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Technological advances during the past two decades have fundamentally changed day-to-day human behavior. With the increasing availability of high-speed broadband internet services, the widespread use of smartphones, and the importance of social media, human lives have been forever altered. For some, it is hard to remember lives without social media, the internet, or smartphones. For some, virtual assistants such as *Siri* and *Alexa* have become indispensable sources for acquiring information. While technological advances have irrevocably changed contemporary living, the gambling and gaming industries have been particularly revolutionized by these advances.

Gambling vs. gaming – What’s in a name?

The terms ‘gambling’ and ‘gaming’ are frequently used synonymously – particularly by those working in the gambling industry. *Gambling* involves wagering money or something of value on an event with an uncertain outcome. Gambling typically comprises three elements: consideration (an amount of money or something of financial value wagered), risk (in the form of chance events), and a prize (typically money but may simply be something of financial value). *Gaming* on the other hand, are formalized expressions of play. Games can come in many different types and genres; they can involve social play, role-playing, they can comprise board games such as *Monopoly* or *Scrabble*, they may include videogames which are played on a game console (e.g., *Call of Duty*), or may come in the form of electronic/digital games played via a computer or smartphone (e.g., *Candy Crush Saga*). One of the ‘classic’ categorization of game types was that proposed by Caillois (1958) who claimed all games comprised one of four types: *agon* (i.e., competitive games), *alea* (chance-based games), *mimicry* (simulation games) and *ilinx* (vertigo-type games such as children spinning around and making themselves dizzy). In the context of gambling games, *agon* and *alea* are crucial in that they offer a combination of skill, chance, and luck.

Historically, Frank Fahrenkopf, the first chief executive and president of the powerful lobbying group the American Gaming Association (AGA) – the industry’s representative organization which was founded in 1994 – helped shaped current attitudes toward gambling. While historically gambling has been around for centuries, it has often been morally associated with sin and vice. Fahrenkopf helped change some people’s perceptions of gambling from sin and vice to one of entertainment. At the time of the creation of the AGA, the casino industry in Nevada viewed themselves as gambling establishments. Fahrenkopf came to the position with an impressive resumé in hand (having previously served as the chairman of the Republican National Committee under President Reagan). His tenure as President of AGA witnessed the rapid expansion of casinos as entertainment centers not only in the U.S. but internationally.

Leading the AGA for over 17 years, Fahrenkopf, aided by other visionaries, helped move the industry from strictly gambling to one of first-class entertainment while still maintaining the emphasis on gambling (activities where individuals staked money on a game to win a greater amount of money). In doing so, he helped change the terminology used by the gambling industry from gambling to gaming, a major source of entertainment enjoyed by tens of millions of individuals. Around the same time, Steve Wynn opened what was then the largest hotel in the world (the *Mirage*) in Las Vegas and capitalized on what non-gambling contributions (e.g., entertainment, hotel occupancy, gourmet restaurants, and shopping) could bring to the gambling industry. Revenues from the entertainment portion of his many properties began to exceed that of gambling revenues. The movement from the terminology of *gambling* to *gaming* had begun in earnest in spite of the fact that huge revenues were still being generated from the gambling sector (e.g., slots, table games, sports wagering, etc.).

The history of games, as Caillois noted, also dates back for centuries. In the latter half of the 20th century, new electronic games began to emerge (i.e., videogames) followed by digital online games in the 2000s. The history of videogames goes as far back as the 1950s, with its popularity rapidly growing in the 1970s and 1980s. From *3D Tic-Tac-Toe* and *Pong* to *Mario Bros*, *FarmVille*, *Mafia Wars*, *Candy Crush* and now “cloud streaming gaming” such as *Grand Theft Auto*, *League of Legends*, *Game of Thrones*, *Minecraft* and *Fortnite*, and a multibillion-dollar business has emerged with millions of people worldwide engaged in *gaming*. While videogame consoles and handheld games continue to evolve and still remain popular, there is a clear movement toward online gaming on the ‘cloud’. The vast majority of these games are played for fun, although in some games individuals can wager on the outcome of events. Technology has also brought about the convergence gambling and gaming over the past decade (Griffiths et al., 2014; King et al., 2010). Whether in the form of ‘loot boxes’, simulated social casino games, or e-sports, there is an evolving migration and intersection between gambling and gaming.

