Gambling, Gaming, and Loot Boxes: Converging Irrational Beliefs?

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July 13, 2021

Thesis

Submitted in partial fulfillment of the requirements for the degree of

Master of Arts (Clinical Psychology)

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Acknowledgements

Writing a thesis is challenging at the best of times, not to mention during a global pandemic. Conducting most of the work online and at home presented with unforeseen challenges. During these “uncertain times” I was most appreciative of family (particularly my parents and sister), friends, and colleagues who supported me from afar and continued to encourage the pursuit of my academic goals. Thank you to everyone who provided those boosts of encouragement and reminders to step away from the screen when needed.

I would also like to extend sincere thanks to my supervisor, Dr. Mazmanian, whose feedback and mentorship were invaluable. In addition, I would like to express my gratitude for my thesis committee - Dr. Rawana and Dr. Visser, thank you for your helpful comments and feedback. A special thank you as well to Shayna Cummings, Casey Oliver, and Micaela Sheinin for assisting with the qualitative double coding – I am so grateful to have such intelligent and thoughtful lab mates.

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Abstract

The current study examined whether engaging with loot boxes (i.e., in-game "boxes" that can be won within a game or purchased with in-game currency or real money, and which contain a random selection of prizes or objects) was associated with increased endorsement of gambling-related cognitions around luck and chance (i.e., controlling the outcome of a chance game) that have been observed in gamblers. Socializing was also proposed to act a mediator between irrational cognitions and loot box use. Further, self-generated motives to engage with or refrain from gambling, gaming, and loot box content were also examined. University students (n = 321) and community participants (n = 279) completed a battery of online questionnaires that included measures of problem gambling (i.e., Problem Gambling Severity Index), gambling-related cognitions (i.e., GamCog, Belief in Good Luck Scale), problem gaming (i.e., Internet Gaming Disorder Scale), and risky loot box engagement (i.e., Risky Loot Box Index). Quantitative analyses, including a one-way ANOVA on gambling-related cognitions (e.g., luck), indicated that gamblers had higher scores than loot box users on a measure of gambling-related cognitions, but that these results were likely statistically but not clinically significant. No evidence for socializing as a mediator was found. Qualitative content analysis identified several overlapping motives to engage or refrain from engaging with gambling, gaming, and loot box content. For example, the chance to win was identified as a motive to engage with both gambling and loot box content. Additional exploratory analyses revealed that loot box use is linked to problem gambling and gaming. Overall, these findings provide further context and insight into the burgeoning research on loot boxes, their relation to gambling and gaming behaviours in terms of gambling-related cognitions (e.g., luck) and problematic behaviour (e.g., problem gambling, problem gaming), as well as motives to engage with or refrain from such content.

Gambling, Gaming, and Loot Boxes: Converging Irrational Beliefs?

Gambling

To gamble is to wager something of value against an uncertain outcome, or chance, with the purpose of gaining something of greater value (American Psychiatric Association [APA], 2013). The Canadian gambling industry has been propelled forward since 1985 when the provincial operation of gambling activities and establishments was legalized (Smith, 2014). The industry's momentum was then further influenced by the emergence of online gambling. Online gambling increased accessibility, in that individuals could gamble wherever and whenever they wished (Macey & Hamari, 2018). More recently, gambling content has emerged in other online activities and platforms that have historically not been associated with gambling; this includes gambling content in video games, social media games, and in the rapidly developing world of esports (Macey & Hamari, 2018). This increased accessibility is concerning, as gambling is associated with a variety of negative health outcomes, including gambling addiction, co-occurring substance use problems (e.g., alcohol, nicotine), and mental health problems (e.g., depression, suicidality) (APA, 2013; Petry et al., 2005). Gambling can also lead to issues associated with one's relationships, finances, or employment (Langham et al., 2016). Thus, the increased accessibility and blurring of boundaries between gambling and other industries is unsettling, as individuals may be increasingly, and unknowingly, exposed to gambling content. Youth or adolescents in particular may be exposed to gambling content while underage, putting them at risk of the negative outcomes described above (Floros et al., 2013; King et al., 2014).

Gaming

The term "gaming" encompasses a variety of games that are played over many platforms, such as video games on a console or PC, social media games, and mobile games. Since the

1970s and the initial creation of video games, the industry has amassed a large following of users. In 2016, there were 2.5 billion reported gamers globally, with Canada claiming $1.926 billion dollars in industry revenue (U.S. dollars) (WePC, 2018). This increasing use, and the risk for abuse, did not go unnoticed. In 2013, the American Psychiatric Association (APA) included Internet Gaming Disorder as a possible condition requiring further study (2013). Then, in 2018 the World Health Organization [WHO] included Gaming Disorder in its 11th revision of the International Classification of Diseases (2018). Like gambling, there are certain risks associated with gaming. Adolescent problem gamers experience higher rates of substance use (e.g., alcohol, nicotine, and cannabis), higher rates of co-occurring mental health problems (e.g., depression, social anxiety), as well as other social problems (e.g., lower self-esteem, poorer school performance) (Rooij et al., 2014). Adult gamers also often present with co-occurring mental health issues, including attention deficit hyperactive disorder (ADHD), depression, and anxiety (Andreassen et al., 2016). Recently, the risks associated with gaming have escalated with the inclusion of underlying gambling content in video, social, and mobile games.

Gambling and Gaming

Many video, social, and mobile games now include or are associated with gambling content. Some specific areas where gambling and gaming converge include esports, games with gambling themes or activities, microtransactions or pay-to play games, and loot boxes (King & Delfabbro, 2018; Macey & Hamari, 2019; WePC, 2018). Esports, or electronic sports, consist of professional gamers playing competitive games. These competitive games or "matches" are often broadcast or played in arenas, so that spectators and fans can watch, similar to typical sporting events for hockey, baseball, or basketball. Although this in itself is not inherently associated with gambling, like the "real-life" world of sports, there are opportunities for

gambling within the esports community (i.e., betting) (Macey & Hamari, 2019). Examples of betting within the industry include sportsbook betting, informal betting that occurs between friends and eSports professionals, as well as more formalized betting (i.e., Player-versus-Player betting), "where players can bet on their own performance when playing a video game" (Macey & Hamari, 2019, p. 22).

A second area of overlap includes gambling content within games. Many games are now designed with gambling content and themes (Jacques et al., 2016; Macey & Hamari, 2019; WePC, 2018). Jacques et al. (2016) determined that 54% of the top one hundred Facebook games contained gambling content. One such example includes the video game Texas Holdem Poker – a video game that portrays a Poker game (i.e., gambling). This video game had the highest number of Facebook fans compared to other game brands found on Facebook, with over 65 million "likes" as of March 2018 (WePC, 2018). On the flipside, many casino games are now "themed according to popular eSports games" (Macey & Hamari, 2019, p. 22). In other words, typical gambling games contain gaming content or features, which may make it confusing for gamers and gamblers alike to distinguish between games that constitute gambling versus games with gambling content.

A third example of gambling and gaming overlap includes monetization schemes within games, such as microtransactions, which some have labeled predatory (King & Delfabbro, 2018). Games with a microtransaction format are often free to play but encourage and enable players to make in-game purchases; these schemes encourage gamers to commit financially and psychologically to the game, before revealing the long-term cost of such transactions (King & Delfabbro, 2018). This is akin to the psychological concept of sunk-cost fallacy, where players think that they have invested too much time into a game to stop playing, even if this comes at the

cost of financial loss and psychological health (Brockner et al., 1979; King & Delfabbro, 2018). Sometimes, these microtransactions or in-game purchases are based on chance outcomes. Although these transactions are small, or "micro", they add up over time and are reminiscent of slot machines wherein players lose a certain dollar amount every time they play. One key example of a monetization scheme is the loot box (King & Delfabbro, 2018).

Loot Boxes

Recently, loot boxes have emerged as a popular aspect of games. Loot boxes are in-game "boxes" that can be won within a game or purchased with in-game currency or real money, and which contain a random selection of prizes or objects (King & Delfabbro, 2018; Li et al., 2019; Zendle et al., 2020). Some loot boxes contain prizes that help one progress through the game, while other loot boxes contain more cosmetic prizes (e.g., different coloured skins or weapons); these cosmetic prizes can often then be wagered against esport competitions or used to bet on other chance games within the gaming industry (Li et al., 2019). Therefore, not only can loot boxes be considered a form of gambling in itself (i.e., the exchange of currency for a prize based on a chance outcome), the contents of loot boxes can also play a role in future gambling activities (i.e., placing bets on the rewards received).

Initial research on loot box engagement has examined the relationship between loot boxes and problem gambling, and also whether specific aspects of loot boxes pose a risk for particular gambling-related harm. This type of research is made particularly challenging, given that there is significant variety in the types of loot boxes that are available. Zendle et al. (2020) determined seven ways in which loot boxes differ from each other. These key differences include: (1) loot boxes that have paid or unpaid openings; (2) loot boxes that a player is able to "cash out"; (3) the opportunity for players to pay to win; (4) loot boxes involving the use of in-game currency; (5)

loot boxes that have crate and key mechanics; (6) loot boxes that show near misses; and (7) loot boxes that contain exclusive items (Zendle et al., 2020).

Paid or unpaid openings refers to the fact that some games (e.g., Counter Strike: Global Offensive) require a transaction with "real money" in order for a gamer to open a loot box, whereas other games (e.g., Overwatch) include loot boxes that can be opened and earned without a monetary transaction, although there is the opportunity to purchase more loot boxes if so desired (Zendle et al., 2020). A second distinction involves opportunities for cashing out. Some games (e.g., Overwatch, Destiny 2) limit loot box rewards (i.e., the winnings/contents of the loot boxes opened) to the players' accounts. In other words, these rewards or winnings cannot be transferred or sold to other players. Other games (e.g., Counter Strike: Global Offensive, Player Unknown's Battlegrounds) allow players to sell the contents of their loot boxes and "cash out", in that they can trade these winnings for real money (Zendle et al., 2020). Similarly, some other games may not technically allow for cashing out (e.g., Rocket League), but loot box winnings are not tied to players' accounts, meaning they can still be traded and sold (Zendle et al., 2020). Market places that support these types of transactions are called "gray markets" and "can be extremely lucrative" (Zendle et al., 2020, p. 182). A third distinction among the different types of loot boxes involves the nature of the loot box contents, namely whether the reward items are advantageous or purely cosmetic. For instance, some games (e.g., Fire Emblem Heroes, Hearthstone) include loot boxes with items that are more powerful than can be achieved in other parts of the game, and which can actually help a player progress throughout the game (Zendle et al., 2020). Thus, it "pays to win". This is different from other games (e.g., Path of Exile, Rocket League) where loot box contents are purely cosmetic (i.e., different coloured skins or weapons) and will not help a player progress throughout the game, regardless of how many loot boxes they

win or open (Zendle et al., 2020). A fourth distinction is whether loot boxes can be purchased with in-game currency. Sometimes players are able to purchase loot boxes with real money (e.g., Overwatch, Hearthstone), whereas in other instances loot boxes must be purchased with a form of "scrib" or in-game currency (Zendle et al., 2020). In-game currency or scrib can be earned in game, or can be purchased with real money, which is similar in concept to casino chips. The fifth distinction involves crate and key mechanics. With crate and key mechanics, loot boxes are free to players in that they may be given at random throughout the game (e.g., Counter Strike: Global Offensive), or else earned by defeating enemies within the game (e.g., Star Trek Online). The loot boxes, however, are locked and impossible to open without the help of a key; obtaining a key typically requires an exchange of real money, or trading between players (Zendle et al., 2020). A sixth distinction between different types of loot boxes includes the concept of showing "near-misses". Some games (e.g., Path of Exile) will show players "near misses", where they almost received special or rare items contained in loot boxes (Zendle et al., 2020). Again, this concept is practically identical to near-misses featured in gambling, such as with slot machines. Finally, a seventh distinction involves whether loot boxes contain exclusive items. Some loot boxes contain items that can be found elsewhere in the game or purchased directly with in-game currency (e.g., Path of Exile). Other loot boxes include exclusive items that can neither be purchased nor found elsewhere (e.g., Rocket League), providing incentive to continue earning or buying loot boxes (Zendle et al., 2020).

Problem gambling has been linked to gamers who purchase loot boxes with real money (Zendle et al., 2020). Similarly, loot boxes that can be cashed out, purchased with in-game currency, or which show near misses have also been weakly linked to problem gambling (Zendle et al., 2020). In a study by Kristiansen and Severin (2020), gamers who purchased or sold items

from a loot box were more likely to be at-risk or problem gamblers, compared to gamers who had only obtained a loot box or who had no loot box engagement. These findings are also supported by Li et al.'s (2019) study, which revealed that gamers who purchased loot boxes more frequently were more likely to have gambling-related problems, such as a higher frequency of online gambling, longer gambling sessions, and higher levels of problem gaming and problem gambling. Further, loot box engagement in general, which can include winning, purchasing, or opening loot boxes, has also been associated with certain problematic gambling behaviour and beliefs (Brooks & Clark, 2019). Finally, findings from a recent study suggest that gamers respond to loot boxes in the same way that gamblers respond to slot machines (Larche et al., 2019). Loot boxes that contain rare items induce greater arousal (i.e., skin conductance responses), feelings of reward, and the urge to continue to play (Larche et al., 2019). These reactions mirror the reactions of gamblers to rare wins in slot machine games (Larche et al., 2019).

Although preliminary research demonstrates a connection between loot boxes and problem gambling behaviour, questions remain regarding the specific nature of the relationship. Gamers who engage with loot boxes demonstrate greater risk for problem gambling and irrational gambling beliefs (i.e., believing they can control a gambling outcome) than gamers who do not engage with loot box content. Yet, it is unclear how similar these risks related to irrational beliefs are in comparison to gamblers. In other words, do gamers who engage with loot boxes and recreational gamblers face a similar risk of developing, or already having, irrational beliefs associated with being able to control a chance-based outcome, whether in respect to loot boxes or traditional gambling? Furthermore, it is not known what other factors may potentially mediate or moderate such a relationship, or why some gamers choose to engage

with loot box content, while others do not. Thus, what motivating factors encourage gamers to engage with loot boxes, or to purchase or sell contents from loot boxes, and what factors prevent or dissuade gamers from this pursuit? These questions need to be addressed, in order to broaden the depth of our understanding of the relationship between loot boxes and gambling.

