grow.

Common features of high-end, problem-level sports bettors include being male, young, single, highly educated, full-time employed, engage in other forms of gambling, with their significant others and peers favoring sports betting. These features are basically similar to other online bettors (EGM players; race track bettors), but there are some distinctive features and characteristics in the wider group of problem gamblers.

This report highlights new issues that are surfacing, particularly concerning the potentially detrimental effects of the interaction between online betting, sports viewing, live betting, and

fantasy gambling. Gamblers who use mobile and supplementary devices, engage in certain features of sports betting (in game betting; micro betting), and often engage in solitary betting in extended sessions late at night are at elevated risk of becoming a PGSB.

Public Health Implications

Our review of the literature supports the viewpoint that countries where legal sports betting has been in place for some time are realistically concerned about a growing culture of high risk sports bettors (Gordon et al., 2015; Thomas et al., 2012). Given that the U.S. is witnessing a rapid expansion of sports betting in the U.S., as well as the inclusion of more sophisticated technologies to promote access to this type of betting that will impact the ways and frequency of wagering, there is credence to the need for continuing monitoring of this emerging form of gambling.

Adjustments to public health responses will need to be in sync with this changing landscape, including policy makers and regulators being cognizant that sport identification, which is a very powerful social and emotional phenomenon in the U.S. (and elsewhere), is unique to this form of gambling, and that the promotional and advertising market will exploit “sports fandom” with technologies allowing live, rapid decision-making on events. In this light, regulators should consider banning micro event betting as this this feature of sports betting appeals almost exclusively to bettors with gambling problems. Such a ban would represent a highly targeted intervention to help reduce gambling-related harm.

Sports betting harm or risk reduction measures may include the following: well-advertised and user-friendly mechanisms for setting bets, incorporating responsible gambling measures such as self-exclusion, establishing time and money limits, and ways to increase individual's knowledge about betting odds are important considerations. The National Council on Problem

Gambling (2018) has articulated an important list of responsible gaming principles for sports gambling legislation, including ensuring the expansion of sports gambling includes dedicated funds to prevent and treat gambling addiction, ensuring that sports gambling operators implement responsible gambling programs (e.g., staff training, self-exclusion, the ability of individuals to establish time and money limits, self-exclusion programs, appropriate messaging, the establishment of a regulatory agency to enforce all regulations implemented, and the establishment of a consistent minimum age for sports gambling and related fantasy sports). Whether or not legislators will adhere to their recommendations remains uncertain. Whereas it remains unclear if “gamble responsibly” messages in Australia are impactful (Lamont et al., 2016), many sports betting websites and social media advertisements there are absent of such messages (<https://www.austgamingcouncil.org.au/content/agcs-responsible-gambling-strategy>).

Also worthy of attention by regulators is that the promotional markets in the U.S. will likely follow trends seen elsewhere whereby advertising is shaped to appeal to young, educated males by saturating promotions with features reflecting excitement, wealth, attractiveness to the opposite sex, and ease of wagering via mobile technologies (Lamont et al., 2016).

Treatment Implications

The characteristics of PGSBs suggest that interventions should target young adult males and take into account the higher educational and income levels of this group. Interventions should discourage frequent betting, in-play betting, micro-betting and challenge beliefs that one can earn money from sports gambling. Whereas the U.S. has made great strides in educating the addiction treatment workforce to address those with a gambling disorder, additional education will be needed in order to best adjust assessment and treatment approaches in order to meet the needs of this “newest generation” of individuals with a gambling disorder resulting from sports betting.

Future Research Needs

The possible causal link between sports betting and problem gambling, as well as the additional harm posed by the presence of individual- and technology-based risk factors, cannot be determined from correlational studies, which is the state of nearly all studies we reviewed. Thus, longitudinal studies and increased funding for this area are needed. Given the contemporary features of sports gambling, a national prevalence study with a representative sample is in order. Other research needs include the following: a) methodological designs that isolate problem behaviors associated with sports betting from possible links to other gambling activities; b) research that delves deeper than the extant literature into the risk factors associated with psychological, social and cultural variables; c) the impact of sports betting inducements, such as sign-up bonuses, 'free' bets, money-back guarantees and other prolific offers; d) the impact of advertising on sports betting; e) the extent and nature of sports betting by children and adolescents; and f) the impact on sports betting involvement of major league sports leagues and professional teams partnering with gambling operators and casinos.

Appendix

Definitions and Terminology Issues

It is important to clarify terms and definitions used in this report. Betting, gambling and wagering refer to the same behavior and are used interchangeably. There is no agreed-upon operational definition of sports betting; as a matter of convenience we rely on the definition or criteria settled upon by the authors' of the manuscripts and reports we reviewed. Poly-gambling refers to playing more than one type of game. An adolescent refers to youth age 12 -17; young adults are 18-25 years of age. College students, unless specified, refer to undergraduates. A "gambling problem" or a "problem gambler" is a general term reflecting a non-clinical diagnostic designation of a person who is experiencing problems as a result of gambling. When the research pertains to those who meet a *formal clinical definition* of a gambling problem, specific terms such as disordered gambling, Pathological Gambling (pre DSM-5) or Gambling Disorder (DSM-5; American Psychiatric Association, 2013) are used. If disordered gamblers among sports bettors was identified in a publication, we report which screening or assessment measure was used, and we refer to such individuals as a problem gambling sports bettor (PGSB). Finally, it was the norm for recent studies that identified a sports betting group to base the definition on self-identification, i.e., the person's preferred form of gambling.