Gambling and gaming convergence

Both gambling and gaming activities have become recognized as sharing similar features at structural and aesthetic levels, especially with the advent of online gambling and online gaming although papers going back decades have highlighted the similarities (e.g., Fisher & Griffiths, 1995; Griffiths, 1991). Technological advances have permitted digital media content to be shared across multiple devices and networks, sometimes referred to as digital convergence (Griffiths, 2013; Gainsbury et al., 2015; King et al., 2015). There has been concern that the structural boundaries between gaming and gambling has in some cases become blurred. King and his colleagues have argued that the overlap between gambling and gaming have become indistinguishable such that “hybrid gambling activities have adopted features of gaming and vice-versa” (Gainsbury et al., 2015; King et al., 2015).

The Morgan Stanley Research Report (2012) noted five primary types of convergence between gaming and gambling: (i) the introduction of gambling elements into social media games; (ii) the use of social gaming features on online gambling sites; (iii) the gamblification of non-gambling type games in which individuals have the opportunity to win items of value; (iv) the consolidation of similar games on non-monetary sites where the operator of both non-gambling activities and online gambling activities are the same; and (v) the cross-marketing of online gambling sites to social casino players.

Some examples of convergence: Lottery products, social casino games, loot boxes and e-sports

Lottery corporations around the world have incorporated both childhood and adult games into scratchcards. Game themes such as *Monopoly*, *Twister*, *Scrabble*, *Sudoku*, *Yahtzee*, *Battleship*, *Bingo*, and *Pictionary* (among many others) can be readily found. Today’s casino includes considerable digital technology adapted from the gaming industry. The slot machines found in casinos incorporate sophisticated graphics, frequently adapting themes from familiar games (e.g., *Texas Tea Pinball*, *Guitar Warrior*, *Mario Bros.*).

The convergence between gaming and gambling is particularly noticeable in the rise of social casino type games (e.g., *DoubleDown Casino*, online gambling simulated practice sites or demo games designed to allow individuals to gamble for fun using virtual currency). These games clearly simulate many features of actual gambling activities while others allow players to spend money in order to continue playing (Derevensky & Gainsbury, 2016; Griffiths, 2015; King et al., 2015). Gainsbury and colleagues (2015) concluded that these games may be offered as a separate product or may actually be linked directly to a gambling product (online or land-based). Of concern is that many online gambling practice sites have simulated gambling activities with unusually high payout rates in order to keep players engaged. Another major concern is the lack of age restrictions for playing social casino games (interestingly there are some gambling simulated videogames where the stated recommended age is 3+ for consumers, for example, PlayStation 2’s *Casino Challenge*). These social games remain enormously popular, with almost 2.5 billion active videogame players (Statista, 2019a). The structural characteristics of these social casino games closely mimic those of traditional gambling games and may serve as a gateway, precursor and/or pre-

gambling training ground for gambling (Derevensky & Gainsbury, 2016; Gainsbury et al., 2015; Griffiths, 2010; 2013; 2015; Parke et al., 2013). Social casino games are typically offered through a variety of social networking sites but can also be found on videogame platforms, with other versions available for other handheld devices (smartphones, tablets, and portable computers). In 2012, the Morgan Stanley Report noted that there were an estimated 170 million people engaged in social casino gaming on a monthly basis (triple the amount engaging in online gambling). Kim and his colleagues (2015) reported they found that approximately 26% of a sample of social casino players (N=409) who never initially gambled online were found to have migrated over to, and engaged in, online gambling after a six-month period, further supporting the Morgan Stanley Report's concerns that social casino games may be a training ground for future gambling.

Another example often cited in the psychological literature concerning the convergence between gambling and gaming are videogames that include the purchasing of 'loot boxes'. Here, gamers use real money to buy keys to open the boxes, crates, chests, cases, or bundles where they receive a chance selection of virtual items. In-game virtual items that can be 'won' can include basic customization (i.e., cosmetic) options for a gamer's online avatar to gameplay assets that can help gamers to progress more effectively while gaming (Drummond & Saur, 2018; Griffiths, 2018). These types of embedded activities within videogames are becoming increasingly common, with estimates that the total revenues generated by loot boxes in 2018 likely exceeded \$30 billion. Griffiths (2018) has noted that many of the characteristics of loot boxes are commonly associated with gambling. Whyte (2019), in testimony before the U.S. Federal Trade Commission, argued that loot boxes are akin to slot machines. Players who play a slot machine or unlock a loot box are risking money for the chance of winning a prize or reward that is of value to the player. Common characteristics to both loot boxes and slot machines include the random distribution of prizes, variable value of the prizes, near-miss features, visual and sound cues associated with participation and reward, and are based upon intermittent variable schedules of reinforcement. Zendle and colleagues (Zendle and Cairns, 2018; Zendle et al. 2019a; 2019b) concluded that among gamers aged over 18 years, the more money spent on loot boxes the more likely they are to be problem gamblers. However, the studies could not determine whether the buying of loot boxes acts as a 'gateway' to problem gambling or whether the buying of loot boxes appeals more to problem gamblers than non-problem gamblers.

