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Transformation of Sports Betting into a Rapid and Continuous Gambling Activity: a Grounded Theoretical Investigation of Problem Sports Betting in Online Settings

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Abstract

There is an increasing trend for online sports betting to be identified in gambling treatment services as the principal gambling activity that leads to harmful consequences. The structure of sports betting in online settings has changed extensively in the last 5 years in response to developing information technology, and these changes appear to have increased the inherent risk associated with online sports betting. There is a current need to understand disordered patterns of sports betting in online settings, in order to commence the development of strategies to identify and, where possible, mitigate harm. Therefore, a systematic grounded theory study was conducted, utilising behavioural data and in-depth interviews with a sample of 19 online sports bettors who met the criteria for problem gambling, to produce a substantive outline of the salient sources of harmful participation in modern online sports betting. The core category to emerge was an *Online Sports Betting Loop* that was facilitated by new structural features of modern online sports betting such as live betting, cash out, micro-event betting and instant depositing. In addition, participants indicated that the immediate accessibility and the ubiquity of online sports betting marketing made it challenging to control sports betting involvement. The emergent findings demonstrate that attention must be directed towards creating mechanisms to reduce patterns of continuous online sports betting by increasing breaks in play in the structure of the activity and enabling customers to restrict usage of features that are associated with disordered play, such as live betting.

Keywords Gambling disorder · Sports betting · Remote gambling · Grounded theory

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Background

Developments in information technology have enabled the gambling industry to expand its commercial offerings significantly with respect to sports betting (Gainsbury 2012; Hing et al. 2016b). It is estimated that online sports betting accounts for approximately 30–50% of all online gambling transactions (European Gaming and Betting Association 2016), and this figure is expected to continue to increase over time (Gainsbury 2014; Lopez-Gonzalez et al. 2018; Rodríguez et al. 2017). Given the proliferation of online sports betting markets and consumption, it is unsurprising to observe online sports betting being increasingly reported as the principal gambling activity causing harm in populations of treatment-seeking problem gamblers (Blaszczynski and Hunt 2011; Hing et al. 2014a, 2018b).

Although historically, sports betting has not been recognised as a particularly risky form of gambling (Lopez-Gonzalez et al. 2017), many researchers have argued that the development and expansion of the structural features of online sports betting are leading to an increased risk for gambling-related harm (Hing et al. 2016a, b; Hing et al. 2014b). More specifically, instant accessibility and the transformation of online sports betting towards a more continuous gambling format have been identified as factors that are likely to increase disordered gambling behaviour (Hing et al. 2014b; Killick and Griffiths 2018; Lopez-Gonzalez et al. 2017, 2018; Lopez-Gonzalez and Griffiths 2018).

Recent research has observed that online sports bettors who have a higher severity of gambling problems tend to place a higher proportion of their bets using mobile phone technology (Lopez-Gonzalez et al. 2018; Lopez-Gonzalez and Griffiths 2018). Existing literature indicated that sports betting conducted online could increasingly be categorised as being impulsive in nature compared to in-venue betting (Hing et al. 2018a, b). This is in sharp contrast with recommendations for responsible gambling, which is principally making informed betting choices and keeping betting within predetermined, affordable time and spending limits (Hing et al. 2016a). Recent research from Australia has indicated that between one third and one half of all bets placed online were considered by participants to be impulse bets rather than carefully evaluated betting selections (Hing et al. 2015, 2018a, b), and it is widely acknowledged that impulsive betting is predictive of gambling problems (Hing et al. 2015, 2016b).

It has been hypothesised that it is the structural transformation of online sports betting in recent years, alongside the changing situational factors in online gambling, is facilitating the high proportion of impulsive bets observed online (Hing et al. 2018a, b). For example, Lopez-Gonzalez and Griffiths (2016) proposed that it is the use of electronic currency, instant and pervasive accessibility and the substantial increase in gambling marketing that is facilitating impulsive online sports betting. Perhaps the most prominent transformation of sports betting in relation to modern information technology is the provision of instant access to live betting markets and the capacity in live betting markets to *cash out* before the cessation of the sporting event (Lopez-Gonzalez et al. 2018, 2017). Early research has clearly demonstrated that more severe problem gamblers regularly make a higher proportion of live bets in contrast to ante-post betting (LaBrie et al. 2007), and these findings have been replicated in more recent studies (Hing et al. 2018a, b; Lopez-Gonzalez et al. 2018). It is argued that problem gamblers will be more attracted to live betting than recreational gamblers because of the quicker *betting cycle*, i.e. betting outcomes being determined in a shorter time-frame and therefore providing more rapid reinforcement (Auer and Griffiths 2016; Lamont et al. 2016).

In terms of situational factors, there has also been a substantial increase in the proliferation of marketing and advertising for online sports betting which is also likely to contribute to the higher proportion of impulsive sports bets made online (Hing et al. 2017; Sproston et al. 2015). The information conveyed in such promotional material emphasises the ease of access and value for money of online sports betting (Hing et al. 2015; Sproston et al. 2015); and its propagation has led to online sports betting to be normalised and perceived as an everyday behaviour, especially among young adults (Deans et al. 2016; Gordon et al. 2015). Promotional sports betting material and inducements delivered via direct marketing such as email and SMS are believed to precipitate impulsive sports betting online (Hing et al. 2017). In terms of indirect marketing, Lamont et al. (2016) observed that participants would be more likely to make impulsive bets in response to live odds being presented on sporting broadcasts, and moreover, the effect was stronger in participants with higher severity of problem gambling.