Review Parameters

The literature on sports wagering that pertained to the core questions stated in the RFP were identified via a comprehensive literature search strategy. We searched a broad domain of sports wagering, including legal and illegal wagering, live in-sport betting, fantasy sports, and various modes of betting (internet, mobile). We examined the wagering by amateur athletes and address betting by professional athletes. Public policy and clinical (prevention and treatment) implications are also discussed.

The identification and retrieval of the relevant published and unpublished studies and reports were guided by the following procedures.

- Combinations of relevant terms were entered into the major search engines and search systems through 2018 (PsycINFO, PubMed, GoPubMed, PubPsych, Google Scholar, and Web of Science. Combinations of terms and themes relevant to sports betting, gambler profiles, betting by athletes were entered (e.g., sport OR sports OR betting OR wager* OR gambl*) AND (clusters OR profiles OR subtypes OR “gambl* classes”).
- We searched the following sources in order to locate gray literature: Campbell Collaboration Library, Cochrane Collaboration CENTRAL, CDC Gaming Reports, Gambling and the Law, American Gaming Association, sportshandle.com, SustainableGAMIGN Digest, as well as state agencies, professional sports leagues and unions, amateur sports leagues, and reports from the treatment field.
- We also a) checked the bibliographies of all screened and eligible studies, and b) conducted hand searches of recent issues of relevant gambling and addiction journals (e.g., *Journal of Gambling Studies*; *Journal of Gambling Issues*; *International Gambling Studies*; *Addiction*; *American Journal on Addictions*; *Psychology of Addictive Behaviors*).

Publications and reports were identified by both authors, and those that satisfied the following criteria were retained: (1) published in English or French; (2) published between January 1980 (i.e., year that pathological gambling was recognized in the DSM-III) and December 2018 (this includes articles accepted for publication in *online first* for relevant journals; and (3) articles providing information pertaining to the RFP questions. Given the limited legal status of sports betting in the U.S. until recently, there is a predominance of data from Europe and Australia.

Quality and Nature of Research and Reports

Whereas we did not formally assess the scientific quality of located publications via formal standards (e.g., Quality Assessment Tool for Quantitative Studies), it is our assessment that

the literature we reviewed is hampered by features common to an emerging field: there is not a wealth of data; most studies are cross-sectional (so links of risk factors to sports betting-related problems provide only preliminary findings); data are based on self-report and prone to social desirability responding, recall and other biases; and most studies suffer from self-selection bias, i.e., respondents may be those who exhibit a greater degree of gambling involvement given they are more interested in the topic. Also, most sports bettors engage in poly-gambling and this feature is a confound variable when seeking to identify characteristics specific to sports betting. In instances when a sport betting group or a mode of betting was identified, such designations were typically based on self-reported preference.