Motives

In order to examine motives in gamers, it is important to consider gambling motives as well. Loot boxes can be considered a form of gambling, meaning typical gambling motives may be present in gamers who engage with loot box content. Motives to gamble recreationally can include the chance of hitting the jackpot, socializing, perceiving gambling as an intellectual challenge, positive mood induction, and the chance to win (Binde, 2013). Another model outlines four motivating factors to gamble: coping, enhancement, social, and financial reasons (McGrath & Thege, 2018). Other research involving the concept of "escapism" suggests its involvement as a motive to gamble as well. Gambling may present opportunities to escape from one's problems, functioning as a means to cope with issues or negative feelings in real life (Blaszcynski & Nower, 2002; MacLaren et al., 2015; Puiras et al., 2021).

Researchers have also examined why individuals refrain from gambling. Some researchers have approached this question from a personality orientation. The individual personality characteristic of honesty-humility is positively associated with non-gambling (McGrath, Neilson, et al., 2018). Qualitative approaches have further revealed several reasons adults refrain from gambling that include: (1) risk aversion and concern for financial risk; (2) having little interest in gambling or other priorities; (3) "personal and religious convictions"; (4) concerns about addiction; (5) the "influence of others' values"; (6) having an awareness about the odds of winning; (7) limited or no access to gambling opportunities; and (8) not gambling

due to emotional distress (Rash & McGrath, 2017, p. 825). Further research also examined differences between adult and university student motives; adult non-gamblers emphasized financial motives as a reason to refrain from gambling, whereas students cited disinterest or social influence as primary reasons to avoid gambling (Rash et al., 2018). This suggests that motives to avoid gambling may change throughout one's life or that there are cohort differences.

Research has also been conducted on gaming motives. Demetrovics et al. (2011) conducted a study wherein seven motivational factors were found in gamers (i.e., motives to game). These motivational factors included: (1) wanting to be social; (2) seeking to "escape" through playing the game; (3) enjoying the competitive nature of the game; (4) using the game to cope with real life issues; (5) playing to develop one's gaming skills; (6) enjoying the fantasy component of gaming; and (7) gaming as a means of recreation (Demetrovics et al., 2011). Hellstrom et al. (2012) contributed to the research literature by specifying which motives may be associated with problematic gaming. Adolescents with social gaming motives had reduced risk, whereas adolescents with motives to escape or gain status demonstrated heightened risk (Hellstrom et al., 2012). An adaptation of the four-dimensional gambling motives model also found that coping, social, enhancement, and self-gratification motives were demonstrated by gamers (Myrseth et al., 2017). Finally, as with gambling, the concept of "escapism" has been linked to gamers (Hagstrom & Kaldo, 2014; Puiras et al., 2021; Warmelink et al., 2009; Yee, 2006). Yee (2006) found that escapism was the best predictor of problematic video game use, while Warmelink et al. (2009) found that gamers sought to "escape" through gaming in order to cope with real-life stressors or to avoid negativity (i.e., negative escapism) and to also provide an escape for entertainment, fun, and fantasy (i.e., positive escapism). This conceptualization differs from the one-dimensional model previously mentioned, which describes the motive to

gamble as a means of coping with negative aspects of one's life (e.g., stress, rumination) (Blaszcynski & Nower, 2002; MacLaren et al., 2015). The bifurcation proposed by Warmelink et al. (2009) in differentiating between positive and negative escapism provides further clarification to the concept of escapism as a motive (Puiras et al., 2021).

To date, there has not been a study that examines why individuals choose not to game (i.e., motives to not engage). Further, at the time this study was proposed, no research had examined specific motives for why gamers engage with gambling content in games (i.e., loot boxes), and how specifically they choose to engage with this content (i.e., earn loot boxes passively, purchasing loot boxes, or playing games to specifically earn loot boxes). Additionally, although there may be specific, self-identified motives to engage or refrain from gambling, gaming, and loot box content, impulsivity may also play a role in relation to engaging with these activities. Prior research has linked problem gambling (Hodgins & Holub, 2015; Wardle & Zendle, 2021), gambling disorder treatment response (Mallorqui-Bague et al., 2018), and problem gaming (King et al., 2020) to trait impulsivity. However, limited research has examined the role impulsivity may play in relation to loot box engagement.

The Present Study

Although some research has explored the association between loot boxes and gambling, the exact nature of the relationship has yet to be delineated. Thus, the purpose of the present study was to examine the relationship between irrational beliefs and loot box use, and motives to engage or not engage with gambling, gaming, and loot box content. The first and second hypotheses were quantitative in nature and primarily addressed the relationship between irrational cognitions and loot box use. The third and fourth hypotheses were mixed methods in nature and addressed motives associated with gaming and loot box use.

Hypothesis 1

For hypothesis one, gamers who engage with loot box content were expected to score higher on a measure of irrational beliefs about luck (e.g., having a tendency to win games of chance) than gamers who do not engage with loot boxes, but less so than gamblers. This hypothesis was supported by research on loot boxes and player motives. Loot box engagement has been associated with irrational gambling beliefs around chance and luck; further, increased time spent pursuing or engaging with loot boxes has been associated with increased risk for problematic engagement (Brooks & Clark, 2019; Zendle et al., 2019). However, it was also important to consider motives for engagement. Although research suggests similarities between gamblers' and gamers' motives to engage in gambling or gaming, gamers also demonstrate different motives than gamblers, such as skill development (Demetrovics et al., 2011). Gambling activities are largely based on chance, whereas games typically require a certain level of skill development along with chance-based elements (e.g., loot boxes). Thus, although gamers can be exposed to gambling content within games, it was possible that gamers better understood the distinction between chance and skill, which could translate to lower endorsement of irrational beliefs.

Hypothesis 2

Hypothesis two examined whether there was a mediated relationship between irrational cognitions around chance and loot box use. Specifically, we sought to determine whether socializing (i.e., playing a game alone, playing a game that allows for some socialization within the game, or playing a team game with other people) would mediate the relationship between irrational cognitions and loot box use. It was hypothesized that socializing may mediate the relationship, in that problematic behaviours often occur in isolation. Although there was not

specific research with loot boxes to support this hypothesis, research was referenced in the area of other addictions. For instance, solitary gambling was found to mediate a relationship between anxiety sensitivity and time spent gambling (i.e., excessive gambling) (Bristow et al., 2018). Similarly, solitary drinking and binge drinking in isolation have been associated with problematic alcohol use and problems with suicidality (Bourgault & Demers, 2006; Gonzalez, 2012). Furthermore, Hellstrom et al. (2012) determined that adolescents who had social gaming motives had reduced risk for problem gaming. Given these findings, it was anticipated that individuals who game in isolation would be more likely to demonstrate excessive or potentially problematic loot box use.

Hypothesis 3

For hypothesis three, it was anticipated that individuals would demonstrate some motives to refrain from gaming that were similar to motives to refrain from gambling. Specifically, it was anticipated that motives to not gamble, including disinterest, having other priorities, social influence, or financial reasons would be revealed as motives to not game as well. Although there is not specific research on motives to refrain from gaming, other research indicates overlap between gamblers' and gamers' motives to engage with their respective activities (McGrath & Thege, 2018; Myrseth et al., 2017). Thus, it was possible that motives to refrain from engaging would also be similar. The motives mentioned above (disinterest, other priorities, social influence, and finances) are motives that can translate to any activity. Although it was anticipated that these motives would be reported, we also hypothesized that other unknown motives specific to gaming would emerge. Therefore, questions relating to this hypothesis were structured as mixed-method and open-ended, in an attempt to capture a range of answers.

Hypothesis 4

For hypothesis four, it was anticipated that motives to engage or not with loot box content would overlap with motives to engage or not with gambling. Loot boxes can be considered a form of gambling. The process of earning and engaging with loot boxes is consistent with the definition of gambling, in that one is wagering something of value (i.e., real or in-game currency, time) to receive something of potential greater value (i.e., loot box contents), that is based on chance. Thus, we anticipated that motives to engage with loot boxes would be akin to gambling motives, including a chance of hitting the jackpot (or a rare item in a loot box), positive mood induction, and the chance to win (Binde, 2013). Similarly, it was anticipated that the motives to refrain from loot box engagement would be consistent with motives to refrain from gambling, including financial reasons and risk aversion, and addiction concerns (Rash & McGrath, 2017). Consistent with hypothesis three, mixed method and open-ended questions were used to capture any other motives associated with loot box engagement.

Method

Participants

Participants were drawn from two samples: students from both the Thunder Bay and Orillia Lakehead University campuses, and community members residing across Canada. Although the questionnaire topic largely focused on gambling, gaming, and loot box engagement, participants did not have to gamble, game, or engage with loot boxes. Altogether, 717 participants were recruited across the two samples. Initial data cleaning consisted of removing participants who responded carelessly or non-purposefully, as measured by Jackson's Personality Research Form - Infrequency Scale (1987). As mentioned, the Infrequency scale is constructed for the purpose of detecting careless or non-purposeful responding. This could be the

result of inattention, confusion, intoxication, or some form of cognitive impairment (psychosis or a neurological condition). The respondent could also be intentionally responding in a random fashion to items for any number of reasons. The potential for careless or invalid responding is present whenever a researcher is employing self-report measures, regardless of context. According to Jackson's recommendations, participants who score 4 or greater on the scale should be removed for responding carelessly or non-purposefully. Consequently, 103 participants were removed from the dataset. The remaining 614 participants were then assessed for age, as participants needed to be at least 18 years of age to complete the survey; this minimum was set as several of the activities addressed in the study involved various minimum age requirements (e.g., substance use, gambling). As a result, 6 participants were removed from the study due to not having reported their age. Finally, a further 8 participants were removed due to non-completion. This resulted in a working, combined dataset of 600 total participants, 279 (46.5%) from the community sample and 321 (53.5%) from the Lakehead University sample. The two samples were combined to preserve adequate power to conduct analyses, some of which involved making comparisons between participant subsamples (e.g., comparing gamblers vs. gamers).

The overall sample was young (M = 26.17 years, SD = 9.16 years), largely female (68.8%), and mostly White (77.5%), Asian (7.5%), and Indigenous (6.2%). When examining the samples individually, the community sample was older (M = 31.46 years, SD = 9.83 years), $t(598) = 15.65$, $p < .001$, included more male participants (50.5%), $z = -10.08$, $p < .001$, and was mostly White (80.3%), Asian (6.8%), and Indigenous (5.4%). In contrast, the university sample was younger (M = 21.57 years, SD = 5.24 years), with a much greater proportion of female participants (86.6%), but was similarly mostly White (75.1%), Asian (8.1%), and Indigenous

(6.9%). For further combined sample demographic characteristics (see Table 1). Additionally, financial information, such as personal and household income, and religiosity, such as religious affiliation and strength of religious beliefs, were recorded for both samples. These aspects (e.g., finances, religion) were recorded given their connection to problem gambling (see Table 2). Finally, in terms of substance use, a majority of the participants endorsed alcohol use (78.8%) and cannabis use (58.7%) (see Table 3).

Table 1: *Demographic characteristics of participants*

Characteristic		Value*	
Age in years, mean (*SD*)		26.17	(*9.16*)
Sampling			
	University	321	(46.5)
	Community	279	(53.5)
Sex			
	Female	413	(68.8)
	Male	183	(30.5)
	Prefer not to say	4	(.7)
Race/ethnicity			
	Asian	45	(7.5)
	Black	22	(3.7)
	Caucasian (White)	465	(77.5)
	Hispanic/Latino/a	5	(.8)
	Indigenous (First Nations, Inuit, or Metis)	37	(6.2)
	Middle Eastern	3	(.5)
	I don't identify with the options listed.	16	(2.7)
	Prefer not to say	7	(1.2)
Education			
	Elementary school	1	(.2)
	Some high school	6	(1.0)
	High school completed	85	(14.2)
	Some college or technical completed	35	(5.8)
	College or technical completed	65	(10.8)
	Some undergraduate	250	(41.7)
	Undergraduate degree completed	95	(15.8)
	Some post-graduate	18	(3.0)
	Post-graduate completed	45	(7.5)
Student status			
	Full-time student	366	(61.0)
	Part-time student	30	(5.0)
	Not a student	204	(34.0)
Employment status			
	Full-time employee	190	(31.7)
	Part-time employee	239	(39.9)
	Unemployed	170	(28.4)
Marital status			
	Single	241	(40.3)
	Married/common-law	151	(25.3)
	Separated/divorced	9	(1.5)
	Widowed	2	(.3)
	In a committed relationship	195	(32.6)

*Values shown are raw frequencies (%) except where otherwise indicated.