In addition, problem gambling has repeatedly been demonstrated to be strongly associated with activities with high event frequency, and with modern online sports betting features, gamblers now have the opportunity to place a larger number of bets on a single event (Auer and Griffiths 2013; Hing et al. 2017). The increased capacity to bet rapidly and continuously in modern online sports betting has been proposed as a potential risk factor for disordered gambling. The lack of environmental distractions in online betting in comparison to in-venue betting may lead to an increased level of immersion experienced in the activity, which in turn is likely to increase dissociation levels, culminating in less cognitive control when gambling (Hing et al. 2018a, b). Furthermore, in relation to the asocial and private nature of online sports betting, there is an increased risk of players not recognising the development or problematic patterns of online sports betting and persisting until a crisis point is reached, in comparison to in-venue gambling (Estevez et al. 2017; Gainsbury et al. 2013; Petry 2006).

The normalisation and embedding of online sports betting into an everyday activity through promotional marketing, and the structural changes of the activity that appear to facilitate risky patterns of gambling behaviour, emphasises the need to understand the mechanisms of online sports betting behaviour in detail (Hing et al. 2016a, b). More specifically, Hing and colleagues (Hing et al. 2018a, b) advocated that the specific behavioural patterns of recreational and problematic gamblers in online sports betting should be contrasted to identify behavioural patterns which could be considered particularly disordered, such as betting sessions with excessive durations continuing late into the night.

Research Aims

It is evident that there is a need to begin development of interventions to assist with moderating and mediating the negative consequences that can arise from excessive and pathological engagement with this form of gambling (Estevez et al. 2017; Killick and Griffiths 2018). Although there are several research articles identifying a relationship between developments in the structural and situational characteristics of online sports betting, the research is largely dependent on self-report survey and qualitative data. A review of the aforementioned literature base indicates that there is insufficient theoretical understanding of the causal and maintenance factors in problem online sports betting (Hing et al. 2016a, b), and therefore, it is not currently possible to propose potential interventions to commence trialling for effectiveness (Parke et al. 2016). In fact, because of inconsistencies in the assessment of online sports betting behaviour, in terms of how the behaviour is classified across different studies in the international

prevalence literature, it is not possible to outline even simplistic trends in online sports betting behavioural patterns (Lopez-Gonzalez et al. 2017; Hing et al. 2018a, b). Therefore, it is prudent to stimulate the generation of substantive theory related to the problem online sports betting and identify key variables and indeed theoretical relationships in order to inform attempts to address gambling-related harm in this realm. In particular, although multiple articles make strong arguments about the elevated risk for problem gambling in modern online sports betting, these arguments have yet to be substantiated through ecologically valid behavioural studies. The current study aims to identify processes and patterns of gambling behaviour related to multiple forms of harm in a cohort of online sports betting problem gamblers, by analysing objectively recorded behavioural data over a continuous 3-month period.

A systematic grounded theory methodology, using principles developed by Corbin and Strauss (2008), would provide a systematic approach to developing theoretical propositions about problematic patterns of online sports betting, by iterative engagement with and grounding in the data. The new theory is produced via systematically breaking down the data and identifying and subsequently explaining the observed underlying behavioural processes (Willig 2008). Data are analysed without a pre-existing framework and this provides flexibility for the researchers to explore concepts that are both unanticipated and determined to be relevant (Strauss and Corbin 1998). Fundamentally, the grounded theory approach will provide a set of well-developed concepts and their relationships that constitute and explain the phenomenon under investigation (Strauss and Corbin 1998).

Disordered patterns of online sports betting behaviour are likely to be complex and multifaceted; therefore, a grounded theoretical approach will be effective in generating inductive theory. Grounded theory approaches have previously been successfully utilised to explore problem gambling behaviour when the online gambling industry was in an early stage of development (McCormack and Griffiths 2012; Parke and Griffiths 2011). Given the vast structural and situational developments in modern online sports betting, it is prudent to conduct further grounded theoretical analysis in order to inform future research designs in this domain to be reflective of current patterns. In turn, the theoretical propositions generated through systematic analysis will be made available for falsification in future empirical studies. In simple terms, this research aims to identify and explain key behavioural processes related to patterns of problematic online sports betting and will provide recommendations for mitigating and moderating gambling-related harm associated with this gambling format.

Methodology

Participants and Research Site

The initial stage of any grounded theory is to identify a problem in general terms and select a site where it can be studied (Dey 1999). Therefore, the research site selected was Unibet plc, a leading online gambling operator that had a large British customer base who participated in online sports betting. An online survey, which identified demographics, gambling preferences and problem gambling status, was distributed to all British-based customers with an active account with this provider. Out of the 33,000 online surveys distributed, 655 customers responded to the survey, and of these 134 were recorded as being problem gamblers, and 101 participants agreed to participate in the study. For the current study, only the participants

who were primarily involved in online sports betting, rather than online casino games, poker or bingo, were observed in order to isolate theoretical relationship specific to the domain of online sports betting. In total, behavioural data was collected for 19 problem online sports bettors, and of those participants, five agreed to provide qualitative data from a semi-structured interview (see Table 1).

Behavioural and Qualitative Data Collection

The behavioural data of the identified problem online sports bettors were requested from the online gambling operator who agreed to be industry partners with the research team. Potential problem gambler participants were screened using the Problem Gambling Severity Index (Ferris and Wynne 2001). These data included specifically the following: detailed records of sports betting transactions, organised consecutively, for each participant between September and November 2015, records of daily total and net expenditure, transcripts of written communication between the participants and the operator and finally data relating to the participant's use of responsible gambling tools, such as limit-setting tools for time and monetary expenditure.