References

- Arnett, J. (2004). *Emerging adulthood*. New York: Oxford University Press.
- Auer, M., & Griffiths, M. D. (2017). Self-reported losses versus actual losses in online gambling: An empirical study. *Journal of Gambling Studies*, 33(3), 795-806.
- Barnes, G. M., Welte, J. W., Hoffman, J. H., & Tidwell, M. C. O. (2010). Comparisons of gambling and alcohol use among college students and non-college students in the U.S. *Journal of American College Health*, 58(5), 443-452. doi: 10.1080/07448480903540499
- Blaszczynski, A., & Hunt, C. (2011). Online sports betting has created new generation of problem gamblers. *Sydney, NSW: The University of Sydney*.
- Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, 97(5), 487-499.
- Blinn-Pike, L., Worthy, S. L., & Jonkman, J. N. (2007). Disordered gambling among college students: A meta-analytic study. *Journal of Gambling Studies*, 23, 175-183.
- Bourn, D. (1998). Gambling behavior among college student-athletes, non-athletes, and former athletes. Unpublished Master's Thesis, Springfield College.
- Braverman, J., LaPlante, D. A., Nelson, S. E., & Shaffer, H. J. (2013). Using cross-game behavioral markers for early identification of high-risk internet gamblers. *Psychology of Addictive Behaviors*, 27(3), 868-877.
- Browne, M., Rockloff, M. J., Blaszczynski, A., Allcock, C., & Windross, A. (2015). Delusions of expertise: The high standard of proof needed to demonstrate skills at horserace handicapping. *Journal of Gambling Studies*, 31(1), 73-89.
- Calado, F., & Griffiths, M. D. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions*, 5(4), 592-613. doi: 10.1556/2006.5.2016.073
- Calado, F., Alexandre, J., & Griffiths, M. D. (2017). Prevalence of adolescent problem gambling: A systematic review of recent research. *Journal of Gambling Studies*, 33(2), 397-424. doi: 10.1007/s10899-016-9627-5
- Castrén, S., Basnet, S., Salonen, A. H., Pankakoski, M., Ronkainen, J. E., Alho, H., & Lahti, T. (2013). Factors associated with disordered gambling in Finland. *Substance Abuse Treatment, Prevention, and Policy*, 8(1), 1-9.
- Corney, R., & Davis, J. (2010). The attractions and risks of Internet gambling for women: A qualitative study. *Journal of Gambling Issues*, (24), 121-139.
- Dannon, P. N., Lowengrub, K., Shalgi, B., Sasson, M., Tuson, L., Saphir, Y., & Kotler, M. (2006). Dual psychiatric diagnosis and substance abuse in pathological gamblers: a preliminary gender comparison study. *Journal of Addictive Diseases*, 25(3), 49-54.
- d'Astous, A., & Di Gaspero, M. (2015). Heuristic and analytic processing in online sports betting. *Journal of Gambling Studies*, 31(2), 455-470.
- Deans, E. G., Thomas, S. L., Daube, M., & Derevensky, J. (2016). "I can sit on the beach and punt through my mobile phone": The influence of physical and online environments on the gambling risk behaviours of young men. *Social Science & Medicine*, 166, 110-119.
- Delfabbro, P., King, D., & Griffiths, M. D. (2014). From adolescent to adult gambling: An analysis of longitudinal gambling patterns in South Australia. *Journal of Gambling Studies*, 30(3), 547-563.

- Demaree, H., DeDonno, M., Burns, K., & Evehart, D. (2008). You bet: How personality differences affect risk-taking preferences. *Personality and Individual Differences, 44*(7), 1484-1494. doi:10.1016/j.paid.2008.01.005.
- Derevensky, J. (2012). *Teen gambling: Understanding a growing epidemic*. New York, NY: Rowman & Littlefield Publishing.
- Derevensky, J. (2018). Annual treatment report for problem gambling in Florida. Report to the Florida Council on Compulsive Gambling.
- Derevensky, J. & Marchica, L. (2018). Fantasy sports wagering: Is it a concern and does it require more regulation?. *Gambling Law Review: Economics, Regulation, Compliance, and Policy, 22*(1), 55-60.
- Dirección General de Ordenación del Juego. (2016). *Study on the prevalence, behavior and characteristics of users of games of chance in Spain 2015*. Madrid: Ministerio de Hacienda y Administraciones Públicas.
- Drayer, J., Shapiro, S. L., Dwyer, B., Morse, A. L., & White, J. (2010). The effects of fantasy football participation on NFL consumption: A qualitative analysis. *Sport Management Review, 13*(2), 129-141.
- Dwyer, B., & Weiner, J. (2018). Daily grind: A comparison of causality orientations, emotions, and fantasy sport participation. *Journal of Gambling Studies, 34*(1), 1-20.
- Ellenbogen, S., Jacobs, D., Derevensky, J., Gupta, R., & Paskus, T. (2008). Gambling behavior among college student-athletes. *Journal of Applied Sport Psychology, 20*(3), 349-362. doi: 10.1080/10413200802056685
- Engwall, D., Hunter, R., & Steinberg, M. (2004). Gambling and other risk behaviors on university campuses. *Journal of American College Health, 52*(6), 245-256. doi: 10.3200/JACH.52.6.245-256
- Estevez, A., Rodriguez, R., Diaz, N., Granero, R., Mestre-Bach, G., Steward, T., ... & Bano, M. (2017). How do online sports gambling disorder patients compare with land-based patients?. *Journal of Behavioral Addictions, 6*(4), 639-647.
- European Gaming and Betting Association. (2018). Leading the way in popular digital entertainment. Retrieved from <https://www.egba.eu/home-page/leading-the-way-in-popular-digital-entertainment/>, December 18, 2018.
- Fantasy Sports Trade Association. (2018). Industry demographics: FSTA. Retrieved from: <http://fsta.org/research/industry-demographics/>.
- Gainsbury, S. M., Liu, Y., Russell, A. M., & Teichert, T. (2016). Is all Internet gambling equally problematic? Considering the relationship between mode of access and gambling problems. *Computers in Human Behavior, 55*, 717-728.
- Gainsbury, S. M., Russell, A., & Hing, N. (2014). An investigation of social casino gaming among land-based and Internet gamblers: A comparison of socio-demographic characteristics, gambling and co-morbidities. *Computers in Human Behavior, 33*, 126-135.
- Gainsbury, S. M., Russell, A., Blaszczynski, A., & Hing, N. (2015a). The interaction between gambling activities and modes of access: A comparison of Internet-only, land-based only, and mixed-mode gamblers. *Addictive Behaviors, 41*, 34-40.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D., & Blaszczynski, A. (2015b). How the Internet is changing gambling: Findings from an Australian prevalence survey. *Journal of Gambling Studies, 31*(1), 1-15.