Table 2: *Participant income and religious beliefs*

Income and Religiosity		Frequencies (%)
Personal income		
	$0	36 (6.0)
	Less than $5,000	74 (12.4)
	$5,000-10,000	110 (18.5)
	$10,000-20,000	119 (20.0)
	$20,000-25,000	34 (5.7)
	$25,000-35,000	42 (7.0)
	$35,000-50,000	50 (8.4)
	$50,000-75,000	75 (12.6)
	$75,000-90,000	22 (3.7)
	More than $90,000	34 (5.7)
Household income		
	Less than $15,000	30 (5.1)
	$15,000-29,000	43 (7.3)
	$30,000-49,000	62 (10.5)
	$50,000-69,000	76 (12.9)
	$70,000-89,000	75 (12.7)
	$90,000-119,000	98 (16.6)
	$120,000-139,000	53 (9.0)
	$140,000-159,000	35 (5.9)
	$160,000-179,000	46 (7.8)
	$180,000-199,000	21 (3.6)
	More than $200,000	52 (8.8)
Religious affiliation		
	Buddhist	5 (.8)
	Catholic	123 (20.6)
	Eastern Orthodox	3 (.5)
	Jewish	2 (.3)
	Muslim	10 (1.7)
	Protestant	39 (6.5)
	Sikh	3 (.5)
	No religious affiliation	295 (49.3)
	None of these	118 (19.7)
Strength of religious beliefs		
	Not applicable	272 (45.4)
	Not strong at all	71 (11.9)
	Not very strong	78 (13.0)
	Somewhat strong	103 (17.2)
	Very strong	47 (7.8)
	Extremely strong	28 (4.7)

Table 3: *Participant substance use*

Substance Use		Frequencies (%)	
Alcohol use			
	Yes	471	(78.8)
	No	127	(21.2)
Alcohol use frequency			
	Not applicable	124	(20.7)
	Once a month or less	231	(38.6)
	Once a week or less	154	(25.7)
	Two to three times per week	72	(12.0)
	Once a day	15	(2.5)
	Multiple times daily	3	(.5)
Cannabis use			
	Yes	248	(41.3)
	No	352	(58.7)
Cannabis use frequency			
	Not applicable	347	(58.2)
	Once a month or less	90	(15.1)
	Once a week or less	39	(6.5)
	Two to three times per week	41	(6.9)
	Once a day	33	(5.5)
	Multiple times daily	46	(7.7)

Measures

***Demographic Questionnaire*.** The demographic questionnaire was a modified version of Tanner and Mazmanian's (2016) scale. Information collected included age, sex, gender, ethnicity, sexuality, education level, employment, student status, marital status, income (personal), income (family), and religious affiliation and strength of affiliation (i.e., casual vs. fundamentalist). Questions about sexuality were modified from the Kinsey Scale (Kinsey, 1948). Additional questions in the demographic questionnaire pertained to gambling and gaming habits, as well as substance use habits involving alcohol and cannabis. Questions related to other substance use were not included, given that the focus of the study was not in respect to the relationships between gambling, gaming, and substance use in particular. Questions related to gaming genres

were drawn from Elliott et al.'s (2012) game genre categorization. Questions about loot box engagement were also included in this demographic section and partly included questions from a study by Brooks and Clark (2019; see Appendix A).

Problem Gambling Severity Index (PGSI). Ferris and Wynne's (2001) Problem Gambling Severity Index was originally based on the Canadian Problem Gaming Index. The index has nine items, which assess for problem gambling behaviour. Questions are related to potential problem gambling (e.g., Have you bet more than you could really afford to lose?), with four response choices ranging from "Never", "Sometimes", "Most of the Time", and "Almost Always". Individuals are classified into gambling-related categories, based on total scale scores. These classifications include non-problem gamblers (PGSI = 0), low-risk (PGSI = 1 to 2), moderate-risk (PGSI = 3 to 7), or problem gambler (PGSI > 7) (Ferris & Wynne, 2001). Research has demonstrated that the PGSI has acceptable psychometric properties, with a test-retest reliability of (.64) after a 14-month interval, and strong evidence of validity for the four gambling categories (e.g., non-problem, low-risk, moderate-risk, and problem gambler) (Currie et al., 2012; see Appendix B).

GamCog. The GamCog measure was adapted by Macey and Hamari (2020) from the Gambling-Related Cognitions Scale (GRCS) by Raylu and Oei (2004). The GRCS is a measure that assesses gambling-related cognitions in gamblers. In turn, the GamCog is intended to measure similar types of gambling-related cognitions in video gamers who also gamble. The 18-item scale assesses for a range of such cognitions (e.g., Specific numbers and/or colours can help me win), with seven response options: "Strongly disagree", "Disagree", "Somewhat Disagree", "Neither Agree nor Disagree", "Somewhat Agree", "Agree", or "Strongly Agree". The questions fall into four categories, including illusion of control, benefits of gambling, inability to

stop, and perceived gambling skill. The total scale demonstrates good reliability with a high Cronbach's alpha (.94), as well as evidence for concurrent, criterion-related, and predictive validity; these psychometric properties are consistent across the four categories of the scale (Macey & Hamari, 2020; see Appendix C).

Belief in Good Luck Scale. The Belief in Good Luck Scale created by Darke and Freedman (1997) measures beliefs concerning luck, including irrational beliefs that luck is consistent and stable in one's life, compared to more rational beliefs wherein luck is considered random and not reliable. The scale items address the concept of luck (e.g., Some people are consistently lucky, and others are unlucky). There are six response choices to each question, which range from "Strongly disagree", "Somewhat disagree", "Slightly disagree", "Slightly agree", "Somewhat agree", or "Strongly agree". Internal consistency of the scale ranged from .78 to .85 across three studies, with a test-retest reliability of .63; there was also evidence for convergent and discriminant validity (Darke & Freedman, 1997; see Appendix D).

Internet Gaming Disorder Scale (IGDS). The Internet Gaming Disorder Scale by Lemmens et al. (2015) was created to measure Internet gaming disorder (IGD), as recently defined by the 5th edition of the *Diagnostic Statistical Manual of Disorders* (*DSM-5*). The scale has a long form (27-item) and a short form (9-item); the short-form version was used in this study. Each of the nine questions in the short-form relate to different themes associated with problematic Internet gaming (e.g., Preoccupation, Tolerance, Withdrawal, Escape). The questions assess for IGD within the past year (e.g., During the last year, have there been periods when all you could think of was the moment that you could play a game?). Response choices range from "Never" to "Very Often" (Pontes & Griffiths, 2015). The short-form has demonstrated good internal consistency with a Cronbach's alpha of .87 (Pontes & Griffiths, 2015). Confirmatory factor

analysis also demonstrated evidence for structural and criterion-related validity (Lemmens et al., 2015; see Appendix E).

Risky Loot box Index (RLBI). Brooks and Clark's (2019) Risky Loot Box Index measures risky engagement with loot boxes. It is a five-item scale that measure cognitions associated with loot boxes (e.g., The thrill of opening loot boxes has encouraged me to buy more), with five response options from "Strongly disagree" to "Strongly agree" (Brooks and Clark, 2019; Drummond et al., 2020). Although only very recently published, the RLI has demonstrated a high internal reliability, with a Cronbach's alpha of .92 (Drummond et al., 2020; see Appendix F).

Abbreviated Impulsiveness Scale. The Abbreviated Impulsiveness Scale (ABIS) is a short-form impulsivity measure constructed through confirmatory factor analysis of the original Barratt Impulsiveness Scale (BIS-11) (Coutlee et al., 2014). The ABIS is a thirteen-item scale organized into three subscales that measure different core aspects of impulsiveness, including attentional (5 items), motor (4 items), and non-planning (4 items) impulsiveness. Four response options to questions such as "I do things without thinking" include "Rarely/Never", "Occasionally", "Often", and "Almost Always/Always" (Coutlee et al., 2014). The authors noted that a total scale score should not be calculated given the lack of unidimensionality across the scale items, and that doing so would be psychometrically inappropriate. Instead, they recommended calculating the core subscale scores, as the subscales measure separate but correlated components of impulsiveness (Coutlee et al., 2014). The ABIS has demonstrated good internal consistency across three studies, with a Cronbach's alpha of .77 for the attentional subscale, .88 for the motor subscale, and .75 for the non-planning subscale (Coutlee et al., 2014; see Appendix G).

Personality Research Form – Infrequency Scale. Jackson's (1987) Infrequency Scale detects random, careless, or non-purposeful responding. The scale has sixteen items (e.g., I have never

bought anything in a store), to which participants respond "True" or "False". According to Jackson's recommendations, participants with scores of 4 or greater on the scale should be removed from analyses. The scale's test-retest reliability is moderate (.46), and the internal consistency is not calculated due to low base-rates; most respondents do not endorse many items, which results in mean scores close to zero and little variance (see Appendix H).

Personality Research Form – Social Desirability Scale. Jackson's (1987) Social Desirability scale has sixteen items that measure the extent to which individuals are responding to a questionnaire in a way that is socially desirable. Participants are asked to answer "true" or "false" to questions, such as "I am never able to do things as well as I should". The scale has strong psychometric properties, with a high test-retest reliability (.81) and internal consistency (.83) (Jackson, 1987; see Appendix I).

Motives Measures. Open-ended responses were collected to examine motives regarding gambling and gaming engagement, and motives specific to loot box engagement. Several questions were asked regarding participants' motives (e.g., Think about what motivates you to NOT play games and briefly list the top three reasons in rank order). These questions were in part modified from Rash et al.'s (2017) study, where open-ended questions were used to develop categorical answers for why individuals chose not to gamble (see Appendix J).

COVID-19 Exploratory Questions. Due to the ongoing pandemic from Coronavirus 2019 (COVID-19), exploratory questions were included in relation to whether social distancing measures have had an effect on gambling or gaming activities (e.g., During the COVID-19 restrictions, how would you describe the frequency of your gaming activities) (i.e., how often you play games?; see Appendix K).

Procedure

Individuals were recruited from Lakehead University, from both the Thunder Bay and Orillia campus student populations. Recruitment of Lakehead university students was primarily conducted through the Sona System, an online tool that connects students with research studies. Students who participate in research studies are awarded extra course credit or other incentives, such as a chance to receive a gift card from a random draw. As an incentive to participate in this study, students were able to earn one bonus point toward an eligible psychology course or enter into an electronic gift card draw. A poster advertisement was also distributed by email throughout the department (see Appendix L). For community participants, online advertisements were posted on various social media sites (i.e., Facebook, Instagram, Reddit) and virtual market sites (i.e., Kijiji). As an incentive to participate, community members were offered a chance to enter into an electronic gift card draw. For the poster advertisement used for community recruitment, see Appendix M. The study was reviewed and approved by the Lakehead University Research Ethics Board.

Upon recruitment, all participants were directed to complete the online questionnaire, which was hosted on the survey platform SurveyMonkey. Before starting the questionnaire, participants viewed a consent form and an information cover letter (see Appendix N). It was anticipated that participants would take no more than an hour to complete the questionnaire. Given the nature of the questions (e.g., gambling, gaming, loot box engagement), not every participant answered every question. Skip-out rules were applied, so that individuals were only asked to answer questions relevant to the activities with which they participate (e.g., gamblers answered gambling-related questions, gamers answered gaming-related questions). Although completion times differed between participants due to these skip-out rules, the average time to

complete the study was 17 minutes. Once the questionnaire was completed, participants viewed a debriefing form and had the opportunity to request the study results once they become available. The researcher's contact information was provided on the debriefing form for participants to ask questions if desired (see Appendix O).

Data Analyses

Prior to conducting analyses relevant to the four hypotheses, variables of interest were examined for outliers. To assess for potential outliers, total scale scores were transformed into *z* scores. As outlined by Tabachnick and Fidell (2018), *z* scores of +/- 3.29 were considered outliers. In terms of gambling related measures, including total scores on the PGSI and the GamCog, 8 and 2 outliers were identified based on the aforementioned criteria. For gaming related measures, including the IGDS, 4 outliers were identified. Although noted here, these identified outliers were neither transformed nor removed from the dataset, given that the scores reflected valid participant responding (i.e., problematic gaming, gambling, and gambling-related beliefs). No outliers were identified in the other measures of interest, including total scores on the RLBI and the BGLS.

After this initial examination, data analyses relevant to the four hypotheses were conducted. To conduct these analyses, participants had to be categorized by activity (e.g., whether they engaged in gambling, gaming, or loot box use). Participants were categorized into groups based on whether they responded "yes" to engaging in gambling activities (i.e., "Do you gamble?"), gaming activities (i.e., "Do you game/play games?"), or gaming with specific loot box content (i.e., "Have you opened a loot box in a game?"). Depending on the analyses in question, participants were either categorized based on involvement in one activity (e.g., a

gambler who does not play games) or multiple activities (e.g., a gambler who plays games with loot box content).

One-way ANOVAs were conducted in respect to hypothesis one. The independent variable of participant type (i.e., gamblers, gamers, loot box users) and the dependent variable of beliefs concerning luck, were examined to determine if irrational cognitions or beliefs differed between participant type. Scores were compared on the BGLS (Darke & Freedman, 1997). Additional analyses included *t*-tests on the independent variable of participant type (i.e., gamblers and individuals who gamble and game) and on the mean scores of the dependent variable of gambling-related cognition scores from the GamCog (Macey & Hamari, 2020). Due to the nature of the questions on the GamCog (i.e., gambling-related), only individuals who endorsed gambling behaviour could be included, hence the additional analyses.

For hypothesis two, the original intention was to conduct linear regression analyses to examine socializing as a mediator in the relationship between beliefs about luck and loot box use. This included using scores on Darke and Freedman's (1997) Belief in Good Luck Scale as the continuous dependent variable, and loot box use (i.e., frequency) as the independent variable. The intended mediator included socializing in respect to game play (i.e., playing a game alone, playing a game that allows for some socialization within the game, or playing a team game with other people). However, after conducting zero-order correlations between the variables of interest, which is outlined as an initial step in mediational analysis by Baron and Kenney (1986), no correlations were observed. Thus, further linear regression analyses were deemed inappropriate.

Finally, as hypotheses three and four were exploratory in nature, qualitative and quantitative analyses were conducted. Qualitative data was analyzed and interpreted using

inductive content analysis with a realist approach to identify themes at the semantic level. This specific qualitative analysis process was based on a guide by Vaismoradi and colleagues (2013). To be clear, the guide by Vaismoradi et al. (2013) outlined and compared prior guides on the process of qualitative analysis, which have garnered support in the qualitative literature (Braun & Clarke, 2006; Elo & Kyngas, 2008). Content analysis was the chosen method, rather than thematic analysis, given that it provides an opportunity to identify and analyze themes within the data, in addition to the opportunity for quantification of the data (e.g., measuring the frequency of themes). The analysis was inductive as the purpose of the study was not to examine or contribute to a pre-conceived theory, but to examine and interpret commonly occurring themes identified in the participant responses. Although hypotheses were generated for the purposes of this study, the hypotheses were generalist (i.e., motives that could be applied to activities in general) and were also exploratory.