Each of the participants who provided consent for their behavioural data was invited to participate in the qualitative component of the study, and five individuals were interviewed in depth. The objective of the qualitative component was to develop and refine the theoretical propositions that emerged from analysis of the behavioural data, by adding phenomenological data that provided an *insider's perspective* regarding the emergent behavioural relationships. The emergent theoretical propositions from the quantitative data were presented to the interviewees who were asked to evaluate their validity and discuss the cognitive processes involved and assist the research team with understanding the motivation for the patterns of persistent online sports betting. Given the multiple epistemological and practical advantages of

Table 1 Participant demographics, gambling severity level and data provision

Participant	Sex	Age	PGSI score	Behavioural data	Interview data	Number of online gambling accounts
1	Male	30	25	✓	✓	Two
2	Female	45	17	✓		One
3	Male	34	26	✓		Three
4	Male	25	11	✓		Two
5	Male	27	8	✓		One
6	Male	32	10	✓		Two
7	Male	23	21	✓		Three
8	Male	34	9	✓		One
9	Male	40	21	✓		Two
10	Male	34	20	✓	✓	Six
11	Male	36	15	✓		Three
12	Male	22	14	✓		Three
13	Male	35	15	✓		Two
14	Male	27	23	✓		One
15	Male	51	8	✓		One
16	Male	49	23	✓	✓	Four
17	Male	51	12	✓	✓	Four
18	Male	28	12	✓	✓	Six
19	Male	34	13	✓		Three

conducting the interviews online in contrast to face to face interviews (Opdenakker 2002; Shapka et al. 2016), such as providing more scope for reflection and answer construction (Adler and Zarchin 2002), the interviews were conducted via email exchange over several weeks. The use of online interviews has been successfully employed in previous research investigating the development of gambling disorder in a sample of current problem gamblers, with the authors noting the advantage of online interviews in allowing interviewees adequate time to consider their responses before responding (Wood and Griffiths 2007).

Data Analysis

Initially, a very open approach to the data was undertaken to enable the detection of as many codes as possible (Glaser 1992), and focus was placed on identifying categories that captured uniformity in the data, i.e. salient patterns (Dey 1999). In practical terms, open coding involved the researchers analysing the behavioural data line by line for each participant, enabling the researcher to follow the sequential pattern of online sports betting as it occurred. The amount of behaviour observed within each participant was variable and inconsistent, with some gambling several times per day and others gambling in infrequent but concentrated *binges*. Axial coding was conducted during the second phase of analysis, which illuminated categories of behaviour and their lower order relationships (Cruickshank et al. 2014). Axial coding required *constant comparison*, an analytical technique where the researcher directly and recursively compares similar behavioural processes in different contextual conditions. In simple terms, the research team began to propose behavioural relationships by observing and comparing how different units of behaviour related to each other and how the relationship varied across different contextual settings. The emergent behavioural processes were developed and refined by integrating the phenomenological data from the online interviews. Effectively, by enabling participants during the interview stage to evaluate the *reasonableness* of the theoretical propositions and, where appropriate, add context and elaborate further, it is possible to confirm theoretical saturation (Marks et al. 2016).

Theoretical Findings

Core Category: 'Online Sports Betting Loop' Facilitated by Structural Features

Emergent from the grounded theory analysis was the core category *Online Sports Betting Loop* that emphasised the role of technological features that appear to support and motivate the continuation of sports betting sessions in online settings (see Fig. 1). The problem gamblers observed and interviewed consistently identified the role of multiple online structural characteristics in their persistent online sports betting, particularly when they were chasing losses incurred earlier in the gambling session. Participants proposed that it was the structural features of the online sports betting environment that enabled such intensive and extensive sports betting behaviour and therefore indicated that online sports betting carries more inherent risks of gambling-related harm than in-venue sports betting.

A consistent behavioural process emergent in the data was for online sports betting sessions to continue until all account funds had been exhausted, and even then, participants were often observed to repeatedly deposit further funds into their account to chase their initial losses. Because of technological advances in online payment systems, participants could deposit further gambling funds into their account within a few seconds and therefore limit any

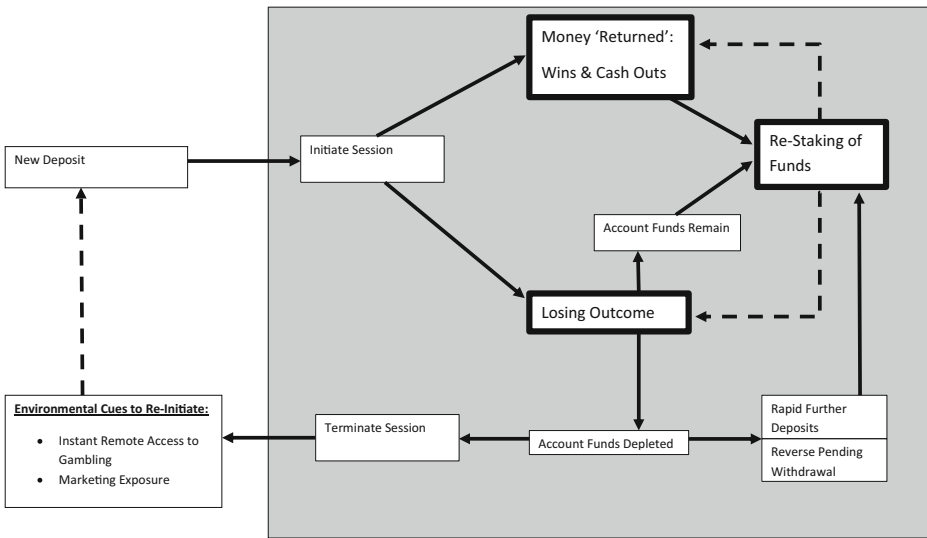


Fig. 1 Core Category ‘Online Sports Betting Loop Facilitated by New Structural Features’

potential break in play. As indicated in Fig. 1, the problem gamblers in the sample would regularly engage in a gambling ‘loop’ and rarely cease gambling if they had funds remaining. Even in the handful of occasions where a participant would leave some funds in their gambling account and log out, they would often return and continue betting further within a relatively short period of time (i.e. several hours later). In addition to making repeated, rapid deposits into their account when funds were spent, participants were also struggling to resist cues in the general environment that motivated them to re-engage in online sports betting.