- Gainsbury, S., Wood, R., Russell, A., Hing, N., & Blaszczynski, A. (2012). A digital revolution: Comparison of demographic profiles, attitudes and gambling behavior of Internet and non-Internet gamblers. *Computers in Human Behavior, 28*(4), 1388-1398.
- General Accounting Office. (2002). *Internet gambling: An overview of the issues* (No. GAO-03-89). Washington, DC: United States General Accounting Office.
- Gordon, R., Gurrieri, L., & Chapman, M. (2015). Broadening an understanding of problem gambling: The lifestyle consumption community of sports betting. *Journal of Business Research, 68*(10), 2164–2172. <https://doi.org/10.1016/j.jbusres.2015.03.016>
- Grall-Bronnec, M., Caillon, J., Humeau, E., Perrot, B., Remaud, M., Guilleux, A., Rocher, B., Sauvaget, A., & Bouju, G. (2016). Gambling among European professional athletes. Prevalence and associated factors. *Journal of Addictive Diseases, 35*(4), 278-290. doi: 10.1080/10550887.2016.1177807
- Gray, H. M., LaPlante, D. A., & Shaffer, H. J. (2012). Behavioral characteristics of Internet gamblers who trigger corporate responsible gambling interventions. *Psychology of Addictive Behaviors, 26*(3), 527-535.
- Griffiths, M. (2003). Internet gambling: Issues, concerns, and recommendations. *CyberPsychology & Behavior, 6*(6), 557-568.
- Griffiths, M. D., & Auer, M. (2011). Approaches to understanding online versus offline gaming impacts. *Casino and Gaming International, 7*(3), 45-48.
- Griffiths, M. D., & Parke, J. (2002). The social impact of Internet gambling. *Social Science Computer Review, 20*(3), 312–320.
- Griffiths, M., Wardle, H., Orford, J., Sproston, K., & Erens, B. (2009). Sociodemographic correlates of internet gambling: Findings from the 2007 British Gambling Prevalence Survey. *CyberPsychology & Behavior, 12*(2), 199-202.
- Gupta, R., Derevensky, J.L., & Marget, N. (2004). Coping strategies employed by adolescents with gambling problems. *Child and Adolescent Mental Health, 9*(3), 115-120.
- Hanss, D., Mentzoni, R. A., Griffiths, M. D., & Pallesen, S. (2015). The impact of gambling advertising: Problem gamblers report stronger impacts on involvement, knowledge, and awareness than recreational gamblers. *Psychology of Addictive Behaviors, 29*, 483-491.
- Hing, N., & Breen, H. (2001). Profiling lady luck: An empirical study of gambling and problem gambling amongst female club members. *Journal of Gambling Studies, 17*(1), 47-69. doi: 10.1023/A:1016640332005
- Hing, N., Cherney, L., Gainsbury, S., Lubman, D., Wood, R., & Blaszczynski, A. (2014). Maintaining and losing control during Internet gambling: A qualitative study of gamblers' experiences. *New Media and Society*. doi:10.1177/1461444814521140
- Hing, N., Lamont, M., Vitartas, P., & Fink, E. (2015). Sports bettors' responses to sports-embedded gambling promotions: Implications for compulsive consumption. *Journal of Business Research, 68*(10), 2057-2066.
- Hing, N., Li, E., Vitartas, P., & Russell, A. M. (2018). On the spur of the moment: Intrinsic predictors of impulse sports betting. *Journal of Gambling Studies, 34*, 413-428.
- Hing, N., Russell, A. M., & Browne, M. (2017). Risk factors for gambling problems on online electronic gaming machines, race betting and sports betting. *Frontiers in Psychology, 8*, 779.