The primary student engaged in the initial round of qualitative analysis. The first step (i.e., the "preparation" stage) included becoming familiar with the dataset (Vaismoradi et al., 2013). The second stage (i.e., the "organizing" stage) included creating various levels of coding, which consisted of identifying semantic content within the responses. This was an ongoing process, which included continuously moving between the dataset and the codes that were increasingly identified. It also included formulating a general description of the data and determining overarching themes across the data through the creation of a codebook. At this stage a collaborative approach was used, including discussions with the thesis supervisor in relation to the themes overall. Once the themes were confirmed collaboratively, three graduate students acted as double coders for a proportion of the dataset. As per general recommendations, 10 percent of responses per question were analyzed by the double coders (O'Connor & Joffe, 2020).

Six qualitative questions were double coded in relation to the hypotheses, so each double coder analyzed responses related to two questions. Cohen's Kappa was computed to determine the interrater reliability between raters. Additional quantitative analyses (i.e., percentage comparisons, *z*-tests) were also conducted to determine the degree of similarity between motives in terms of the identified themes. This included reporting on the proportion of the sample that endorsed the theme or subtheme for one activity (e.g., gambling), and the proportion of the sample that endorsed the same theme or subtheme but for a different activity (e.g., loot box use).

Results

The combined sample was examined in relation to activities endorsed (i.e., gambling, gaming, loot boxes). Roughly half of the participants were gamblers (52.8%), whereas approximately three quarters of the sample were gamers (73.7%). In terms of loot box use, 268 participants (44.7%) endorsed playing games with loot box content. This subsample met the previously calculated sample size of 252 participants needed for a power of .95. For the obtained means and internal consistencies of study measures, see Table 4; and for further participant activity engagement, see Table 5.

Table 4. *Obtained Means and Internal Consistencies of Study Measures*

Measure Scale (range possible)	Mean (*SD*)	Cronbach's Alpha
Problem Gambling Severity Index (0-27)	1.10 (*2.34*)	.85
Internet Gaming Disorder Scale (9-45)	15.34 (*5.32*)	.85
GamCog (18-126)	36.38 (*14.87*)	.88
Belief in Good Luck Scale (12-72)	35.06 (*8.88*)	.82
Risky Loot Box Index (5-25)	10.84 (*5.00*)	.86
Infrequency Scale (0-16)	.32 (*.61*)	.20
Social Desirability Scale (0-16)	11.08 (*6.26*)	.69
*ABIS – Motor (4-16)	7.50 (*2.26*)	.79
*ABIS – Non-planning (4-16)	7.50 (*2.62*)	.78
*ABIS – Attentional (5-20)	10.16 (*2.64*)	.75

*Abbreviated Impulsiveness Scale

Table 5: *Participant activity engagement*

Activity Engagement		Frequencies (%)
Gambling		
	Yes	317 (52.8)
	No	283 (47.2)
Gambling frequency		
	Once a month or less	253 (79.6)
	Once a week or less	47 (14.8)
	Two to three times per week	12 (3.8)
	Once a day	3 (.9)
	Multiple times daily	3 (.9)
Gaming		
	Yes	442 (73.7)
	No	158 (26.3)
Gaming frequency		
	Once a month or less	76 (17.2)
	Once a week or less	67 (15.2)
	Two to three times per week	102 (23.1)
	Once a day	95 (21.5)
	Multiple times daily	102 (23.1)
Loot box		
	Yes	268 (55.3)
	No	332 (44.7)
Loot box frequency		
	Once a month or less	121 (44.8)
	Once a week or less	60 (22.2)
	Two to three times per week	27 (10.0)
	Once a day	37 (13.7)
	Multiple times daily	25 (9.3)

Hypothesis 1

BGLS. A one-way ANOVA (gamblers, gamers, loot box users) on beliefs in good luck, as measured by the BGLS, yielded significant variation among groups, $F(2, 232) = 3.85$, $p = .02$. A post-hoc Tukey test revealed that gamblers ($M = 36.24$, $SD = 8.73$) had significantly higher scores on the BGLS than loot box users ($M = 34.60$, $SD = 9.11$), $p < .05$. Gamers did not have significantly different scores compared to gamblers or gamers who engage with loot boxes. Analyses were rerun with the social desirability measure to determine whether socially desirable

responding may have influenced the results. The results did not remain significant after controlling for social desirability, $p = .06$.

GamCog. A *t*-test (gamblers, gamblers who are loot box users) on gambling-related cognitions, as measured by the GamCog, yielded no significant variation between groups.

Hypothesis 2

As outlined by Baron and Kenney (1986), zero-order relationships needed to be established among the variables prior to conducting regression analyses. For the purposes of this hypothesis, this included the independent variable (i.e., loot box use), the dependent variable (i.e., scores on the Belief in Good Luck Scale), and the proposed mediator variable (i.e., gameplay socializing). Correlational analyses revealed that not all of the variables of interest were significantly correlated (see Table 6). Similar correlations were also examined with the GamCog measure, in place of the BGLS, and the correlations remained non-significant. Gameplay socializing was also not associated with problematic loot box use, based on scores on the RLBI, $p = .98$. Therefore, further meditational analyses were not conducted.

Table 6: *Zero-order correlations*

Variables of interest	Loot box use	Gameplay socializing	BGLS scores	GamCog scores
Loot box use	1	.16*	-.06	.13
Gameplay socializing	.16*	1	-.11	.11
BGLS scores	-.06	-.11	1	.39**
GamCog scores	.13	.11	.39**	1

*Correlation is significant at the .05 level (2-tailed).

**Correlation is significant at the .01 level (2-tailed).

Hypothesis 3

Reasons Not to Gamble. Qualitative data from $n = 277$ participants were analyzed in relation to motives not to gamble. Four main themes were identified, including (1) negative consequences, (2) uncertain outcomes, (3) disinterest, and (4) financial motives. In terms of interrater reliability, almost perfect agreement was achieved between the two raters ($K = .90$). Sample participant responses are included to provide context. Other themes were identified in the data, (e.g., accessibility, time) as reasons not to gamble. However, given low sample sizes associated with these themes, they were not reported in detail.

Theme 1: Negative Consequences. Participants reported concerns relating to negative consequences of gambling, such as addiction and mental health problems ($n = 25$), as motives not to gamble. For example, one participant reported that their "mom was addicted" to gambling, while another disclosed that they were "addicted to gambling in the past". Other participants ($n = 20$) also noted risk as a motive not to gamble. For instance, some participants stated that they are not "risk takers" or are "risk adverse".

Theme 2: Uncertain Outcomes. A second theme included uncertain outcomes, with subthemes such as losing money ($n = 107$), a low chance of winning ($n = 14$), and uncertainty ($n = 5$). Participants responded that they "don't want to lose money", the "odds of winning are low", and that the "lack of control over (the) outcome" of gambling acted as motives not to gamble.

Theme 3: Disinterest. A lack of interest ($n = 33$) was another theme identified. Many participants reported that they had "no interest" or "never saw the point" in gambling.

Theme 4: Financial Motives. Financial motives was another theme identified in the data. Some participants ($n = 23$) reported that it is too expensive or that they lack the money to

gamble (e.g., “I’m very low income and barely scraping by”). Other participants also noted that they’d rather “save money” for the purposes of economic stability (n = 10), or to be financially responsible (n = 3) (e.g., “don’t think it’s a responsible thing to do”). Other participants (n = 2) also noted that they would rather earn their money than gain it through gambling (e.g., “I’d rather work for what I want”).

Reasons Not to Game. Qualitative data from n = 151 participants were analyzed in relation to motives not to game. Three main themes were identified within the data, including (1) disinterest, (2) time and priorities, and (3) accessibility. In terms of interrater reliability, almost perfect agreement was achieved between the two raters (K = .92). Sample participant responses are presented for context. Other themes were identified in the data (e.g., negative consequences associated with addiction). However, given low sample sizes associated with these themes, they were not reported in detail.

Theme 1: Disinterest. A more commonly occurring theme included a general lack of interest (n = 33) or not finding gaming enjoyable (n = 22) as motives not to game. Many participants reported that they had “no interest” in gaming, while others noted that they find it “boring”, “too stressful” or not enjoyable (e.g., “not my idea of fun”).

Theme 2: Time and Priorities. Many participants (n = 55) reported concerns associated with time, gaming not being a priority (n = 9), or that it was not a productive use of time (n = 5). Participants reported that that “don’t have time” or that it’s a “waste of time”. Others reported that they had other priorities or “more important things to do”.

Theme 3: Accessibility. Participants (n = 15) also reported concerns relating to accessibility as motives not to game. These included responses associated with four subthemes, including impairment, technology use, cost and equipment, and various other restrictions.

Impairment included things such as motion sickness (e.g., "I get motion sick easily)", whereas others noted the cost of gaming consoles (e.g., "consoles are expensive"). Other participants noted challenges with technology (e.g., "not good with technology").

Associated Quantitative Analyses. A number of similarities were identified between motives to refrain from gambling and gaming (see Table 7). To compare the differences in proportions between samples, *z*-tests were conducted. More gamers reported time, $z = -11.88$, $p < .05$, and disinterest, $z = -5.88$, $p < .05$, as motives than gamblers. In contrast, more gamblers reported negative consequences, $z = 4.04$, $p < .05$, as a motive than gamers. There was no significant difference between samples in terms of accessibility as a motive to gamble or game, $p = .20$.

Table 7: *Motives to refrain from gambling and gaming*

Shared themes	**Proportion of gambling responses**	**Proportion of gaming responses**
Time	1% (*n* = 3/277)	46% (*n* = 69/151)
Disinterest	12% (*n* = 33/277)	36% (*n* = 55/151)
Negative consequences	16% (*n* = 45/277)	3% (n = 5/151)
Accessibility	6% (*n* = 18/277)	10% (*n* = 15/151)

Hypothesis 4

Reasons to Gamble. Qualitative data from $n = 315$ participants were analyzed in relation to motives to gamble. Two main themes were identified, including (1) enjoyable aspects and (2) the chance to win. In terms of interrater reliability, almost perfect agreement was achieved between the two raters ($K = .88$). Sample participant responses are presented for context. Other themes were identified in the data (e.g., environment and opportunity, boredom, charitable). However, given low sample sizes associated with these themes, they were not reported in detail.

Theme 1: Enjoyable Aspects. Participants noted several subthemes that fell under the overarching theme of enjoyable aspects associated with gambling, including gambling being entertaining (n = 83), the sense of thrill or adrenaline (n = 12), the opportunity to socialize (n = 11), and enjoying the competition of gambling (n = 3). Participants responded that it was a "fun activity" and "entertaining", and that they gamble for the "thrill of it", for the "social aspect" (e.g., "fun time with friends"), or for the "competitiveness".

Theme 2: Chance to Win. "The chance to win" was the most commonly occurring theme and included responses associated with the chance to win/win money (n = 139), prizes and rewards (n = 22), and a chance at a better life (n = 10). Many participants noted the "chance to win" and "winning money" as a motive to gamble. Others also commented on the "desire for the prize" or "potential rewards". Some participants further specified that the hope for a better life was a motivating factor (e.g., "chance to become rich and not have to worry about finances").

Reasons to Game with Loot Boxes. Qualitative data from n = 265 participants were analyzed in relation to motives to game with loot boxes. Four main themes were identified, including (1) enjoyable aspects, (2) the chance to win, (3) game progression, and (4) no motivation. In terms of interrater reliability, almost perfect agreement was achieved between the two raters (K = .88). Sample participant responses are presented for context. A number of other themes were identified in the data (e.g., curiosity and boredom). However, given low sample sizes associated with these themes, they were not reported in detail.

Theme 1: Enjoyable Aspects. Many participants noted enjoyable aspects of gaming that act as a motive. This included responses (n = 48) such as this type of gaming being "entertaining", "fun", and "exciting". Others (n = 12) noted that gaming is enjoyable (e.g., "I really enjoyed the game"). Some participants (n = 8) also described enjoying the social element

of these games (e.g., “fun games to play with somebody”), or that “competition” and “competitive gameplay” was a motive (n = 5). Two participants also stated that loot boxes created a “better game experience” overall.

Theme 2: Chance to Win. Many participants (n = 22) stated that a motive to engage with loot box content included the chance to win in general (e.g., “the chance of winning something”). A number of participants (n = 21) mentioned the chance to win exclusive items (e.g., “the prospect of rare or legendary items”) as a motivating factor. Similarly, some participants (n = 10) specifically mentioned that gaining prizes or rewards was also motivating (e.g., “I like getting the prizes”).

Theme 3: Game Progression. Participants (n = 25) also described in-game progression as a motive to engage with loot box content (e.g., “I can win something that will help me in future games”). Some participants noted feeling a sense of accomplishment for progressing, in that it was motivating or “something to strive for”.

Theme 4: No Motivation. Finally, many participants (n = 42) responded that they engage with loot boxes passively, in that a game they already played or enjoyed simply happened to include loot boxes as a feature (e.g., “they just happen to be in games I would play otherwise”). Some participants (n = 26) also responded that they do not have a specific motivating factor to game with loot boxes as opposed to gaming in general (e.g., “A loot box is not a determining factor in my motivation to play games”). Seven participants declared that they do not enjoy loot boxes despite engaging with them (e.g., “I hate loot boxes”).

Associated Quantitative Analyses. In terms of examining themes across activities, a number of similarities were identified between motives to gamble and game with loot boxes, including enjoyable aspects and the chance to win (see Table 8). To compare the differences in proportions

between samples, *z*-tests were conducted. More gamblers reported the chance to win as a motive than gamers, $z = 8.38$, $p < .05$. However, there was no significant difference between samples in terms of enjoyable aspects being a motive to gamble or game with loot boxes, $p = .12$.

Table 8: *Motives to gamble and game with loot boxes*

Shared themes	**Proportion of gambling responses**	**Proportion of loot box responses**
Enjoyable aspects	34% (*n* = 109/315)	28% (*n* = 75/265)
The chance to win	54% (*n* = 171/315)	20% (*n* = 53/265)

Reasons Not to Gamble. As discussed previously, four main themes were identified in relation to motives not to gamble, including (1) negative consequences, (2) uncertain outcomes, (3) disinterest, and (4) financial motives, from *n* = 277 participant responses. For further details, see Hypothesis 3 results.