Unlimited Betting Opportunities

The vastly expanded sports betting markets that are available in modern online sports betting was consistently identified by the problem gamblers as an important factor in extending the length of gambling sessions. This specific structural feature was considered to be particularly relevant when participants were motivated to continue sessions started earlier in the evening and chase mounting losses further into the night. The significance of the vast array of sporting markets available online relates to the restrictive nature of betting solely on British-based or mainland Europe-based sporting events, in terms of their availability and timing. Online gambling has always been devoid of the restrictive opening hours in most forms of commercial gambling in Britain. However, previously, with respect to online sports betting in Britain, the lack of a closing time had less significance on gambling behaviour because often, there would be minimal sports betting opportunities available during unsociable hours. Aside from high-profile international sports such as North American professional leagues such as the NFL and NBA, traditionally, there has been limited opportunity to continue sports betting during late-night gambling sessions for British online sports gamblers. Currently, at any time of the day, there are a multitude of sporting events starting every few minutes to continue one’s sports betting session online. International sporting markets available also include amateur and semi-professional events, such as under-17 soccer games, and the inclusion of these lower profile events substantially increases the available opportunities to gamble.

For example, a British-based customer, participant 11 at 11 pm placed a bet on who would win the first point in a Brazilian volleyball game, followed by betting on the total first half goals market in an under-21 Australian soccer game. The online operator often compensated for the lack of familiarity of international and low-profile sporting events by providing customers with statistical information to help inform betting selections and frequently provide live streaming of the event to retain the customer sports betting experience that one finds regularly available with higher profile sporting events.

Whereas previously, British-based sports bettors were restricted to the British and European sporting calendar or international ante-post markets, modern online sports betting operators offer the customer a wide variety of sports betting opportunities late at night and in the early morning. The data has clearly demonstrated that when problem gamblers were motivated to chase recent gambling losses, they would frequently continue sports betting on unfamiliar and low-profile sporting events, indicating that this was not a predetermined strategy.

As indicated by participant 1, in modern online sports betting, there is motivation to persist gambling during a losing session because there are constant opportunities to quickly make further sports bets and chase losses. For example,

I've never really touched casino or games but I have in the past gambled on sports that I haven't got a huge knowledge on such as ice hockey or baseball, often chasing odds to win back losses. Participant 1, Male, 30.

Fundamentally, the cyclical online sports betting loop consistently observed in the grounded theory is facilitated by the vast offering of sporting markets available to customers who are motivated to persist gambling and extend the duration of their session after having accumulated significant losses.

Live Betting

The introduction of live betting options further increased the opportunity for problem gamblers, motivated to chase losses, to persist and extend online sports betting sessions (Table 2). Live betting, often referred to as *in-play* or *in-running betting*, is the act of placing a bet after a

Table 2 Behavioural data extract of the rapid re-staking of account funds and use of live betting and cash out structural characteristics (participant 4, 5 November 2015)

Time	Sports betting action	Amount	Subsequent account balance
22:03:24	Winnings fund paid	£16.90	£28.01
22:07:12	Live bet placed	£10	£18.01
22:09:46	Live bet cashed out	£10.97	£28.98
22:12:27	Live bet placed	£10	£18.98
22:13:33	Live bet placed	£10	£8.98
22:14:42	Live bet placed	£8.98	£0
22:18:20	Winnings fund paid	£17.70	£17.70
22:21:09	Live bet cashed out	£5.40	£23.10
22:21:45	Live bet placed	£10	£13.10
22:27:48	Winnings fund paid	£23.50	£36.60
22:35:20	Winnings fund paid	£18.90	£55.50
22:38:18	Winnings fund paid	£50	£105.50
22:38:18	Winnings fund paid	£15.40	£120.90
22:39:24	Live bet placed	£10	£110.90

sporting event has commenced. Effectively, this means that online sports bettors are no longer limited and restricted to betting on events that will commence in the future, and customers can now rapidly re-engage by placing a bet in an ongoing sporting event. The problem gamblers within this study would frequently place multiple live bets simultaneously, and when a bet provided winning returns, funds were rapidly re-staked on further live bets. This increase in ability to quickly re-stake winnings or continue betting in response to gambling losses by the perennial availability of live betting options meant that there is less requirement for breaks in play during modern online sports betting sessions.

Previously, before live betting, a customer may have been forced to pause during a gambling session as they wait for a new event to commence. Breaks in play can provide an important opportunity for problem gamblers to evaluate gambling behaviour in combination with a reduction in the arousal and emotional responses stimulated by the preceding sports betting outcomes.

Micro-Event Betting

Micro-event betting relates to the deconstruction of sporting events into smaller, stand-alone units that customers can bet on rather than on the full event. For example, rather than betting on the outcome of a basketball match, it is also possible to bet on the winner of a specific quarter of the basketball match. Micro-event betting increases the betting opportunities and therefore the flexibility available to online gambling customers, because similar to live betting, the customer is no longer restricted to betting on events before they commence. Furthermore, the deconstruction of sporting events into several individual units often has the impact of reducing the duration of bet. Put simply, if a customer wants to bet on tennis, they can receive feedback on whether they win or lose much more rapidly if they bet on who will win the next point, game or set, in contrast to betting on the outcome of the full match.