- Hing, N., Russell, A. M., Vitartas, P., & Lamont, M. (2016). Demographic, behavioural and normative risk factors for gambling problems amongst sports bettors. *Journal of Gambling Studies*, 32(2), 625-641
- Hing, N., Vitartas, P., & Lamont, M. (2013). Gambling sponsorship of sport: An exploratory study of links with gambling attitudes and intentions. *International Gambling Studies*, 13(3), 281-301.
- Holdsworth, L., Hing, N., & Breen, H. (2012). Exploring women's problem gambling: a review of the literature. *International Gambling Studies*, 12(2), 199-213. doi: 10.1080/14459795.2012.656317
- Huang, J. H., & Boyer, R. (2007). Epidemiology of youth gambling problems in Canada: A national prevalence study. *The Canadian Journal of Psychiatry*, 52(10), 657-665.
- Huang, J. H., Jacobs, D. F., & Derevensky, J. L. (2010). Sexual risk-taking behaviors, gambling, and heavy drinking among U.S. College athletes. *Archives of Sexual Behavior*, 39(3), 706-713. doi: 10.1007/s10508-009-9521-7
- Huang, J. H., Jacobs, D. F., & Derevensky, J. L. (2011). DSM-based problem gambling: Increasing the odds of heavy drinking in a national sample of U.S. college athletes?. *Journal of Psychiatric Research*, 45(3), 302-308. doi: 10.1016/j.jpsychires.2010.07.001
- Huang, J. H., Jacobs, D. F., Derevensky, J. L., Gupta, R., & Paskus, T. S. (2007a). A national study on gambling among US college student-athletes. *Journal of American College Health*, 56(2), 93-99. doi: 10.3200/jach.56.2.93-100
- Huang, J. H., Jacobs, D. F., Derevensky, J. L., Gupta, R., & Paskus, T. S. (2007b). Gambling and health risk behaviors among U.S. college student-athletes: findings from a national study. *Journal of Adolescent Health*, 40(5), 390-397. doi: 10.1016/j.jadohealth.2006.11.146
- iGaming Business Directory (2016). Research and Markets: 2016 Edition. Dublin: iGaming.
- Johansson, A., Grant, J.E., Kim, S.W., Odlaug, B.L., & Gøtestam, K.G. (2009). Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies*, 25(1), 67-92.
- Kerber, C. S. (2005). Problem and pathological gambling among college athletes. *Annals of Clinical Psychiatry*, 17(4), 243-247. doi: 10.1080/10401230500295388
- Kludt, T. (2015). DraftKings and FanDuel ads seem to be everywhere on TV because they are. Retrieved from: <http://money.cnn.com/2015/10/08/media/fanduel-draftkings-commercials/index.html>
- LaBrie, R., & Shaffer, H. J. (2011). Identifying behavioral markers of disordered Internet sports gambling. *Addiction Research & Theory*, 19(1), 56-65.
- LaBrie, R. A., Shaffer, H. J., LaPlante, D. A., & Wechsler, H. (2003). Correlates of college student gambling in the United States. *Journal of American College Health*, 52(2), 53-62.
- Ladd, G. T., & Petry, N. M. (2002). Disordered gambling among university-based medical and dental patients: A focus on Internet gambling. *Psychology of Addictive Behaviors*, 16(1), 76-79.
- Ladouceur, R. (2004). Perceptions among pathological and nonpathological gamblers. *Addictive Behaviors*, 29(3), 555-565.
- Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C., Leblond, J., & Jacques, C. (2001). Cognitive treatment of pathological gambling. *The Journal of Nervous and Mental Disease*, 189(11), 774-780.

- Lamont, M., Hing, N., & Gainsbury, S. (2011). Gambling on sport sponsorship: A conceptual framework for research and regulatory review. *Sport Management Review, 14*(3), 246–257. <https://doi.org/10.1016/j.smr.2011.04.004>
- Lamont, M., Hing, N., & Vitartas, P. (2016). Affective response to gambling promotions during televised sport: A qualitative analysis. *Sport Management Review, 19*(3), 319-331.
- LaPlante, D. A., Nelson, S. E., & Gray, H. M. (2014). Breadth and depth involvement: Understanding Internet gambling involvement and its relationship to gambling problems. *Psychology of Addictive Behaviors, 28*(2), 396-403.
- LaPlante, D. A., Nelson, S. E., LaBrie, R. A., & Shaffer, H. J. (2009). Disordered gambling, type of gambling and gambling involvement in the British Gambling Prevalence Survey 2007. *The European Journal of Public Health, 21*(4), 532-537.
- LaPlante, D. A., Schumann, A., LaBrie, R. A., & Shaffer, H. J. (2008). Population trends in Internet sports gambling. *Computers in Human Behavior, 24*(5), 2399-2414.
- Lopez-Gonzalez, H., Estévez, A., & Griffiths, M. D. (2017a). Controlling the illusion of control: A grounded theory of sports betting advertising in the UK. *International Gambling Studies, 1*–17. <https://doi.org/10.1080>
- Lopez-Gonzalez, H., Estévez, A., & Griffiths, M. D. (2018). Internet-based structural characteristics of sports betting and problem gambling severity: Is there a relationship?. *International Journal of Mental Health and Addiction, 1*-14
- Lopez-Gonzalez, H., Estévez, A., & Griffiths, M. D. (2017b). Marketing and advertising online sports betting: A problem gambling perspective. *Journal of Sport & Social Issues, 41*(3), 256–272.
- Lopez-Gonzalez, H., & Griffiths, M. D. (2016). Is European online gambling regulation adequately addressing in-play betting advertising?. *Gaming Law Review and Economics, 20*, 495-503.
- Lostutter, T. W., Lewis, M. A., Cronce, J. M., Neighbors, C., & Larimer, M. E. (2014). The use of protective behaviors in relation to gambling among college students. *Journal of Gambling Studies, 30*(1), 27-46.
- Marchica, L., & Derevensky, J. (2015). Fantasy sports: A growing concern among college student-athletes. *International Journal of Mental Health and Addiction, 14*(5), 635 -645. <https://doi.org/10.1007/s11469-015-9610-x>.
- Marchica, L., Zhao, Y., Derevensky, J. & Ivoska, W. (2017). Understanding the relationship between sports-relevant gambling and being at-risk for a gambling problem among American adolescents. *Journal of Gambling Studies, 33*, 437-448
- Martin, R. J., & Nelson, S. E. (2014). Fantasy sports, real money: Exploration of the relationship between fantasy sports participation and gambling-related problems. *Addictive Behaviors, 39*(10), 1377-1382.
- Martin, R. J., Nelson, S. E., & Gallucci, A. R. (2016). Game on: Past year gambling, gambling-related problems, and fantasy sports gambling among college athletes and non-athletes. *Journal of Gambling Studies, 32*(2), 567-579.
- Martin, R.J., Nelson, S. E., Gallucci, A. R., & Lee, J. G. L. (2018). Daily and season-long fantasy sports participation and gambling -related problems among a sample of college students at three universities. *International Gambling Studies, 18*(3), 395-407.
- McBride, J. (2006). Internet gambling among youth: A preliminary examination. *Youth Gambling International, 6*(2), 1.