Reasons Not to Game with Loot Boxes. Qualitative data from *n* = 297 participants were analyzed in relation to motives not to game with loot boxes. Three themes were identified, including (1) negative consequences, (2) disinterest, and (3) financial motives. In terms of interrater reliability, almost perfect agreement was achieved between the two raters ($K = .94$). Sample participant responses are presented for context. Other themes were identified in the data (e.g., negative consequences). However, given low sample sizes, they were not reported in detail.

Theme 1: Accessibility. Many participants noted issues with accessibility, including a lack of knowledge (*n* = 64) and opportunity (*n* = 4). Participants reported not gaming with loot boxes because they "don't know what a loot box is", or due to a lack of opportunity (e.g., "I've just never come across them in the games I've played").

Theme 2: Disinterest. Participants also reported a lack of interest, not finding loot boxes enjoyable, or having any value, and having poor perceptions of loot boxes. Many participants (n = 62) noted a lack of interest (e.g., "not interested in those types of games") or had other negative perceptions about loot boxes (n = 24) (e.g., loot boxes are "a scam" or an "unfair game mechanic").

Theme 3: Financial Motives. Finally, many participants (n = 64) noted that cost and not wanting to spend the money acted as a motive to not engage with loot boxes (e.g., "I don't like spending money on in game things"). Others reported loot boxes as being too expensive or lacking the necessary money to purchase them (n = 7), (e.g., "trying to be careful with a limited income"). Three participants responded that they would rather "save money".

Associated Quantitative Analyses. Similarly, in terms of motives to refrain from gambling and loot boxes, three overlapping themes were identified including disinterest, financial motives, and accessibility (see Table 9). *Z*-tests were conducted to compare the differences in proportions between samples. More loot box users reported that disinterest, $z = 5.75$, $p < .05$, financial motives, $z = 3.31$, $p < .05$, and accessibility, $z = 5.73$, $p < .05$, were motives to refrain from gaming as compared to gamblers.

Table 9: *Motives to refrain from gambling and gaming with loot boxes*

Shared themes	**Proportion of gambling responses**	**Proportion of loot box responses**
Disinterest	12% (n = 33/277)	32% (n = 96/297)
Financial motives	14% (n = 38/277)	25% (n = 74/297)
Accessibility	6% (n = 18/277)	23% (n = 68/297)

Additional Analyses

Gambling, Gaming, and Loot Boxes. Scores on the PGSI were analyzed to assess for problematic gambling. Of the 313 of participants with PGSI total scores, 8 participants (2.6%) had a score of 8 or greater, which is the cut-off score used to determine problem gambling (Ferris & Wynne, 2001). Problematic gaming was assessed with scores on the IGDS. Of the 439 of participants with total scores on the IGDS, 4 participants (1%) had a score of 32 or higher, which is the recommended cut-off score for problematic gaming (Pontes & Griffiths, 2015). In terms of loot box use, risky or problematic loot box use was measured with total scores on the RLBI, though there are no criteria in respect to cut-off scores for problematic versus non-problematic engagement. For correlations between total scale scores on the PGSI, GamCog, BGLS, IGDS, and RLBI, see Table 10.

Table 10: *Correlations between total scale scores*

Measures	PGSI	GamCog	BGLS	IGDS	RLBI
PGSI	1	.45**	.25**	.21**	.39**
GamCog	.45**	1	.39**	.26**	.29**
BGLS	.25**	.39**	1	-.02	.23**
IGDS	.21**	.26**	-.02	1	.41**
RLBI	.39**	.29**	.23**	.41**	1

**Correlation is significant at the .01 level (2-tailed).

When asked whether loot boxes have the potential to be addictive or problematic for some gamers, 92.8% (n = 231) of respondents agreed. Further, purchasing loot boxes (i.e., not earning them passively) was associated with problem gambling, gaming, and loot box use. Specifically, participants who purchased loot boxes had greater scores (M = 1.33, SD = 2.16)

than those who did not purchase loot boxes (M = .56, SD = 1.10) on the PGSI, $t(247) = 6.90$, $p <$ .001. Further, as per the Welch t-test, purchasing loot boxes (M = 17.97, SD = 5.98) versus not (M = 14.62, SD = 3.74) was associated with greater scores on the IGDS, $t(237.84) = 5.34$, $p <$ .001, and was also associated with greater scores (M = 12.40, SD = 4.93) versus not (M = 8.51, SD = 4.15) on the RLBI, $t(234.48) = 6.71$, $p < .001$. Having sold a loot box for profit was associated with greater scores on the IGDS, $t(237) = 2.95$, $p = .003$, but was not associated with scores on the PGSI or RLBI. Further, Welch's t-test revealed that participants who spent time specifically to earn loot boxes had greater scores than those who did not on the PGSI, $t(124.13) =$ 2.78, $p = .006$, on the IGDS, $t(218.85) = 3.89$, $p = <.00$, and on the RLBI, $t(237.49) = 7.87$, $p <$ .001.

Impulsivity. Total scores on the three impulsivity subscales (i.e., attention, motor, and non-planning subscales) were examined in relation to gambling, gaming, and loot box use. Total scores on the PGSI were positively but weakly correlated with scores on the attention, $r(313) =$ .18, $p = .002$, 95% CI [.07, .29], motor, $r(313) = .19$, $p = .001$, 95% CI [.08, .30], and non-planning, $r(313) = .18$, $p = .002$, 95% CI [.07, .29] impulsivity subscales. Similarly, total scores on the IGDS were positively but weakly correlated with scores on the attention, $r(436) = .20$, $p <$ .001, 95% CI [.11, .29], motor, $r(439) = .16$, $p = .001$, 95% CI [.07, .25], and non-planning, $r(437) = .21$, $p < .001$, 95% CI [.12, .30], impulsivity subscales. Total scores on the RLBI were correlated with scores on the attention subscale only, $r(247) = .14$, $p = .03$, 95% CI [.02, .26].

COVID-19. Most participants (n = 569, 94.8%) reported having experienced a lockdown or government-imposed restrictions related to COVID-19. Participants also reported on their gambling, gaming, and loot box engagement during the pandemic (see Table 11). In terms of gambling behaviour during the pandemic, a one-way ANOVA (increase, decrease, no change) on

problem gambling, as measured by PGSI total scores, yielded significant variation among groups, $F(2, 294) = 7.39$, $p = .001$. A post-hoc Tukey test revealed that participants whose gambling had increased during the pandemic had significantly higher scores on the PGSI than those whose gambling had decreased or not changed, $p < .05$. Similarly, in terms of gaming behaviour during the pandemic, a one-way ANOVA (increase, decrease, no change) on problem gaming, as measured by IGDS total scores, yielded significant variation among groups, $F(2, 409) = 5.52$, $p = .004$. A post-hoc Tukey test revealed that participants whose gaming had increased during the pandemic had significantly higher scores on the IGDS than those whose gaming had not changed, $p < .05$. Finally, in terms of gaming behaviour that specifically included loot box content, a one-way ANOVA (increase, decrease, no change) on loot box use, as measured by the RLBI, yielded significant variation among groups, $F(2, 229) = 7.66$, $p = .001$. A post-hoc Tukey test revealed that participants who experienced an increase in gaming with loot boxes had higher scores on the RLBI as compared to gamers whose loot box engagement had decreased or not changed during the pandemic, $p < .05$. Similarly, participants who increased their loot box engagement during the pandemic had higher scores on the PGSI, $F(2, 293) = 5.52$, $p = .004$, as compared to participants whose loot box engagement had not changed, $p < .05$.

Table 11: *Gambling and Gaming Behaviour During COVID-19*

Behaviour	Frequencies (%)		
	I have experienced an ***increase*** in…	I have experienced a ***decrease*** in…	The frequency of my (activity) has ***not changed***…
…the frequency of my gambling activities.	48 (8.5%)	112 (19.8%)	406 (71.7%)
…the frequency of my gaming activities.	283 (49.9%)	41 (7.2%)	243 (42.9%)
…the frequency of my gaming activities with games that have loot boxes specifically.	62 (11%)	62 (11%)	441 (78.1%)

Discussion

The purpose of this study was to examine gambling-related cognitions and motives for engagement in a convenience sample of Canadian university students and community participants. Gambling-related cognitions differed between gamblers and loot box users, in that gamblers had significantly greater scores on a measure of beliefs concerning luck. Though initially hypothesized as a potential mediator, socializing in gameplay did not correlate with gambling-related cognitions. Qualitative analyses revealed a number of motives to engage with or refrain from engaging with gambling, gaming, and loot box content. A number of overlapping themes were identified between these activities, indicating that there are similar motives across activities. Interestingly, additional analyses highlighted correlations between problematic gambling, gaming, loot box use, and gambling-related cognitions, and also shed light on how the COVID-19 pandemic may have influenced these behaviours. Overall, these results may broaden

our understanding of the relationships between loot boxes, gambling, and gambling-related cognitions, as well as the motivation behind engaging with or refraining from such content.

Gambling-Related Cognitions

Problem gambling has been associated with irrational cognitions concerning luck and chance. For instance, individuals with problem gambling may believe they can control the outcome of a gambling game through superstitious beliefs (e.g., gambling based on "lucky" numbers, colours, or other rituals) (Blaszczynski & Nower, 2002; Macey & Hamari, 2020; Raylu & Oei, 2004). In turn, loot boxes have increasingly been considered a form of gambling (Brooks & Clark, 2019), with some researchers suggesting that gamers respond to loot boxes in ways that are similar to how gamblers respond to slot machines (Larche et al., 2019). Given the conceptual similarities between gambling and loot boxes, it was anticipated that gamers who engage with loot boxes would also endorse irrational beliefs around luck and chance. Specifically, it was hypothesized that gamblers would endorse more irritational cognitions than loot box users and gamers, but that loot box users would also endorse more irrational cognitions than gamers alone (i.e., gamers who do not engage with loot box content). This hypothesis was partially supported, in that gamblers demonstrated significantly greater scores than loot box users on one measure of luck (i.e., BGLS); however, there was no significant difference in scores between gamers and gamblers or gamers and loot box users. Further, these results did not remain significant when social desirability was added as a covariate to the analysis. An additional analysis between gamblers and gamblers who also engage with loot boxes also revealed no significant difference on another measure of gambling specific cognitions (i.e., GamCog). That being said, the initial difference obtained between gamblers (M = 36.24, SD = 8.73) and loot box users (M = 34.60, SD = 9.11) on the BGLS was statistically significant but likely not clinically relevant or meaningful.

Potential explanations for this finding may relate to the nature of the gamblers in this study. Wu et al. (2012) determined that problem gambling specifically correlated with beliefs in luck, whereas non-problem gambling did not. This is consistent with more recent findings, which revealed that specific types of gambling (i.e., lottery gambling) and luck were associated with problem gambling and not with non-problem gambling (Thompson et al., 2021). As only 2.6% of participants in this study met criteria for problem gambling as measured by the PGSI (Ferris & Wynne, 2001), it is possible that this may explain why there was little variation in beliefs in luck among gamblers, gamers, and loot box users. Indeed, the eight participants who demonstrated problematic gambling behaviour as measured by the PGSI, scored higher on the BGLS (M = 47.00, SD = 8.67) as compared to the mean scores of all participant gamblers (see above). (M = 36.24, SD = 8.73). Similarly, given the theorized conceptual similarities between problem gambling and problematic loot box use, it may be that these beliefs would emerge in a sample of individuals with problematic loot box use, though criteria for distinguishing problematic from non-problematic loot box use have yet to be developed.

This proposed explanation for the current findings is also supported by a number of additional exploratory analyses. These additional analyses revealed that overall measures between problem gambling, gambling-related cognitions, and problematic loot box use were highly and positively correlated. In particular, the PGSI and the GamCog were highly correlated, indicating that greater problem gambling scores were associated with greater scores relating to gambling cognitions and beliefs. This supports what prior literature has proposed, in that individuals with problem gambling endorse a greater number of gambling-related cognitions (Thompson et al., 2021; Wu et al., 2012). Moderate positive correlations were also demonstrated between the RLBI and both measures of beliefs concerning chance and luck (i.e., BGLS and

GamCog). This further demonstrates that problematic beliefs may emerge in individuals who demonstrate problematic patterns of engagement (i.e., risky loot box use).

Socializing. Socializing (i.e., playing a game alone, playing a game that allows for some socialization within the game, or playing a team game with other people) was predicted to act as a mediator between irrational cognitions around luck and chance and loot box use. Specifically, it was anticipated that individuals who game in isolation would be more likely to demonstrate excessive or potentially problematic loot box engagement. However, initial zero-order correlations revealed that not all variables of interest were significantly correlated, regardless of whether either measure of gambling-related cognitions (i.e., the BGLS or GamCog) was included. Further, problematic loot box behaviour, as measured by the RLBI, was also not associated with gameplay socializing.

This hypothesis was initially proposed based on other research in the addiction literature (Bourgault & Demers, 2006; Bristow et al., 2018; Gonzalez, 2012; Hellstrom et al., 2012). Research was drawn from other areas because, at the time this study was proposed, research specific to socializing and loot box use did not exist. In terms of other addiction research, gambling in isolation has been found to mediate the relationship between anxiety sensitivity and excessive or problem gambling (Bristow et al., 2018), whereas solitary drinking and solitary binge drinking have been associated with problematic alcohol use (Bourgault & Demers, 2006; Gonzalez, 2012). In a recent systematic review, Mason et al. (2020) determined that solitary alcohol and cannabis use were related to earlier and more frequent substance use and were also associated with problematic coping-related motives (e.g., drinking or using cannabis to feel better or avoid negative feelings). On the flip side, gaming with friends has been shown to act as a protective factor, in that gamers with social motives are less likely to be at risk for problem

gaming (Hellstrom et al., 2012). Thus, other literature in the area of chemical and behavioural addictions suggests that socializing may act as a protective factor, whereas solitary engagement may pose a risk.