The data revealed that the implication of betting on micro-events for problem gamblers is that it facilitated higher event frequency and shorter event duration in sports betting and that the rapidity of feedback on gambling outcomes enabled participants to either immediately re-stake winnings or commence loss-chasing. The availability of micro-event betting may have benefits in terms of customer experience, as it provides more flexibility; however, it is evident from the data that it can be used to increase the speed and event frequency of sports betting and ultimately facilitate extensive and intensive online sports betting sessions for problem gamblers. Table 3 is a truncated extract of micro-event betting from a larger 168-min online sports betting session and provides a brief illustration of the intensity possible in online sports betting sessions in terms of speed of play and outcome feedback and the amount of transactions that can occur within a relatively short time period. In the extract presented in Table 3, the mean time between bet placement and the returning of funds into one's account was 149.9 s for each bet. Moreover, participant 11 placed 22 different bets in 168 min, culminating in 51 account transactions within that time period. The opportunity to bet on micro-events has facilitated problem gamblers in this sample to engage in rapid, intensive online sports betting sessions, which is in contrast to traditional forms of retail sports betting such as on- and off-course betting.

Cash Out

In many instances, modern online sports betting operators permit customers to 'cash out' bets on sporting events that have not finished. Cashing out effectively terminates the original bet

Table 3 Behavioural data demonstrating the rapidity of transactions in micro-event sports betting (participant 11, male, October 9 2015)

Time	Event	Bet type	Amount (GBP)	Time of payout (inc cash out)
00:15:48	ITF Women's Tennis Singles Match:	Pegula to win next game	£5.30	00:18:23
00:17:37	Lao vs Pegula	Pegula to win next set	£15	00:18:39
00:23:33		Pegula to win next game	£15	00:27:54
00:25:23		Lao to win next game	£22	00:26:31
00:28:50		Lao to win next set	£18	00:32:32
00:29:40		Lao to win next game	£25	00:32:04
00:35:35		Pegula to win next game	£35	00:37:29
00:41:29		Pegula to win next point	£20	00:43:04
00:44:11		Pegula to win next game	£30	00:47:59

and the customer is returned to their account, a mutually agreed monetary sum that reflects the probability of the original bet winning based upon the current status of the sporting event. The amount cashed out during the event may be more or less than the original amount staked and therefore could be interpreted to be a win or a loss on this basis.

With respect to the online sports betting loop that consistently emerged within the data, cash out becomes relevant as a mechanism for extending an online sports betting session. If a customer has placed a bet and used all their available funds from their online account and wishes to continue to gamble and place further bets, in many instances, they will have the potential to cash out and therefore make funds available within their account that can be re-staked on different bets. With respect to the duration of a sports betting session and facilitating the continuation of the sports betting loop process, cashing out becomes particularly important when the original bet appears to be unlikely to win. If a customer's account funds are depleted, and they were without the option to cash out a probable losing bet and retain at least a proportion of the original amount staked, the sports betting session would be shorter than if money could be retrieved and re-staked elsewhere via cashing out.

In Table 4, participant 5 is observed repeatedly using the cash out function to cancel bets that appear likely to lose and retrieve a proportion of the money that was originally staked. In this example, participant 5, on each occasion, was losing a large percentage of original stake when cashing out. Furthermore, as observed consistently across the cohort data, money retrieved via the cash out function was re-staked rapidly. Within the extracted behavioural data illustrated in Table 4, the mean length of time between the cashed out funds returning to the participant's account and the placement of further bets was 196.5 s.

Instant Depositing

The process of the Online Sports Betting Loop that emerged from the data, reflecting the continuous and persistent approach to sports betting observed, was also readily facilitated by the speed of which customers could replenish their depleted accounts through instantaneous depositing mechanisms online. The speed at which customers can deposit further funds to continue sports betting online when their account was empty meant that there are minimal

Table 4 Behavioural extract demonstrating the use of cash out facility to enable further bet placement (participant 5, 14 October 2015)

Time	Action	Amount (GBP)	Account balance
07:38:35	Live bet placement	£200.00	£0.59
07:52:07	Cash out	£93.68	£94.27
07:54:52	Live bet placement	£94.27	£0.00
08:40:26	Cash put	£46.73	£46.73
08:40:56	Live bet placement	£46.73	£0.00
08:49:08	Cash out	£35.78	£35.78
08:49:33	Live bet placement	£35.78	£0.00
09:57:12	Monetary deposit	£50.00	£50.00
10:00:15	Live bet placement	£50.00	£0.00
10:31:52	Cash out	£7.09	£7.09
10:39:38	Cash out	£40.49	£47.58
10:43:32	Live bet placement	£47.00	£0.58
11:44:25	Payment of winnings	£56.40	£56.98
12:00:02	Live bet placement	£56.98	£0.00
12:12:04	Payment of winnings	£56.98	£56.98
12:20:06	Live bet placement	£56.98	£0.00
13:11:18	Payment of winnings	£82.62	£82.62
13:27:32	Live bet placement	£82.62	£0.00
14:33:19	Payment of winnings	£112.36	£112.36
14:39:45	Live bet placement	£112.36	£0.00
14:53:16	Cash out	£55.02	£55.02
14:56:38	Live bet placement	£55.00	£0.02
16:17:07	Cash out	£37.67	£37.69
16:25:50	Live bet placement	£37.69	£0.00

enforced breaks in play and that decisions to deposit further funds and to persist gambling were made with alacrity. Participant 18 proposed that the rapidity in which a customer can make gambling decisions can impede the quality of their evaluations, particularly when they are making decisions in a state of arousal and negative valence in response to recent negative gambling outcomes.