- McBride, J., & Derevensky, J. (2009). Internet gambling behavior in a sample of online gamblers. *International Journal of Mental Health and Addiction*, 7(1), 149-167.
- McCormack, A., Shorter, G. W., & Griffiths, M. D. (2013). An examination of participation in online gambling activities and the relationship with problem gambling. *Journal of Behavioral Addictions*, 2(1), 31-41.
- Mercier, J., Sévigny, S., Jacques, C., Goulet, A., Cantinotti, M., & Giroux, I. (2018). Sports bettors: A systematic review. *Journal of Gambling Issues*, 38, 203-236.
- Milner, L., Hing, N., Vitartas, P., & Lamont, M. J. (2013). Embedded gambling promotion in Australian football broadcasts: An exploratory study. *Communication, Politics & Culture*, 46(2), 177-198.
- Mitka, M. (2001). Win or lose, Internet gambling stakes are high. *Journal of the American Medical Association*, 285(8), 1005.
- Mohler-Kuo, M., Lee, J. E., & Wechsler, H. (2003). Trends in marijuana and other illicit drug use among college students: Results from 4 Harvard School of Public Health College Alcohol Study surveys: 1993-2001. *Journal of American College Health*, 52(1), 17-24. doi: 10.1080/07448480309595719
- Monaghan, S. (2009). Responsible gambling strategies for Internet gambling: The theoretical and empirical base of using pop-up messages to encourage self-awareness. *Computers in Human Behavior*, 25(1), 202-207.
- National Centre for Education Statistics. (2018). What are the new back to school statistics for 2017?. Retrieved from: <https://nces.ed.gov/fastfacts/display.asp?id=372>
- National Collegiate Athletic Association. (2016). *1981-82 – 2015-16 NCAA Sports Sponsorship and Participation Rates Report*. Indianapolis, IN: National Collegiate Athletic Association.
- National Council on Problem Gambling. (2018). Responsible gaming principles for sports gambling legislation. Retrieved from <https://www.ncpgambling.org/responsible-gaming-principles-for-sports-gambling-legislation/>
- Nelson, S. E., LaPlante, D. A., Peller, A. J., Schumann, A., LaBrie, R. A., & Shaffer, H. J. (2008). Real limits in the virtual world: Self-limiting behavior of Internet gamblers. *Journal of Gambling Studies*, 24(4), 463-477.
- NORC. (1999). *Gambling Impact and Behavior Study*. Author: U. of Chicago, IL. <http://www.norc.org/PDFs/publications/GIBSFinalReportApril1999.pdf>
- Nordmyr, J., Forsman, A. K., Wahlbeck, K., Björkqvist, K., & Österman, K. (2014). Associations between problem gambling, socio-demographics, mental health factors and gambling type: Sex differences among Finnish gamblers. *International Gambling Studies*, 14(1), 39-52.
- Nowak, D. E. (2017). A meta-analytical synthesis and examination of pathological and problem gambling rates and associated moderators among college students, 1987-2016. *Journal of Gambling Studies* 34(2), 465-498. doi: 10.1007/s10899-017-9726-y
- Nowak, D. E., & Aloe, A. M. (2014). The prevalence of pathological gambling among college students: a meta-analytic synthesis, 2005-2013. *Journal of Gambling Studies*, 30(4), 819-843. doi: 10.1007/s10899-013-9399-0
- Nower, L., & Blaszczynski, A. (2006). Characteristics and gender differences among self-excluded casino problem gamblers: Missouri data. *Journal of Gambling Studies*, 22(1), 81-99. doi: 10.1007/s10899-005-9004-2