Interestingly, recent research on loot boxes specifically has provided more nuance to the discussion on the effect of socialization. A study by King et al. (2020) revealed that one of the most important predictors of loot box expenditure for Fortnite gamers (i.e., a popular video game that contains loot boxes) was the expenditure habits of the participant's closest friend. In other words, the nature of the social relationship (i.e., whether a participant's friend spent in-game money on loot box purchases) predicted the purchasing habits of the participants themselves. Further, King's (2020) study demonstrated that spending money on Fortnite in-game purchases was associated with greater online social connections associated with the game overall (i.e., more online friends). However, these social elements (e.g., friends' expenditures, number of social contacts) were not associated with problem gaming (King et al., 2020), despite other studies demonstrating a relationship between purchasing loot boxes and problem gaming and gambling severity (Kristiansen & Severin, 2020; Li et al., 2019). In this vein, the present study's additional exploratory analyses on different types of loot box engagement are consistent with prior research (Kristiansen & Severin, 2020; Li et al., 2019; Zendle et al., 2019), in that purchasing loot boxes and spending time specifically to earn loot boxes was associated with problem gambling, gaming, and loot box engagement.

Based on King et al.'s (2020) findings, it is possible that the nature of the socializing question used in this study did not capture the essence of the socializing influence, in that gamers were simply asked whether they played various types of social or individual games. Instead, it may be more apt to determine whether and how a participant's online friends engage with in-

game purchases such as loot boxes, and what effect this may have on others' loot box expenditure habits. At the same time, although King et al.'s (2020) findings are interesting, it is but one study focused on one type of video game, making the findings less generalizable.

Motives

Identifying motives to engage or refrain from engaging with an activity can provide context to patterns of behaviour, including risk and protective factors. Although research has examined motives to gamble (Binde et al., 2013; McGrath & Thege, 2018; Myrseth et al., 2017) and game (Demetrovics et al., 2011; Puiras et al., 2021), as well as motives to refrain from gambling (Rash & McGrath, 2017), no prior research has examined motives to refrain from gaming. Similarly, only one study has examined motives to engage with loot boxes (Nicklin et al., 2021), whereas no prior research has examined motives to refrain from engaging with loot box content.

Motives to Refrain from Gambling and Gaming. There are a number of reasons to refrain from gambling, such as risk aversion and concern for negative financial outcomes, having little interest in gambling or other priorities, religious restrictions, concerns about addiction, and limited or no access to gambling opportunities, among others (Rash & McGrath, 2017). Given the current study's research was exploratory, it was anticipated that participants would demonstrate some general overlapping motives in respect to refraining from gambling and gaming. Four motives in particular were hypothesized to act as reasons to refrain from both activities, including disinterest, having other priorities, social influence, and financial reasons. This hypothesis was partially supported, in that gamblers and gamers endorsed shared motives such as disinterest, time, negative consequences (i.e., addiction), and accessibility. Further self-

generated motives unique to refraining from gambling included uncertain outcomes and financial motives.

The motives related to refraining from gambling (i.e., disinterest, time, negative consequences, accessibility, uncertain outcomes, and financial motives) are consistent with prior research (Rash & McGrath, 2017). Though named differently, the overarching theme of negative consequences in this study captured subthemes relating to addiction and concerns around risk, which is consistent with Rash and McGrath's (2017) work. Similarly, the motive labelled as "time" in this study captured participant responses that included not having the time, feeling gambling was a waste of time, or having other priorities, which is consistent with "having other priorities" as a reason not to gamble (Rash & McGrath, 2017). Further, the theme labelled as uncertain outcomes in this study captured a range of responses related to uncertainty itself or uncertainty in respect to the outcome of gambling (e.g., losing, losing money), which is not inconsistent with concern for financial risk or loss (Rash & McGrath, 2017).

In terms of gaming, although there is no prior literature to reference, motives such as disinterest, not having the time, and accessibility are general motives that could be applied to a range of activities. In this sense, it is logical that they were generated in respect to gaming as well. However, the fact that addiction was also endorsed in respect to gaming, but by very few participants, is particularly interesting and may speak to the difference in perceptions between gaming and gambling. Indeed, the majority of participants reportedly refrained from gaming due to disinterest, time, and accessibility, rather than concerns relating to risk (e.g., loss of money) or harm (e.g., addiction), whereas the majority of participants reportedly refrained from gambling due to potential financial loss. Recent research from one study highlighted that people were more likely to perceive gambling as a risky or problematic behaviour as compared to gaming and

alcohol use; further, individuals struggled to identify signs of problem gaming but overly pathologized problem gambling symptoms (Jamieson & Dowrick, 2021). It may be that there are different public perceptions of the risks of certain chemical and behavioural addictions, and that limited information is available in relation to problematic gaming, particularly given its only recent classification as a disorder (Jamieson & Dowrick, 2021; WHO, 2018).

Motives to Gamble and Game with Loot Box Content. There are a number of gambling motives related to recreational (e.g., socializing) and problematic (e.g., coping, escapism) gambling behaviour (Binde et al., 2013; MacLaren et al., 2015; McGrath & Thege, 2018; Puiras et al., 2021; Sauter et al., 2020). In terms of loot boxes, however, at the time this project was proposed no prior research had examined reasons to engage or refrain from loot box content. Nevertheless, due to the conceptual similarity between loot boxes and gambling, it was anticipated that motives would be similar between gamblers and loot box gamers, specifically the chance of hitting the jackpot (or a rare item in a loot box), positive mood induction, and the chance to win (Binde et al., 2013). This hypothesis was partially supported in that the two main overlapping themes identified in the data included enjoyable aspects of the activity and the chance to win. Two further themes unique to loot boxes included game progression and no motivation.

In terms of the overlapping gambling and loot box motives, both are consistent with gambling and loot box literature (Binde et al., 2013; Nicklin et al., 2021). Research suggests that the chance to win and other enjoyable aspects of gambling (e.g., the thrill, social element) are motives to engage with the activity (Binde et al., 2013; Blaszczynski, & Nower, 2002). Similarly, a recently published qualitative study on loot box motives reported six main themes, including (1) the opening experience, (2) the value of content, (3) game-related motives, (4) social influences, (5) emotive or impulse motives, and (6) fear of missing out (Nicklin et al.,

2021). It is also interesting that more gamblers than loot box users reported the chance to win as a motive to game. This may suggest that loot box users are engaging with the content for a greater number of reasons, or different reasons than the chance of winning in-game rewards, money, or items. Indeed, a majority of loot box gamers reported that they had no specific motivation to game with loot boxes, and that they engaged with them passively.

This line of reasoning is theoretically supported by Delfabbro and King (2020) who examined the evidence for a gateway hypothesis between loot box content leading to gambling. The authors proposed that there is limited evidence for a gateway pathway between loot box content and gambling (Delfabbro & King, 2020). Instead, they suggest that gamers may not be prone to perceive loot boxes as gambling content, but that gamblers may be particularly drawn to loot boxes as a different avenue for gambling expenditure (Delfabbro & King, 2020). It is plausible, then, that loot box gamers are not engaging with the content for similar gambling-related motives but are more passive in their engagement, as reported here.

Motives to Refrain from Gambling and Loot Box Content. As discussed previously, research has demonstrated a number of reasons to refrain from gambling (e.g., risk aversion, concerns about addiction) (Rash & McGrath, 2017). In contrast, no prior research has examined motives to refrain from loot box content. It was anticipated the motives to refrain from loot box engagement would be consistent with motives to refrain from gambling, given the conceptual similarity between gambling and loot boxes. Specifically, financial reasons and risk aversion and addiction concerns were hypothesized to be shared motives to refrain from gambling and loot box content (Rash & McGrath, 2017). The results partially supported this hypothesis, in that financial motives were shared between groups as predicted, but other shared motives emerged as well including disinterest and accessibility motives.

As noted above, disinterest, accessibility issues, and financial motives (e.g., not wanting to spend money on an activity) are logical reasons to refrain from engaging in any number of activities, including gambling or loot box gaming. Interestingly, these three shared themes accounted for the majority of loot box related responses. In contrast, the majority of responses related to not gambling included subthemes related to uncertainty (e.g., the uncertain outcomes of gambling, such as losing money). Again, this may reflect a difference in public perception around risks related to gambling versus gaming and loot boxes (Jamieson & Dowrick, 2021). It is possible that individuals better understand or are more aware of the risks of losing money in the context of gambling, but not in the context of gaming. Alternatively, a recent study by DeCamp (2020) proposed that fewer youth gamers had purchased loot boxes than previously supposed by other researchers. The current findings that many gamers have not engaged with loot box content, or mostly engage with it passively, are congruent with this research (DeCamp, 2020).

Additional Analyses

Impulsivity. In addition to self-generated motives to engage or refrain from gambling, gaming, and loot box use, the role of impulsivity was also examined. All three impulsivity subscales (i.e., attention, motor, and non-planning) were positively but weakly correlated with problem gambling and gaming scores, as measured by the PGSI and IGDS. In contrast, only the attentional impulsivity subscale was positively but weakly correlated with risky loot box use, as measured by the RLBI. Impulsivity being linked to problem gambling and gaming is consistent with prior research (Bargeron & Hormes, 2017; Hodgins & Holub, 2015; King et al., 2020; Wardle & Zendle, 2021). In terms of loot box use, it is interesting that potentially problematic loot box engagement was only partially associated with impulsivity. This finding is perhaps

complementary to King et al.'s (2020) findings, in that impulsivity was associated with problem gaming, but problem gaming was not associated with problematic loot box engagement. At the same time, it is important to consider the nature of the correlations (i.e., weak). Given the large sample size in the present study, it is possible that statistically significant findings may be exaggerated and are, in fact, not clinically relevant (Fabers & Fonseca, 2014).

COVID-19. Initial research related to the COVID-19 pandemic has demonstrated that various pandemic-related restrictions may pose a risk for the development or increase in mental health difficulties, such as depression and psychological distress (O'Connor et al., 2020; Xiong et al., 2020). Other research also suggests that specific risk factors, such as feelings of boredom and social isolation, may result in increased or problematic gambling and gaming behaviour in particular (Hall et al., 2021; Sharman et al., 2021). It has also been hypothesized that increasingly accessible online activities, such as online gambling and gaming, may be used more frequently and as coping mechanisms associated with pandemic-related distress or mental health fallout (Hall et al., 2021; Higuchi et al., 2020). Therefore, given that participant recruitment was occurring during Canadian COVID-19 restrictions, additional exploratory questions were included to determine participants' perceptions of whether this had influenced gambling, gaming, and loot box engagement. Overall, the majority of participants responded that their gambling and loot box engagement had not changed during the pandemic restrictions. However, nearly half of the participants noted that their gaming frequency in general had increased during the pandemic restrictions. Further analyses revealed that individuals whose gambling, gaming, and loot box engagement had increased during the pandemic were more likely to have greater scores on measures of problem gambling, gaming, and loot box use. This suggests that those who

gambled and gamed more during the pandemic restrictions were more likely to be at risk for, or meet criteria of, problem gambling and gaming.

These findings are consistent with initial research detailing how the pandemic has affected gambling, gaming, and loot box engagement. An initial study in the UK revealed that most gamblers reported a decrease in gambling frequency during the pandemic restrictions, but that those who did not report a decrease included potential problem gamblers (Sharman et al., 2021). This supports our findings, in that the participants who reported an increase in gambling behaviour were associated with greater problem gambling scores. Similarly, results from a study by Higushi et al. (2020) revealed that roughly half of gamers reported an increase in time spent gaming during the pandemic restrictions, which is consistent with this study's findings. Finally, research by Hall et al. (2021) during the pandemic demonstrated that problem gambling was associated with greater loot box spending. This is not unlike results from this study, which revealed that participants who had increased their loot box engagement during the pandemic had higher problem gambling scores.

Limitations and Strengths

The present study had several limitations that should be considered when interpreting the results. The use of a cross-sectional, passive-observational design prevents any causal interpretation of the results. For instance, it is unknown whether loot box use precipitates gambling-related cognitions, or whether individuals with gambling-related cognitions are more likely to engage with loot boxes. The use of self-report measures also presents with the potential for biased reporting. Further, the inclusion of many measures added to the length of the study, which could have contributed to participant attrition or non-purposeful responding. At the same time, not including more in-depth questions related to certain topics, such as substance use, may

have acted as a limitation, considering the frequent comorbidity of problem gambling and gaming with various substance use problems. Additionally, and as with all forms of qualitative analysis, there is a potential for bias on the part of the coder in interpreting the results, which should be considered when examining the present study's findings. Finally, there were concerns related to the nature of the sample itself. A large proportion of the sample was young, White, and female, limiting the generalizability of the findings to other populations. The large sample size may have also resulted in relationships that were statistically significant but of trivial clinical or practical relevance. Additionally, the decision to combine the datasets (i.e., community and student samples) may also have acted as a limitation. On the one hand, if the datasets had remained separate, the sample sizes would have likely been insufficient to conduct comparisons of certain subsamples (e.g., gamblers versus loot box users) within each dataset (i.e., community versus student sample). On the other hand, the samples differed in terms of certain demographic characteristics (e.g., age, sex). Although these are arguably not intrinsic differences between the samples, it is possible that they influenced the findings and should be considered when interpreting the results of the study.

Despite its limitations, this study also had a number of strengths. First, participant recruitment was effective in amassing an overall large sample, which also resulted in an adequate subsample of loot box users. Second, a number of measures were included, which allowed for an examination of multiple different elements in addition to the main hypotheses (e.g., impulsivity, the perceived effects of COVID-19). Further, the inclusion of a mixed method design added depth and breadth to the study; quantitative measures of problematic engagement, in addition to open-ended and self-generated motives, provided a richness to the data and resulting discussion. Finally, measures that were included to examine the nature of participant responding added to

the strength of the study, particularly in relation to detecting non-purposeful responding at the data cleaning stage and socially desirable responding at the data analysis stage.