[Online Gambling] allows players to make a lot of decisions in a very short space of time before they have had a chance to consider just how potentially damaging these decisions are, when things are going badly there is a strong temptation to ignore the negative sides in the hope that if you quickly bet big and add more in you'll end up make in profit and not have to deal with those negative feelings or ideas... This only ever lasts during the moment, afterwards you do realise how irrational you were, even in the case of you actually winning back the losses there can be a sense of guilt or self-awareness at the ridiculousness of the situation you have let yourself get into. Participant 18, male, 28

In addition to the ability to deposit funds almost immediately after one's online gambling account is empty, the continuation and extension of the Online Sports Betting Loop was also facilitated by the capacity to cancel and reverse monetary withdrawals that had recently been made. In other words, after losing all remaining gambling funds in one's account, it is possible to reactively supersede previous monetary decisions to transfer a proportion of winnings to one's bank account and instead make these funds immediately available to re-stake on further bets. As illustrated by participant 90 below, there is scope for customers to make emotionally driven monetary decisions that they have not fully evaluated.

I would remove the cancel withdrawal features as they are basically tempting people to lose their winnings and continue gambling... The longer the withdrawal time was the more tempting it was to use the money again as it seemed less real. Participant 18, male, 28

Furthermore, Table 5 provides a representative example of typical use of the reverse withdrawal function by this cohort of problem gamblers during an online sports betting session. Reverse withdrawals, as a form of instant depositing, reduced scope for a break in play that may assist sober evaluation of one's gambling behaviour. It was repeatedly observed that the participants would be making a large number of transactions within a relatively short space of time in terms of bet placement, cash out, withdrawals, further deposits and reversing previous withdrawals. This high level of sports gambling intensity online from problem gamblers would be much harder to replicate, in terms of speed of transaction and flexibility, in retail sports betting environments.

Environmental Cues to Reinitiate Online Sports Betting

In addition to the structural features of online gambling appearing to facilitate a continuous loop of sports betting until the participant is either fatigued or has depleted their available resources, there are also situational features related to online gambling in the general environment that motivate re-engagement. It was very common for the problem gamblers observed in this study to engage in multiple, significant online sports betting sessions per day, even when there had been a significant interval between sessions (i.e. several hours of break in play). One of the most prominent environmental factors that appeared to trigger a return to gambling is the awareness of the constant availability of online gambling via information technology.

Table 5 Behavioural demonstration of rapid monetary transactions including utilisation of reverse withdrawals feature to facilitate sports betting session continuation (participant 2, 13 November 2015)

Time	Action	Amount (GBP)	Account balance
00:35:58	Monetary withdrawal	£230	£30
00:37:57	Live bet placement	£20	£10
00:39:00	Live bet placement	£10	£0
00:53:29	Reverse withdrawal	£230	£230
00:54:01	Monetary withdrawal	£200	£30
00:55:44	Live bet placement	£15	£15
00:57:16	Live bet placement	£15	£0
01:00:52	Cash out	£8.57	£8.57
01:02:13	Live bet placement	£8.57	£0
01:12:41	Reverse withdrawal	£200	£200
01:13:06	Monetary withdrawal	£170	£30
01:15:09	Live bet placement	£10	£20
01:17:05	Live bet placement	£20	£0
01:21:57	Payment of winnings	£36	£36
01:26:09	Casino bet placement	£16	£20
01:27:15	Casino bet placement	£10	£10
01:32:19	Live bet placement	£10	£0
01:42:59	Reverse withdrawal	£170	£170
01:43:25	Monetary withdrawal	£150	£20
01:44:02	Live bet placement	£20	£0
01:57:01	Reverse withdrawal	£150	£150
02:00:12	Live bet placement	£30	£120

It's not easy and the temptation is there, for example yesterday I lost again and I want to go back and chase my losses and win more... I don't think I can now avoid [gambling] since it is easily accessible, unless I am move to locations where there is no internet.
Participant 10, male, 34

From the data, it is evident that the constant temptation of being able to instantly re-engage in online sports betting is particularly difficult to manage after experiencing significant losses, with the participant therefore motivated to chase those losses. This challenge of maintaining self-control from re-engaging in online gambling has been identified by the participants as being particularly difficult when they are exposed to online gambling marketing. Participants pointed to the salience of online gambling advertising in various media as cues which stimulated an urge to initiate another gambling session (Table 6).

I blame all this advertng on TV that's the trigger for a lot of people. Put [subscription sports channel] on and watch it for a few hours and you will see a betting operator advertising a new type of offer every 7 minutes. They are ruthless, advertising betting online or in shop has to be banned full stop. Participant 17, male, 51

Discussion

Problem Gambling and Modern Online Sports Betting

The increase in online sports betting consumption, and the increase of online sports betting being identified as a causal factor in problem gambling treatment facilities, appears more comprehensible after analysing the behavioural patterns in this cohort of the problem online sports gamblers. Previous research has suggested that the ease of access of online sports betting and the proliferation of online sports gambling marketing were likely to increase the risk of gambling-related harm in this format (Hing et al. 2017; Killick and Griffiths 2018). Furthermore, several researchers also proposed that the increase in potential event frequency available within modern online gambling was also likely to be a risk factor for increased

Table 6 Summary table of grounded theoretical propositions within the core category of *Online Sports Betting Loop*

Unlimited betting opportunities	Vast offering of sporting markets to customers who are motivated to persist and chase losses facilitates extended betting session duration
Live betting	Perennially available opportunities to continue gambling via live betting markets reduces the amount of enforced breaks in play which facilitates persistent gambling and extended betting session duration
Micro-event betting	The opportunity to bet on micro-events has facilitated rapid, intensive online sports betting sessions in contrast to in-venue betting
Cash out	Cashing out allows customers to recycle funds and place further bets. It also allows customers to cut their losses and retain a proportion of their original stake, and this is often subsequently quickly re-staked on further bets.
Instant depositing	The speed at which customers can replenish their betting account when funds are depleted, reduces scope for breaks in play which facilitates more impulsive betting behaviour.
Environmental cues to reinstate online sports betting	The constant availability of online betting via information technology and repeated exposure to gambling marketing make it difficult to establish self-control when motivated to chase losses.