- Nower, L., Caler, K. R., Pickering, D., & Blaszczynski, A. (2018). Daily fantasy sports players: Gambling, addiction, and mental health problems. *Journal of Gambling Studies*. doi:10.1007/s10899-018-9744-4
- Nower, L., Derevensky, J., & Gupta, R. (2004). The relationship of impulsivity, sensation seeking, coping, and substance use in youth gamblers. *Psychology of Addictive Behaviors*, 18(1), 49-55. doi: 10.1037/0893-164X.18.1.49.
- Nower, L., Volberg, R. A., & Caler, K. R. (2017). *The Prevalence of Online and Land-Based Gambling in New Jersey*. New Brunswick, NJ: Center for Gambling Studies, Rutgers University.
- Petry, N. M. (2007). Gambling and substance use disorders: current status and future directions. *The American Journal on Addictions*, 16(1), 1-9.
- Paskus, T. & Derevensky, J. (2017). Trends in NCAA student athlete gambling behaviors and activities. Retrieved from http://www.ncaa.org/sites/default/files/2017RES_wagering_powerpoint_20171129.pdf
- Philander, K. S., & MacKay, T. L. (2014). Online gambling participation and problem gambling severity: is there a causal relationship?. *International Gambling Studies*, 14(2), 214-227.
- Pitt, H., Thomas, S. L., Bestman, A., Daube, M., & Derevensky, J. (2017). Factors that influence children's gambling attitudes and consumption intentions: lessons for gambling harm prevention research, policies and advocacy strategies. *Harm Reduction Journal*, 14(1), 1-12.
- Potenza, M. N. (2008). The neurobiology of pathological gambling and drug addiction: an overview and new findings. *Philosophical Transactions of the Royal Society B: Biological Sciences*. <https://royalsocietypublishing.org/doi/full/10.1098/rstb.2008.0100>
- Potenza, M. N., Wareham, J. D., Steinberg, M. A., Rugle, L., Cavallo, D. A., Krishnan-Sarin, S., & Desai, R. A. (2011). Correlates of at-risk/problem internet gambling in adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 50(2), 150-159.
- Productivity Commission (2010). *Productivity commission report on gambling*. Canberra, Australia: Australian Government Report. <https://www.pc.gov.au/inquiries/completed/gambling-2010/report>
- Reith, G. (2012). Beyond addiction or compulsion: The continuing role of environment in the case of pathological gambling. *Addiction*, 107(10), 1736-1737.
- Richard, J., Derevensky, J. & Paskus, T. (2018). Trends in gambling behaviours among NCAA college student-athletes: A comparison of the 2004, 2008, 2012 and 2016 NCAA survey data. Poster presented at the 3rd annual Summer Institute for School Psychology conference, McGill University, Montreal, May.
- Rose, I. N. (2015). Are daily fantasy sports legal?. *Gaming Law Review and Economics*, 19(5), 346-349.
- Russell, A. M., Hing, N., Browne, M., Li, E., & Vitartas, P. (2018a). Who bets on micro events (microbets) in sports?. *Journal of Gambling Studies*, 1-19. <https://doi.org/10.1007/s10899-018-9810-y>
- Russell, A. M., Hing, N., Li, E., & Vitartas, P. (2018b). Gambling risk groups are not all the same: Risk factors amongst sports bettors. *Journal of Gambling Studies*, 1-22. <https://doi.org/10.1007/s10899-018-9765-z>
- Sansanwal, R. M., Derevensky, J. L., & Paskus, T. S. (2018). Trends in gambling behaviour among NCAA college student-athletes: A comparison of 2004, 2008 and 2012 NCAA Survey Data. *International Journal of Sports and Exercise Medicine*, 4, 1-12.