The issue of whether loot boxes are actually a form of gambling has been debated by a number of stakeholders including gambling regulators, the gaming industry, and legislators who have provided diverse perspectives and opinions. The U.K. Gambling Commission (2018) reported that 31% of children aged 11-16 years had bought loot boxes, and that the amount of money spent on loot boxes was associated with the severity of gambling problems. While the U.K. Gambling Commission (2018) concluded that where prizes are used within the game itself does not constitute gambling *per se*, other jurisdictions have concluded it represents a form of gambling (Chansky & Okerberg, 2019). Whyte (2019) concluded that "there is reasonable concern that gambling-related harm may occur to some loot box users, particularly among minors and individuals with or at risk for gambling problems." Given that all of the empirical research has been based upon correlational cross-sectional studies, further longitudinal studies are needed to determine the direction of this relationship. Furthermore, while the gaming industry has repeatedly suggested that loot boxes are not gambling, a number of jurisdictions including Belgium and the Netherlands have concluded that loot boxes meet the established criteria for gambling (Chansky & Okerberg, 2019). King and colleagues (2019) go further, suggesting that some in-game purchasing systems could be characterized as "unfair or exploitative", with limited or no consumer protection especially for vulnerable populations (e.g., children and adolescents, problem gamers).

Finally, another area of convergence is in the area of e-sports (electronic sports). E-Sports represents a new and rapidly growing phenomenon. The skill involved and mastering video/online games has led to the professionalization of e-sports (Banyai et al., 2019; Faust et al., 2013). Playing videogames has become one of the most popular recreational activities engaged in by children, adolescents, and adults

alike (Entertainment Software Association, 2017). Not only are people actively engaged in videogame playing but competitive videogame communities have evolved with e-sports also becoming a spectator sport, and wagering on the outcome of competitions and tournaments is growing. Whether engaging in e-sports for the competition or for fun and entertainment, e-sports have garnered a huge following via online streaming platforms such as *Twitch* and *YouTube* (Banyai et al., 2019). E-sports are basically competitive videogame playing, coordinated by different leagues, where players participate in group gaming competitions. Viewers can watch professional gamers compete against each other in a variety of games. Griffiths (2017) has argued that there may be motivational differences between casual/recreational players and those seeking high levels of competition. While a relatively new phenomenon, the popularity of e-sports has witnessed enormous growth, with viewers filling major stadiums to watch competitions, with a worldwide audience viewing competitions through video streaming to be in excess of 450 million viewers in 2019, with \$1.1 billion dollars in revenue. Championship tournaments have upwards of 60 million unique visitors watching (Statista, 2019b). Colleges and universities are now building stadiums to house school-sponsored teams, with the International Olympic Committee considering e-sports as an Olympic event. A growing number of youth are interested in becoming professional videogame players or gaming programmers. While there are differences between e-sport players and e-sport spectators, in some of his writings Griffiths (2017) paralleled professional videogame playing to professional gamblers (i.e., poker players) articulating similarities with respect to the excessive time spent gaming or gambling, issues surrounding the near-miss phenomenon, the use of sophisticated graphics, color and sound, and the perceived skill involved in both activities.

Why should we be concerned about the convergence between gaming and gambling?

In most jurisdictions, there are no age restrictions on games that simulate gambling activities, the use of loot boxes, or wagering on e-sports. As noted in the Morgan Stanley Report (2012), social casino simulated games may be an entry into real gambling, sometimes with distorted payout rates (i.e., higher probabilities of winning compared to real gambling), and may be teaching young people how to gamble. There is a growing body of evidence that early engagement in social casino type games is a popular activity among children and that young adults who participate in these games are also more likely to engage in actual gambling activities and experience gambling-related problems (Derevensky & Gainsbury, 2016; Gainsbury et al., 2015; Griffiths, 2015; Ipsos MORI, 2011). The fact that some videogames for the *Wii*, *Nintendo*, and *PlayStation* have casino-type games targeting children as young as 3+ years is concerning. Such gambling-themed games may normalize gambling (Morgan Stanley Report, 2012; Gainsbury et al., 2015), and where payout rates exceed the norm, it may provide a sense of confidence among young people that they can be successful when gambling (Gainsbury et al., 2015). Parke and his colleagues (2013) also suggested that the ‘freemium’ model may induce social rewards (e.g., bragging rights) which may be more a powerful motivator for continued play.

Can the gambling and gaming industry work with the academic research community?