gambling-related harm, as it created the potential for online sports betting to become a continuous gambling format (Hing et al. 2014b; Lopez-Gonzalez et al. 2017). Not only did the current study support these propositions through behavioural and qualitative data, but it also provided a mechanistic framework that demonstrates how the aforementioned contextual and structural factors interact and produced combined behavioural effects. Essentially, the new contextual and structural risk factors for harm appeared to combine to facilitate continuous gambling in online sports betting formats until funds were exhausted, leading to sessions with high expenditure and a long duration.

The ease of access via mobile technology, the ability to reverse withdrawals and ubiquitous online sports betting marketing in the everyday environment meant that participants were experiencing increased environmental cues to either initiate, or re-engage with, online sports betting. This increased exposure to online sports betting cues was reported in interview data and observed in behavioural data to be difficult to resist, especially when motivated to chase recent losses. In other words, situational features of the everyday environment made it difficult for the problem gamblers to create 'mental separation' from the behaviour, which is likely to be necessary to dissipate states of desire and negative arousal and to implement inhibition and self-control.

The scope for mentally disassociating and maintaining cognitive and behavioural control in online sports betting also appeared to be significantly reduced because of the elimination of many natural forms of breaks in play that exist in retail sports betting. Previously, the rate of play in sports betting was restricted by the periodic commencement and cessations of full

sporting events, like horse races and soccer games, and therefore provided frequent periods of non-gambling. Because of the provision of live betting, vast international and amateur markets and micro-event betting in modern online sports betting, gamblers can essentially participate continuously as there is a constant stream of sports betting opportunities readily available.

The patterns of disordered gambling that emerged in the current study are strongly supportive of the existing literature, which proposed a relationship between disordered gambling and the use of live betting. Evidence from self-report and correlational data observed that gambling problems increased with the amount of live betting conducted in proportion to total bets made (Hing et al. 2018b; LaBrie et al. 2007; Lopez-Gonzalez et al. 2018). Previous research emphasised the transformation of sports betting in online domains into a largely impulsive activity, in contrast to sports betting being approached as a skilful activity that involves considered assessment of selections and that this transformation is driven by the new structural characteristics of modern online sports betting sites (Hing et al. 2015, 2018b). The current study not only supports these conclusions but has produced a theoretical mechanism that attempts to explain the behavioural process of rapid, continuous impulsive online sports betting, and it is evident from the current study that the features of live betting and cash out appear to be central in impulsive disordered gambling patterns in online sports betting, supporting previous conclusions (Lopez-Gonzalez et al. 2017, 2018). Auer and Griffiths (2016) proposed that live betting was particularly reinforcing to problem gamblers who were drawn to the rapid betting cycles. In live betting, outcomes are determined in a much shorter time-frame, which in turn facilitates higher frequency and more impulsive betting behaviour (Auer and Griffiths 2016). The current study supports this conclusion by demonstrating quite clearly, in this cohort of online problem sports bettors at least, that the use of live betting and the associated cash out feature are being used to enable high-frequency sports betting. The high-frequency online sports betting across sessions of both short and long duration could only

be categorised as being impulsive when observing the amount of time elapsed between bets and how quickly money returned to the account through wins or cash outs is re-staked on further bets.

With respect to the rapid, impulsive sports betting observed, another natural break in play that has been eliminated in modern online sports betting is the removal of the need to leave the immediate betting environment to access further funds. The use of debit and credit cards in gambling environments, including online, has been established for many years. However, it is important to acknowledge to what extent the process of depositing further funds has been truncated in modern online sports betting. Behavioural data has demonstrated that problem gamblers could replenish funds and engage in further gambling in a handful of seconds of losing their last account funds, with the use of instant deposit features, in contrast to having to transfer from the gambling section to the account section of the website to make further deposits.

Ultimately, research indicates that even an extra few seconds of respite between betting behaviours can be a sufficient opportunity to evaluate behaviour and reduce risk-taking and overall gambling expenditure (Corr and Thompson 2014). It is argued that the nature of continuous gambling activities, with minimal natural or enforced breaks in play, creates intense emotional and dissociative states, leading to impaired gambling decision-making and maladaptive responding (Coates and Blaszczynski 2013; Loba et al. 2001). Fundamentally, a break in play is required to facilitate suppression of arousal and negative valence and to respond adaptively to negative outcomes (Newman and Lorenz 2003; Verbruggen et al. 2012). Arguably, it is the rapid and continuous nature of electronic gambling machines that make that gambling format most associated with gambling-related harm (Belisle and Dixon 2016). From the current study, it is evident that online sports betting has the capacity to be used as a rapid and continuous gambling format, and therefore, one can expect the associated risk for gambling-related harm to increase as a result.