- Shead, N.W., Derevensky, J. & Gupta, R. (2010). Risk and protective factors associated with problem gambling. *International Journal of Adolescent Medicine and Health*, 22,39-58.
- Spider Marketing. (2016). Connected Sports Fans 2016: Trends on The Evolution Of Sports Fans Digital Experience With Live Events. Retrieved from: <https://www.avaya.com/AvayaScripts/webtrends/track-pdf.html?f=/en/documents/premium/connected-sports-fan-2016-report-avaya.pdf>
- Statista. (2018a). <https://www.statista.com/statistics/248655/segmentation-of-online-gambling-market/>.
- Statista. (2018b). Number of TV viewers who typically watch sports on TV in the United States from spring 2008 to spring 2017 (in millions). Retrieved from: <https://www.statista.com/statistics/229116/tv-viewers-who-typically-watched-sports-on-tv-usa/>
- Stinchfield, R.D., & Winters, K.C. (2001). Outcome of Minnesota's gambling treatment programs. *Journal of Gambling Studies*, 17, 217-245.
- Supreme Court of the United States. (2018). Murphy v NCAA. Retrieved from: <https://www.supremecourt.gov/search.aspx?filename=/docket/docketfiles/html/public/16-476.html>
- Thomas, S. L., Lewis, S., McLeod, C., & Haycock, J. (2012). "They are working every angle". A qualitative study of Australian adults' attitudes towards, and interactions with, gambling industry marketing strategies. *International Gambling Studies*, 12(1), 111–127. <https://doi.org/10.1080/14459795.2011.639381>.
- Thomas, S. L., Lewis, S., Westberg, K., & Derevensky, J. L. (2013). What influences the beliefs, behaviours and consumption patterns of 'moderate risk' gamblers?. *International Journal of Mental Health and Addiction*, 11(4), 474-489.
- Thomas, S.L., & Moore, S. (2001). "Do women gamble for the same reasons as men?". In *Culture and the gambling phenomenon: Proceedings of the eleventh National Association for Gambling Studies conference*, Sydney, Australia. Edited by: Blaszczynski, A. 366–377. Alphington: National Association for Gambling Studies.
- Toneatto, T., Blitz-Miller, T., Calderwood, K., Dragonetti, R., & Tsanos, A. (1997). Cognitive distortions in heavy gambling. *Journal of Gambling Studies*, 13, 253-266. doi:10.1023/A:1024983300428
- Vespa, J. (2017). The changing economics and demographics of young adulthood: 1975-2016. *Current Population Reports*, P20-579, U.S. Census Bureau, Washington, DC.
- Volberg, R., Gupta, R., Griffiths, M., Olason, D. & Delfabbro, P. (2010). An international perspective on youth gambling prevalence studies. *International Journal of Adolescent Medicine and Health*, 22, 3-28.
- Walker, M. B. (1992). Irrational thinking among slot machine players. *Journal of Gambling Studies*, 8, 245-261. doi:10.1007/BF01014652
- Wechsler, H., Lee, J. E., Kuo, M., Seibring, M., Nelson, T. F., & Lee, H. (2002). Trends in college binge drinking during a period of increased prevention efforts. Findings from 4 Harvard School of Public Health College Alcohol Study surveys: 1993-2001. *Journal of the American College Health*, 50(5), 203-217. doi: 10.1080/07448480209595713
- Weinstock, J., Whelan, J. P., Meyers, A. W., & McCausland, C. (2007). The performance of two pathological gambling screens in college students. *Assessment*, 14(4), 399-407. doi: 10.1177/1073191107305273

- Weiss, S. (2010). Cross-addiction on campus: More problems for student-athletes. *Substance Use and Misuse*, 45(10), 1525-1541. doi: 10.3109/10826081003682297
- Weiss, S. M., & Loubier, S. L. (2008). Gambling behaviors of former athletes: The delayed competitive effect. *UNLV Gaming Research and Review Journal*, 12(1), 53–60.
- Welte, J. W., Barnes, G. M., Tidwell, M. C., Hoffman, J. H., & Wieczorek, W. F. (2015). Gambling and problem gambling in the United States: Changes between 1999 and 2013. *Journal of Gambling Studies*, 31(3), 695-715. doi: 10.1007/s10899-014-9471-4
- Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidwell, M. C., & Parker, J. (2002). Gambling participation in the US: Results from a national survey. *Journal of Gambling Studies*, 18(4), 313-337.
- Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidwell, M. C., & Parker, J. C. (2004). Risk factors for pathological gambling. *Addictive Behaviors*, 29(2), 323-335.
- Williams, R. J., West, B. L., & Simpson, R. I. (2012). *Prevention of problem gambling: A comprehensive review of the evidence and identified best practices*. Guelph, ON: Ontario Problem Gambling Research Centre.
- Winters, K.C. (2016). *Summary of Select Topics of the Problem Gambling Literature: Prevalence and the Promotion of Responsible Gambling*. Report prepared for MGM Resorts International. September 12, 2016.
- Winters, K.C., Bengston, P., Dorr, D., & Stinchfield, R.D. (1998). Prevalence and risk factors of problem gambling among college students. *Psychology of Addictive Behaviors*, 12, 127-135.
- Wong, G., Zane, N., Saw, A., & Chan, A. K. (2013). Examining gender differences for gambling engagement and gambling problems among emerging adults. *Journal of Gambling Studies*, 29(2), 171-189. doi: 10.1007/s10899-012-9305-1
- Wood, R. T., & Williams, R. J. (2011). A comparative profile of the Internet gambler: Demographic characteristics, game-play patterns, and problem gambling status. *New Media & Society*, 13(7), 1123-1141.
- Wood, R. T., & Williams, R. J. (2009). *Internet gambling: Prevalence, patterns, problems, and policy options*. Final Report prepared for the Ontario Problem Gambling Research Centre; Guelph, Ontario.
- Worthy, S., Jonkman, J., & Blinn-Pike, L. (2010). Sensation-seeking, risk-taking, and problematic financial behaviors of college students. *Journal of Family Economic Issues*, 31, 161–170. doi: 10.1007/s10834-010-9183-6.
- Wu, A. M., Lai, M. H., & Tong, K. K. (2015). Internet gambling among community adults and university students in Macao. *Journal of Gambling Studies*, 31(3), 643-657.