Future Research Considerations

Future research could further explore the relationships between gambling, gaming, and loot boxes. Although socializing was not determined to be a mediator, it is possible that other factors may mediate or moderate these relationships. Longitudinal studies in particular may shed light on the directionality of the relationships between loot box use and problem gambling and gambling-related cognitions. This may be particularly helpful in further contributing to the gateway hypothesis discussion, and in determining whether younger gamers who are exposed to loot boxes could be primed for gambling-related cognitions or other gambling-related problems. Alternatively, such research may further elucidate whether problem gamblers may be particularly vulnerable to problematic loot box use, with gaming acting as another avenue for gambling-related expenditure. Further research in this vein may also assist regulatory bodies in determining the necessity of restrictions pertaining to loot box access, as has been discussed in several contexts already (McCaffrey, 2020). Finally, although general motivations to engage or refrain from engaging in gambling and gaming activities were explored in this study, it would be prudent to examine whether motives endorsed by individuals with problem gambling, gaming, or loot box use differ from motives in the general population. A closer inspection of these motives, in addition to other personality (e.g., impulsivity) or contextual (e.g., socializing) factors, may assist in delineating whether different therapeutic approaches may be more appropriate for different problem gambling and gaming populations.

Conclusion and Implications

As loot boxes are increasingly added to games, and the blending of the gambling and gaming industries becomes more pronounced, it will be critical to examine the effect of loot boxes. The current study examined the relationships between loot box use and gambling-related cognitions typically associated with problem gambling. Though gamblers initially demonstrated greater scores than loot box users on a measure of gambling-related cognitions, the difference in scores was seemingly significant but not clinically relevant. It may be that gambling-related cognitions associated with chance and luck are more present in a problematic gambling context. Further, although socializing was predicted as a mediator between loot box and gambling-related cognitions, no such relationship was determined. Additional nuance in the discussion around socializing may need to be considered in future research, while also exploring the potential for other mediator or moderator variables. Despite this dearth of significant findings, additional correlations revealed that loot box use was associated with problem gambling and gaming.

In addition to these findings, qualitative analyses in relation to self-generated motives revealed overlapping reasons to engage with or refrain from gambling, gaming, and loot box content. These motives provide further context to the discussion on the perceived benefits and risks of gambling, gaming, and loot box content. Similarly, a brief examination of impulsivity as it relates to gambling and gaming provided further insight into its role in relation to problematic engagement (e.g., problem gambling). Finally, exploratory analyses associated with the perceived effects of the COVID-19 pandemic revealed that the current climate of uncertainty may pose a particular risk to individuals vulnerable to, or who are experiencing, problem gambling and gaming.

Overall, the present findings provide further context to the burgeoning research literature on loot boxes and their relation to gambling and gaming behaviours. This study also offers additional insight into the motives for engagement, and specific elements of gambling and gaming that appeal or dissuade individuals from engaging with such content. Findings from the study may help further identify the prevalence of risk factors associated with gambling-related game content, such as loot boxes, as regulatory bodies increasingly seek to determine the need for protective policies around loot box content.

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Appendix A

Demographic Questionnaire

1. What is your age?
    a. Open response (19+)
2. What was your biological sex at birth?
    a. Female
    b. Male
    c. Other
    d. Prefer not to say
3. What is your gender?
    a. Female
    b. Male
    c. Non-binary
    d. Transgender
    e. Other
    f. Prefer not to say
4. What is your race/ethnicity?
    a. Asian
    b. Black
    c. Caucasian (White)
    d. Hispanic/Latino/a
    e. Indigenous (First Nations, Metis, or Inuit)
    f. Middle Eastern

g. Prefer not to say

h. Other (please specify)

5. What is your sexual orientation?

    a. Exclusively heterosexual

    b. Predominantly heterosexual, only incidentally homosexual

    c. Predominantly heterosexual, but more than incidentally homosexual

    d. Equally heterosexual and homosexual

    e. Predominantly homosexual, but more than incidentally heterosexual

    f. Predominantly homosexual, only incidentally heterosexual

    g. Exclusively homosexual

    h. No socio-sexual contacts or reactions (asexual)

    i. Prefer not to say

    j. Other

6. What is the highest level of education you have completed?

    a. None

    b. Elementary school

    c. Some high school

    d. High school completed

    e. Some college or technical

    f. College or technical completed

    g. Some undergraduate

    h. Undergraduate degree completed

    i. Some post graduate

    j. Post graduate completed

7. What is your current cumulative grade point average (0-100)? If this is your first semester at university, please use/estimate your exiting grade point average from the last educational institution you attended (e.g., high school).
    a. Open response, numerical
8. What is your work/employment status?
    a. Employed full-time
    b. Employed part-time
    c. Unemployed
9. Are you currently a student at a university or college?
    a. Yes – full time
    b. Yes – part time
    c. No
10. What is your marital status?
    a. Single
    b. Married/Common-law
    c. Separated/divorced
    d. Widowed
    e. In a committed relationship (not married or common law)
11. What is your total annual personal income? (Include income from all sources – salary, financial aid, bonuses, investment, income, etc.) Please check only one. Canadian dollars.
    a. $0

b. Less than $5000

c. $5000 - 10,000

d. $10,000 – 20,000

e. $20,000 - $25,000

f. $25,000 – 35,000

g. $35,000 – 50,000

h. $50,000 – 75,000

i. $75,000 - 90,000

j. More than $90,000

12. What is your total annual household income? (Include income for all family members from all sources – salary, bonuses, investment, income, etc.). Please check only one. Canadian dollars.

    a. Less than $15,000

    b. $15,000 – 29,000

    c. $30,000 – 49,000

    d. $50,000 – 69,000

    e. $70,000 – 89,000

    f. $90,000 – 119,000

    g. $120,000 - $139,000

    h. $140,000 – 159,000

    i. $160,000 – 179,000

    j. $180,000 – 199,000

    k. More than $200,000

13. What is your religious affiliation?
    a. Buddhist
    b. Catholic
    c. Eastern Orthodox (e.g., Shinto, Jainism)
    d. Jewish
    e. Muslim
    f. Protestant
    g. Sikh
    h. No religious affiliation (e.g., atheist, agnostic)
    i. None of these
14. What is the strength of your religious beliefs?
    a. Not applicable
    b. Not strong at all
    c. Not very strong
    d. Somewhat strong
    e. Very strong
    f. Extremely strong

Substance Use

1. Do you drink alcohol?
    a. Yes
    b. No
2. If yes, how frequently do you drink alcohol?
    a. Not applicable

   b. Once a month or less
   c. Once a week or less
   d. Two to three times a week
   e. Once a day
   f. Multiple times daily

3. Do you smoke, consume or use cannabis?
   a. Yes
   b. No
4. If yes, how frequently do you smoke/use/consume cannabis?
   a. Not applicable
   b. Once a month or less
   c. Once a week or less
   d. Two to three times a week
   e. Once a day
   f. Multiple times daily

Gambling

5. Do you gamble?

In responding to this question, please consider the definition of gambling: To gamble is to wager something of value against an uncertain outcome, or chance, with the purpose of gaining something of greater value. This can include but is not limited to activities such as casino gambling, online gambling, raffles, bingo, and scratch and lottery tickets.

   a. Yes

b. No

If you answered "no" to the previous question (i.e., Do you gamble?), please scroll to the end of the page and skip to the next page.

6. How often do you gamble?
    a. Once a month or less
    b. Once a week or less
    c. Two to three times a week
    d. Once a day
    e. Multiple times daily
7. Have you gambled at least once in the past year?
    a. Yes
    b. No
8. How old were you (in years) when you first started gambling?
    a. Open response, numerical
9. If applicable, what age were you (in years) when you first started gambling consistently?
    a. Open response, numerical
10. What types of gambling activities do you participate in?
    a. Bingo
    b. Casino
    c. Online gambling
    d. Raffles
    e. Scratch and lottery tickets
    f. Video lottery terminal

g. Other (please specify)

11. How much money (in Canadian dollars) on average do you spend during one gambling session?

    a. Open response, numerical

12. When you gamble, do you also engage in drug use at the same time?

    a. Yes – I drink alcohol while gambling

    b. Yes – I smoke/consume/use cannabis products while gambling

    c. Yes – I drink **and** use cannabis products while gambling

    d. No

Gaming

13. Do you game/play games?

In responding to this question, please consider the current study's definition of gaming: Gaming refers to playing both off or online games/video games that are played across a number of platforms (e.g., PlayStation, Personal Computer, Cell Phone) and which span a variety of genres (e.g., MMORPGs, third/first-person shooter, social media games).

    a. Yes

    b. No

If you answered "no" to the previous question (i.e., Do you game/play video games?) please scroll down to the end of the page and skip to the next page.

14. If yes, how often do you game?

    a. Once a month or less

    b. Once a week or less

    c. Two to three times a week

d. Once a day

e. Multiple times daily

15. How old were you (in years) when you first started gaming?

    a. Open response, numerical

16. If applicable, when did you first start gaming consistently?

    a. Open response

17. What types of (video) games do you currently play?

    a. Action-Adventure

    b. Massively Multiplayer Online Role-Playing Games (MMORG) and Other Role-Playing Games (RPG)

    c. First/Third-person Shooter and Other shooter

    d. Real-Time and Other Strategy

    e. Board/Card Games

    f. Sports

    g. Puzzle

    h. Rhythm

    i. Driving

    j. Platformer

    k. Other

18. What device do you play most of your games on?

    a. Console (e.g., Xbox, PlayStation, Nintendo Switch)

    b. PC (i.e., Personal Computer)

    c. Phone Applications

d. Social Media

e. Other

19. When you play games, do you also engage in drug use at the same time?

a. Yes – I drink alcohol while gaming

b. Yes – I consume/smoke/use cannabis products while gaming

c. Yes – I drink **and** use cannabis while gaming

d. No

Loot Boxes:

20. Have you ever played a game with loot boxes?

In responding to this question, please refer to the definition of loot boxes: Loot boxes are in-game "boxes" that can be won within a game or purchased with in-game currency or real money, and which contain a random selection of prizes or objects.

a. Yes

b. No

If you answered "no" (i.e., you have never played a game with loot boxes) please scroll down to the end of the page and skip to the next page.

21. How often do you play games that have loot boxes?

a. Once a month or less

b. Once a week or less

c. Two to three times a week

d. Once a day

e. Multiple times daily

22. Have you opened a loot box within a game?

a. Yes

b. No

If you answered "no" (i.e., you have never played a game with loot boxes) please scroll down to the end of the page and skip to the next page.

23. What was your approximate age of first loot box use (in years)?

24. When you play games with loot boxes, what best describes your situation:

    a. I play games without any social interaction (verbal or in-game) with other players.

    b. I play games with passive social interaction (i.e., listening to other players without contributing to the conversation).

    c. I play games with some/limited social interaction (i.e., interacting with other gamers verbally or through gameplay).

    d. I play games where interaction with other gamers is required (i.e.., speaking through a headset, using in-game text, or any other means of communication).

25. When you play games with loot boxes, do you mostly play games that are:

    a. Single-player

    b. Multi-player

    c. Team-based (i.e., require in-game communication with other players)

26. Have you bought a loot box or a loot box item?

    a. Yes

    b. No

27. Have you bought a loot box or a key to unlock one?

    a. Yes

    b. No

28. If you answered “Yes” to either of the two previous questions, why do you purchase loot boxes/purchase keys to unlock loot boxes?
    a. Open response
29. How do you purchase loot boxes? Do you use:
    a. In-game currency
    b. Real money
    c. Both
    d. Neither
30. How much money do you spend on loot boxes per month (in Canadian dollars)?
    a. Open response
31. Have you sold a loot box or loot box item?
    a. Yes
    b. No
32. Have you spent time specifically to earn loot boxes?
    a. Yes
    b. No
33. If you answered “Yes” to the previous question, why have you spent time specifically to earn loot boxes?
    a. Open response
34. Approximately how many hours (per week) do you spend specifically to earn loot boxes?
    a. Open response (numerical)
35. Do you believe loot boxes are a good or bad feature of gameplay?
    a. Good feature

   b. Bad feature
   c. Neither good nor bad feature

36. Do you believe that loot boxes have the potential to be addictive or problematic for some gamers?
   a. Yes
   b. No
   c. I don't know
37. If you answered "Yes" or "No" to the previous question, please explain your reasoning (i.e., why you believe loot boxes may or may not be addictive or problematic for some gamers):
   a. Open response
38. When you play video games with loot boxes specifically, do you also engage in drug use at the same time?
   a. Yes – I drink alcohol while gaming with loot boxes
   b. Yes – I consume/use cannabis products while gaming with loot boxes
   c. Yes – I drink **and** consume/use/smoke cannabis products while gaming with loot boxes
   d. No
39. My loot box use has caused me problems (Brooks & Clark, 2019).
   a. Strongly disagree to Strongly Agree (7 response options)
40. Opening loot boxes is exciting (Brooks & Clark, 2019).
   a. Strongly disagree to Strongly Agree (7 response options)
41. Opening loot boxes sometimes feels like making a bet (Brooks & Clark, 2019).

a. Strongly disagree to Strongly Agree (7 response options)

42. I believe loot boxes are a form of gambling (Brooks & Clark, 2019).

a. Strongly disagree to Strongly Agree (7 response options)

43. I buy loot boxes with the hope of receiving valuable items to sell (Brooks & Clark, 2019).

a. Strongly disagree to Strongly Agree (7 response options)

44. I believe obtaining items from loot boxes is an effective way to generate money (Brooks & Clark, 2019).

a. Strongly disagree to Strongly Agree (7 response options)

45. I most enjoy games that rely heavily on randomization to determine rewards (Brooks & Clark, 2019).

a. Strongly disagree to Strongly Agree (7 response options)

Esports

46. Do you watch/engage with esports content?

a. Yes

b. No

47. If yes, how often do you engage with esports content?

a. Once a month or less

b. Once a week or less

c. Two to three times a week

d. Once a day

e. Multiple times daily

Appendix B

Problem Gambling Severity Index

Please note: These next few questions pertain to gambling. If you do not gamble, please skip to the next page.