Limitations

There are multiple limitations when using behavioural data from online problem gamblers, including the acknowledgement that the data only represents online gambling behaviour, and the recording of offline behavioural data is dependent on self-report. Furthermore, it is important to recognise that despite the previously outlined advantages to conducting online interviews with remote samples, there are limitations to this methodological approach. For example, the asynchronous nature of the online interaction can limit the scope for rapport to develop between the interviewer and interviewee and could lead to more abrupt and less conversational data (Jowett et al. 2011). Moreover, the online gambling behavioural data were taken from one operator, and it is acknowledged that often, online gamblers use more than one operator simultaneously (Blaszczynski et al. 2014). In addition, grounded theory analysis requires the researcher to be selective about the direction in which to direct data collection, based on pragmatic evaluations of relevance to the research aims (Strauss and Corbin 1998; Willig 2008), and this may create interpreter bias. The behavioural patterns outlined within the current study do not represent an exhaustive account of all behavioural processes observed from this cohort of problem online sports gamblers. However, the objective of the current study was to generate a substantive understanding of how the contextual and structural features of modern online sports betting combine and support problematic gambling patterns, rather than accounting for all gambling behaviour observed. The grounded theory produced does not

represent an empirically validated model, but instead provides a mechanistic overview of the most salient behavioural patterns of gambling-related harm in online sports betting. Pragmatically, this has enabled the proposition of multiple directions for future research, and most importantly, it provides a grounded foundation for initiation for trialling problem gambling prevention and intervention strategies.

Implications and Conclusion

There is a clear consensus in the literature regarding the urgent need to improve understanding of problem online sports betting behaviour and to develop effective online sports betting prevention and intervention strategies (Hing et al. 2016a, b). From the current study, it is evident that a priority for harm reduction in online sports betting is to implement scope for more breaks in play and implement a reduction in the continuous betting loop that was observed across all participants. Breaks in play can be implemented in two distinct approaches: principally, operator-enforced breaks in play and/or self-imposed breaks in play.

Operator-Enforced Breaks in Play

The problem gamblers within the study were observed to consistently re-deposit further funds and continue gambling immediately after losing all of the funds in their online betting account. It was not uncommon to observe a participant empty their betting account and within 60 s successfully deposit further funds and place a further bet. Given the strong association between the emotionally driven, irrational chasing of losses and gambling-related harm (Corless and Dickerson 1989; Goudriaan et al. 2004), it would be prudent to extend the length of time between losing all of one's initially deposited funds and making further deposits. It is reasonable to assume that the original amount of money deposited into the online betting account represents how much the player was prepared to spend during that session, and therefore, any further deposits will be made on an ad hoc basis. By eliminating instant re-deposits, and implementing a time-delay of 5 min, for example, before being able to make subsequent deposits may increase the likelihood of the player making informed and less emotionally driven gambling decisions. Currently, there is insufficient evidence in the literature base to propose the most effective time-delay parameters regarding repeated account deposits in order to increase informed decision-making. Therefore, it is recommended that experimentation and trialling commence to build the knowledge base regarding the effectiveness of various parameters of breaks in play.

In addition to the capacity to instantly replenish online sports betting funds and persist in gambling, another structural mechanism used to reduce breaks in play during a period of sustained losses is the capacity to reverse pending withdrawals. Given that the customers have already made a firm decision to withdraw funds from their betting account, from a responsible gambling strategy standpoint, it is reasonable to question whether customers should be permitted to cancel pending withdrawals and re-stake the money when one's account is empty. However, at minimum, it appears prudent to implement a time-delay on reversing pending withdrawals. Even a relatively brief pause of a few minutes before being able to reverse pending withdrawals may provide enough time for highly aroused and negatively charged emotional states stemming from incurring repeated losses to dissipate somewhat and increase the scope for more rational and informed decision-making.

Self-imposed Breaks in Play

Given the observed capacity for online sports gamblers to chase losses, in a pattern similar to electronic gaming machine (EGM) or online casino games, it would be prudent to encourage the use of, and increase the provision of, limit-setting opportunities in this gambling format. Although sports betting has been traditionally considered to be less risky than formats such as EGMs (Lopez-Gonzalez et al. 2017), the developments in information technology now mean that patterns of behaviour of online sports betting share a similar structure in terms of frequency of bets made per session, the absence of natural breaks in play and the rapidity of feedback on gambling outcomes. Therefore, the provision to set limits on session duration or the application of pop-up messages to break up continuous play, which initially may not seem directly applicable to online sports betting, now appears necessary for some online sports gamblers. There is a large body of literature demonstrating the effectiveness of limit-setting in online gambling environments for problem gamblers (Auer and Griffiths 2013, 2016), and although these studies are not specific to online sports betting, it is reasonable to assume that a similar effect would be observed. One of the arguments against the setting of self-imposed time or spending limits is the expectation that the customer would simply continue gambling on a different site once the limit had been reached; however, recent research has demonstrated that the vast majority of online gamblers do not migrate to other gambling sites once their limit has been reached (Auer and Griffiths 2016).

Furthermore, given that the vast expansion of available sports betting markets and the chasing of losses in unplanned extended gambling sessions through the night and early morning, it would be prudent to provide a feature for customers to set restricted 'betting windows', outside of which they would not be able to place bets. The interview data indicated that even when customers were able to recoup losses during unplanned loss-chasing sessions, they would often still regret the process given the implications for social functioning the following day in terms of sleep deprivation.

Finally, it is evident that the problem gamblers in the current study were particularly susceptible to disordered patterns of gambling when engaging in live betting and micro-event betting, in contrast to placing bets on full events and ante-post markets. If a customer finds themselves struggling to apply self-control when using live or micro-event betting, they should be provided with an opportunity to restrict or 'block' these sports betting elements in which they find themselves most vulnerable to poor decision-making, without requiring a comprehensive self-exclusion from sports betting altogether.

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Compliance with Ethical Standards

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the University of Lincoln approved the study. All subjects were informed about the study and all provided informed consent. The research has received ethical clearance from the School of Psychology's Ethical Review Board at the University of Lincoln (SOPREC).

Conflict of Interest The authors declare that they have no conflict of interest.

Informed Consent All participants provided fully informed consent with clear and full understanding of what participation entailed and how the data will be utilised.

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