During the past thirty years, the gambling industry has made great strides and effort toward promoting responsible gambling. A wide variety of harm-minimization and prevention measures have been established and in many cases universally adopted (e.g., voluntary self-exclusion policies). The gambling industry, along with academic researchers, have developed many harm minimization tools that could similarly be used by the gaming industry. Griffiths and Pontes (2019) have argued that the gaming industry has an abundance of high-quality data in the form of player account information (behavioral tracking data) and that if the industry elects to work with researchers it would help all stakeholders to learn more about the acquisition, development and maintenance of gaming and problematic gaming. It would also be helpful for reports presented by the gaming and/or gambling industry examining player data and migration from gaming to gambling (or vice versa) could be shared with academic researchers and regulators to better understand how specific individuals develop problems to either or both of these activities. Attempts at acquiring this data have, in general, not proven successful with the video gaming industry. Griffiths and

Pontes (2019) note that while there is a need for cooperation, the integrity of independent research should not be jeopardized or undermined.

Derevensky and Richard (2019), in commenting on Griffiths and Pontes' (2019) suggestions, similarly argued for greater collaborative efforts between the gaming industry and academic researchers. The examples provided in this paper suggest that (i) there is convergence and some migration between gaming and gambling, (ii) social casino type games may be particularly problematic for some individuals and that such games may be socially and behaviorally conditioning gambling-like behavior and be a risk factor in the acquisition of gambling with real money and later problem gambling, (iii) loot boxes may be problematic and that there is an association between loot box buying and problem gambling, and (iv) many of the social gambling games may be an early training ground for future gambling and gambling-related problems.

A better understanding of the risk factors and vulnerabilities of individuals experiencing problems would be beneficial to the treatment and prevention communities (King, Koster & Billieux, 2019). While the World Health Organization (2019) in its International Classification of Diseases (ICD-11) officially recognized Gaming Disorder as a legitimate mental health disorder, the gaming industry has been reluctant to accept its existence. Ultimately, the goal should be to help minimize any potential problems and develop prevention programs for high-risk individuals. Derevensky and Richard (2019) supported the arguments elucidated by Griffiths and Pontes (2019) that many of the tools and harm minimization strategies adopted by the gambling industry may be relevant within the gaming industry. A number of social media tools, modeled upon the gambling industry, have already been suggested by *Apple*, *Facebook* and *Instagram*. Using research to help inform prevention initiatives will go a long way to help protect users. Together, working in collaboration, vulnerable populations can be protected.

Consumer protection

While the gambling industry has embraced the notion of consumer protection and have adopted ethical codes of practice (AGA, 2019; Carran, 2018; National Council on Problem Gambling, 2012; 2019), the video gaming industry has lagged behind. Using the National Council on Problem Gambling's (2019) Internet Responsible Gambling Standards as an example, both gamers and gamblers players should be provided with highly visible and readily accessible tools and information to help them make informed decisions (for gamers this would necessitate being informed about risks associated with excessive gaming, embedded forms of gambling, costs involved in purchasing additional time, probabilities of winning specific items when buying loot boxes, etc.). Risks associated with excessive gaming should be emphasized, along with allowing players to self-exclude themselves from playing. Discussions and indications about the potential problematic and/or addictive nature of games should be included in personal statements. Whether gamers will read such warnings remains uncertain but that does not mean it should not be done. References to resources about gaming (e.g., gamequitters.com) would be helpful, especially for parents.

The gaming industry often argues that the responsibility of the amount of time and the types of games engaged in by children and adolescents should be relegated and monitored by parents. While parents clearly have a responsibility to ensure their children play within reasonable limits, the video gaming industry, as has been done by the gambling industry, can certainly help in minimizing potential problems. While there are distinct differences between gambling and gaming, adopting a public health approach in developing effective policies appears warranted. As Griffiths and Pontes (2019) suggested, there is no need to reinvent the wheel. However, there remains an onus on the video gaming industry to develop and initiate responsible gaming measures that facilitate player protection and harm minimization. Unlike gambling which has legal age restrictions, there are rarely legal age restrictions associated with gaming (although most videogames have age ratings to help parents buy age-appropriate games), and harm minimization strategies may be more difficult to implement and be accepted because of this.

There is little doubt that both gambling and gaming have entertainment value and may have multiple benefits for the majority of individuals who engage in them, yet there remains concern when either

gambling or gaming become excessive. Differentiating gaming from gambling will be important for the industry and academics going forward. However, their psychological and behavioral similarities, and areas of overlap should not be overlooked. While the gambling industry has stepped up its duty of care in relation to social responsibility and consumer protection, it is now time for the gaming industry to do so.

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