Thinking about the last 12 months…

1. Have you bet more than you could really afford to lose?
2. Still thinking about the last 12 months, have you needed to gamble with larger amounts of money to get the same feeling of excitement?
3. When you gambled, did you go back another day to try to win back the money you lost?
4. Have you borrowed money or sold anything to get money to gamble?
5. Have you felt that you might have a problem with gambling?
6. Has gambling caused you any health problems, including stress or anxiety?
7. Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
8. Has your gambling caused any financial problems for you or your household?
9. Have you felt guilty about the way you gamble or what happens when you gamble?

Response options: (0) Never, (1) Sometimes, (2) Most of the time, (3) Almost always

Appendix C

GamCog

1. I will never be able to stop gambling.
2. A series of losses will provide me with a learning experience that will help me win later.
3. I have some superstitions which make me lucky when I gamble.
4. I'm not strong enough to stop gambling.
5. Specific numbers and/or colours help me win.
6. It is difficult to stop gambling as I am so out of control.
7. My knowledge and skill in gambling contribute to the likelihood that I will make money.
8. There are certain circumstances or situations that increase my chances of winning.
9. If I know someone who is lucky, I try to be around them so that their luck rubs off of on me.
10. My desire to gamble is so overpowering.
11. Gambling makes me happier.
12. Gambling makes the future seem brighter.
13. My gambling wins prove that I have skills and knowledge related to gambling.
14. I can't function without gambling.
15. When I win it is mainly due to my skill and knowledge in the area.
16. I collect specific objects that help increase my chance of winning.
17. I have specific rituals and behaviours that increase my chance of winning.
18. Gambling makes things seem better.

Response Options: (1) Strongly disagree, (2) Disagree, (3) Somewhat disagree, (4) Neither agree nor disagree, (5) Somewhat agree, (6) Agree, and (7) Strongly agree.

Appendix D

Belief in Good Luck Scale

1. Luck plays an important part in everyone's life.
2. Some people are consistently lucky, and others are unlucky.
3. I consider myself to be a lucky person.
4. I believe in luck.
5. I often feel like it's my lucky day.
6. Nobody can win at games of chance in the long-run.
7. I consistently have good luck.
8. I tend to win games of chance.
9. It's a mistake to base any decisions on how lucky you feel.
10. Luck works in my favor.
11. I don't mind leaving things to chance because I'm a lucky person.
12. Even the things in life I can't control tend to go my way because I'm lucky.
13. I consider myself to be an unlucky person.
14. There is such a thing as luck that favors some people, but not others.
15. Luck is nothing more than random chance.

Response options: (1) strongly disagree, (2) somewhat disagree, (3) slightly disagree, (4) slightly agree, (5) somewhat agree, (6) strongly agree.

Appendix E

Internet Gaming Disorder Scale (Short-Form)

1. Do you feel preoccupied with your gaming behaviour? (Some examples: Do you think about previous gaming activity or anticipate the next gaming session? Do you think gaming has become the dominant activity in your daily life?)
2. Do you feel more irritability, anxiety, or even sadness when you try to either reduce or stop your gaming activity?
3. Do you feel the need to spend increasing amount of time engaged gaming in order to achieve satisfaction or pleasure?
4. Do you systematically fail when trying to control or cease your gaming activity?
5. Have you lost interests in previous hobbies and other entertainment activities as a result of your engagement with the game?
6. Have you continued your gaming activity despite knowing it was causing problems between you and other people? Have you hidden the time you spend on games from others?
7. Have you deceived any of your family members, therapists, or others because of the amount of your gaming activity?
8. Do you play in order to temporarily escape or relieve a negative mood (e.g., helplessness, guilt, anxiety)?
9. Have you jeopardized or lost an important relationship, job, or educational or career opportunity because of your gaming activity?

Response options: Never (1), Rarely (2), Sometimes (3), Often (4), Very Often (5)

Appendix F

Risky Loot box Index:

1. The thrill of opening loot boxes has encouraged me to buy more.
2. I frequently play games longer than I intend to, so I can earn loot boxes.
3. I have put off other activities, work, or chores to be able to earn or buy more loot boxes.
4. Once I open a loot box, I often feel compelled to open another.
5. I have bought more loot boxes after failing to receive valuable items.

Response options: (1) strongly disagree to (5) strongly agree

Appendix G

Abbreviated Impulsivity Scale:

1. I am a careful thinker.
2. I plan trips well ahead of time.
3. I do things without thinking.
4. I concentrate easily.
5. I plan for job security.
6. I am “on impulse”.
7. I am self-controlled.
8. I say things without thinking.
9. I don’t “pay attention”.
10. I act on the spur of the moment.
11. I plan tasks carefully.
12. I am a steady thinker.
13. I am future oriented.

Response options: (1) Rarely/Never, (2) Occasionally, (3) Often, and (4) Almost Always/Always

Appendix H

Personality Research Form - Infrequency Scale

Read each statement and decide whether or not it describes you. If you agree with the statement or decide that it does describe you, answer TRUE. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE. Answer every item either true or false, even if you are not completely sure of your answer.

0 = False
1 = True

1. I have never bought anything in a store. _____
2. I could easily count from one to twenty-five. _____
3. I can run a mile in less than four minutes. _____
4. I have never talked to anyone by telephone. _____
5. I usually wear something warm when I go outside on a very cold day. _____
6. I make all my own clothes and shoes. _____
7. I have never brushed or cleaned my teeth. _____
8. Things with sugar in them usually taste sweet to me. _____
9. Sometimes I see cars near my home. _____
10. I have never had any hair on my head. _____
11. I have traveled away from my home town. _____
12. I have never ridden in an automobile. _____
13. I have never felt sad. _____
14. I try to get at least some sleep every night. _____
15. Sometimes I feel thirsty or hungry. _____
16. I have attended school at some time during my life. _____

Appendix I

Personality Research Form - Desirability Scale

Read each statement and decide whether or not it describes you. If you agree with the statement or decide that it does describe you, answer TRUE. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE. Answer the items either true or false, even if you are not completely sure of your answer.

0 = False

1 = True

1. I am quite able to make correct decisions on difficult questions. _____
2. I am never able to do things as well as I should. _____
3. My life is full of interesting activities. _____
4. I believe people tell lies any time it is to their advantage. _____
5. If someone gave me too much change, I would tell him (them) _____
6. I would be willing to do something a little unfair to get something that was important to me. _____
7. I get along with people at parties quite well. _____
8. I did many very bad things as a child. _____
9. I am glad I grew up the way I did. _____
10. I often question whether life is worthwhile. _____
11. I am always prepared to do what is expected of me. _____
12. My daily life includes many activities I dislike. _____
13. I am one of the lucky people who could talk with my parents about my problems. _____
14. Many things make me feel uneasy. _____
15. I am careful to plan for my distant goals. _____
16. I find it very difficult to concentrate. _____

Appendix J

Qualitative Motive Questions

1. Think about what motivates you to gamble and briefly list the top three reasons in rank order:
2. Think about what motivates you to NOT gamble (i.e., why you do not gamble) and briefly list the top three reasons in rank order:
3. Think about what motivates you to play games and briefly list the top three reasons in rank order:
4. Think about what motivates you to NOT game/play video games i.e., why you do not game) and briefly list the top three reasons in rank order:
5. Think about what motivates you to play games that have loot box content specifically (i.e., possible to win or purchase loot boxes) and briefly list the top three reasons in rank order:
6. Think about what motivates you to NOT play games that have loot box content specifically (i.e., possible to win or purchase loot boxes) and briefly list the top three reasons in rank order:

Appendix K

1.Have you experienced a lockdown, or other similar type of government-imposed restrictions, during the COVID-19 pandemic? ***Note: this refers to the measures set in place (e.g., physical distancing, travel bans, closed borders, lockdowns) to restrict human contact because of the Coronavirus (COVID-19) disease, which was upgraded to pandemic status on March 11th, 2020 by the World Health Organization (WHO).***

a. Yes
b. No

2. During the COVID-19 restrictions, how would you describe the frequency (i.e., different sessions) of your gaming activities (i.e., how often you play games?)

a. I have experienced an increase in time spent gaming during the COVID-19 restrictions.

b. I have experienced a decrease in time spent gaming during the COVID-19 restrictions.

c. The frequency of my gaming has not changed during the COVID-19 restrictions.

3.Have you started gaming for the first time during the COVID-19 restrictions?

a. Yes

b. No

4. During the COVID-19 restrictions, how would you describe the frequency (i.e., different sessions) of your gaming activities (i.e., how often you play games?), specifically with games that have loot boxes?

a. I have experienced an increase in time spent gaming during the COVID-19 restrictions.

b. I have experienced a decrease in time spent gaming during the COVID-19 restrictions.

c. The frequency of my gaming has not changed during the COVID-19 restrictions.

5. Have you started gaming, specifically games with loot boxes, for the first time during the COVID-19 restrictions?

a. Yes

b. No

6. During the COVID-19 restrictions, how would you describe the frequency (i.e., different sessions) of your gambling activities (i.e., how often you play gamble?)

a. I have experienced an increase in time spent gambling during the COVID-19 restrictions.

b. I have experienced a decrease in time spent gambling during the COVID-19 restrictions.

c. The frequency of my gambling has not changed during the COVID-19 restrictions.

7.Have you started gambling for the first time during the COVID-19 restrictions?

a. Yes

b. No

Appendix L

(Insert Lakehead University recruitment poster here).

Appendix M

(Insert community recruitment poster here).

Appendix N

Information/Cover Letter

Dear Potential Participant,

Thank you for your interest in the "Gambling, Gaming, and Loot box" study. The main purpose of this study is to assess participants' gambling, gaming, and loot box habits and how they relate to other psychological factors with the use of relevant online questionnaires. Participants maintain the right to decline to answer any question or questions. It is anticipated that this session is not expected to last longer than 1 hour. If you have any questions about this study, please ask one of the research team members.

There are no known physical risks associated with participating in the current study. However, some of the material in the surveys ask questions on sensitive subject matter that might result in some minor psychological discomfort for some people. If this occurs, we ask that you please contact Student Health and Wellness at Lakehead University. If you are at the Thunder Bay campus, please contact 1-807-343-8361, and if you are at the Orillia campus, please contact 1-705-330-4008 ext. 2116. For the Thunder Bay Crisis Response Service, through the Canadian Mental Health Association, you may also contact 1-807-346-8282. You may also contact the Ontario Mental Health Helpline at 1-866-531-2600.

Your anonymity and confidentiality will be maintained throughout this study and the faculty research investigator (Dr. Mazmanian) will not know which students have participated in this study. All data will be coded with a number and no identifying information will be associated with responses or research results. For publication purposes, all data and forms obtained will be securely stored at Lakehead University for five years. Your participation in this research is completely voluntary, and should you choose not to participate, you may do so without consequence or the need for justification. Similarly, you may also discontinue your participation at any time without explanation or penalty. Once you submit your data it cannot be withdrawn due to its anonymity. The data obtained in this research will be used for the MA Master's thesis of the student investigator, Erika Puiras, and the findings will also be used for research publications and/or presentations at scholarly conferences. Your identity will remain confidential throughout these processes as well. Please note, however, that the online survey tool used in the study (SurveyMonkey.com) is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this we cannot absolutely guarantee the full confidentiality and anonymity of your data. With your consent to participate in this study, you acknowledge this.

As a token of our gratitude for participating in this research, you may elect to be entered into a draw to win one of two $25 (CAD) Starbucks's gift cards or you may elect to receive one bonus mark towards an eligible Lakehead University course. If you elect to be entered into the draw to win the Starbucks's gift card, you will be asked for your email address in order to be informed should you win. If you elect to receive the bonus mark, your instructor must allow the acquisition of bonus marks to receive one from this study. A summary of the research findings may also be available to you once the study is completed. Please note, however, that it might take up to 1 year from the time of your participation before the study is completed and the findings are available. If you wish to receive a summary of the findings, please provide your email address to the researcher at the end of the study session.

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 1-807-343-8283 or research@lakeheadu.ca.

Thank you for your interest and participation. It is greatly appreciated and will make a difference!

Do you consent to participate in this study?

Yes/No

Appendix O

Debriefing Form
(Please print this page for your information)

Thank you for your participation in this research project on student gambling, gaming, and loot box habits. We hope that this study will help provide information associated with gambling and loot box engagement, as well as the motives associated with participating in such activities. Problematic loot box engagement has been associated with problematic beliefs around chance and luck, as well as problem gambling. Information regarding the relationship between gambling, gaming, and loot boxes, as well as the motives to engage or refrain from engaging in these activities, can help inform service providers and is valuable information for the development of services for those with gambling or gaming problems.

Information about study results

A summary of the results can be made available to you by email once the study has been completed. If you are interested in receiving these research results, please email the researcher at [eppuiras@lakeheadu.ca] with the subject heading "Results Summary Request". We will email you a copy of the Results Summary once it is made publicly available.

Bonus Mark or Starbuck's Gift Card Draw

As a token of our gratitude for participating in this research, you may elect to be entered into a draw to win one of five $10 (CAD) iTunes gift cards, or you may elect to receive one bonus mark towards an eligible Lakehead University course. If you elect to be entered into the draw to win the iTunes gift card, you will be asked for your email address in order to be informed should you win. Your instructor must allow the acquisition of bonus marks to receive one from this study. Click here to provide your email address. If you do not wish to enter the draw you can simply click the "DONE" button after you have reviewed this page.

If you have specific questions about the survey you may contact the Student Investigator, Erika Puiras, [eppuiras@lakeheadu.ca] or the Principle Investigator, Dwight Mazmanian, Ph.D., C.Psych, [dmazmani@lakeheadu.ca, 807-343-8257].

If completing this survey has raised any issues about mental health concerns that you would like to discuss, you may contact Student Health and Wellness at Lakehead University. If you are at the Thunder Bay campus, please contact 1-807-343-8361, and if you are at the Orillia campus, please contact 1-705-330-4008 ext. 2116. For the Thunder Bay Crisis Response Service, you may also contact 1-807-346-8282, or for the Ontario Mental Health Helpline, please contact 1-866-531-2600.

With sincere thanks, The Health, Hormones & Behaviour Lab

iTunes Gift Card Draw:

If you would like to be entered into the draw for a Starbucks gift card, please include your email below in order to be informed should you win.

Email:

Thank you for participating in this study!