Are direct messages (texts and emails) from wagering operators associated with betting intention and behavior? An ecological momentary assessment study

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Background and aims: Direct messaging via text messages (texts) and emails is a widely used method to advertise sports and race-betting offers. However, they have attracted little research, as this advertising is not in the public domain. This study aimed to determine whether betting expenditure is related to receiving direct wagering messages, and the specific inducements they promote. We hypothesized that receiving direct messages, particularly texts, would be related to betting expenditure within 24 hr. *Methods:* In this ecological momentary assessment study, regular sports ($n = 98$) and race ($n = 104$) bettors from Australia completed short daily surveys over 1 week that captured exposure to direct messages, betting behavior in the previous 24 hr, and betting intention for the next 24 hr. Respondents were asked to forward any texts and emails received to the researchers, who coded them for inducement content. *Results:* Longitudinal analyses found that receiving emails was positively associated with betting intention, whereas texts were positively associated with higher likelihood of betting and betting expenditure. These effects persisted when controlling for problem gambling status and signature betting events. Refund stake and bonus odds inducements were positively associated with likelihood of race betting (although not in multivariate models), as were bonus winnings inducements for sports betting. *Discussion and conclusions:* Direct messages, particularly texts, are powerful marketing tools, encouraging a nearly immediate, and arguably impulsive, betting response, which may increase gambling-related problems. Overseeing this private form of advertising presents challenges to regulators, and to public health efforts that aim to reduce gambling harm.

Keywords: direct messages, wagering, advertising, inducements, gambling, intention

INTRODUCTION

Gambling is a popular pastime in Australia. Per capita, Australians lose more money than residents of any other country (H2 Gambling Capital, 2017). The most popular forms are lottery-type games, electronic gaming machines, race wagering, and sports betting (Hing, Gainsbury, et al., 2014). Sports betting and race wagering are the only forms where expenditure is increasing (Queensland Government Statisticians Office, 2017).

Sports and race betting can legally be provided by Australian-licensed operators at the sports ground or race track, at land-based venues (hotels, clubs, and casinos), and via the telephone or Internet. The convenience of betting online is driving increased participation in these forms (Gainsbury, 2012; Hing, Russell, Vitartas, & Lamont, 2016; Sproston, Hanley, Brook, Hing, & Gainsbury, 2015), and more Australians are betting via the Internet, from 15.7% in 2011 to 34% in 2018 (Roy Morgan, 2018). This has led to intense competition among Australian-based online wagering operators, as indicated by an abundance of wagering advertising and inducements (Hing, Russell, Rockloff, et al., 2018), which have been contentious

(Australian Communication and Media Authority, 2013), and the subject of several government inquiries (Department of Broadband, Communications and the Digital Economy, 2013; Joint Select Committee on Gambling Reform, 2011, 2013; O'Farrell, 2015). Sports betting advertising has been linked to problem gambling (Lopez-Gonzalez, Estévez, & Griffiths, 2017, 2018; Lopez-Gonzalez, Guerrero-Solé, & Griffiths, 2018), and is recalled in detail by children, prompting concerns around normalization (Pitt, Thomas, Bestman, Daube, & Derevensky, 2017).

Inducements (e.g., offers to match deposits with bonus bets) are common in wagering advertising (Guerrero-Solé, Lopez-Gonzalez, & Griffiths, 2017; Hing, Sproston, Brading, & Brook, 2015; Lopez-Gonzalez & Griffiths, 2017). A recent Australian study found that wagering inducements influence betting expenditure, including

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betting when not intending to, and betting more than intended (Hing, Russell, Rockloff, et al., 2018). That study found that direct messages to consumers via text messages (texts or SMS), email, or telephone calls had the most influence on betting behavior. This study aims to examine the effects of these messages on betting in more detail.

Direct messages

Direct messages are sent directly to consumers, through texts, emails, or telephone calls using betting account details. This allows operators to track behavior, and target consumers who may be most receptive to inducements (Scharl, Dickinger, & Murphy, 2005; Shankar & Balasubramanian, 2009) or target lapsed consumers (Hing, Cherney, Blaszczynski, Gainsbury, & Lubman, 2014).

Direct messages are conveyed privately, in contrast to advertising in public mass media. This distinction is crucial in Australia's most populated state, where it is illegal for operators to advertise gambling inducements in public (New South Wales Department of Industry: Liquor and Gaming [NSW DILG], 2015). The definition of "public" in this context excludes direct messaging sent to existing account holders (NSW DILG, 2016, 2018). Thus, direct messaging has become an increasingly important advertising mechanism for Australian wagering operators. Their private nature means that fewer people see them, likely resulting in fewer complaints, as well as making it difficult for regulators to access them.

In general, direct messaging is a particularly effective form of advertising (Drossos, Giaglis, Vlachos, Zamani, & Lekakos, 2013; Hing, Russell, Rockloff, et al., 2018). Marketers are increasingly using texts in favor of email, partly due to the high prevalence of smartphone ownership (88% in Australia; Deloitte, 2017), allowing consumers to receive these messages almost immediately. Text message marketing is highly effective compared to emails. Unsolicited contact (spam) is far more prevalent for emails (90%) than for texts (1%; Doherty, 2014), and consumers pay less attention to emails due to spam (Fallows, 2003). Consumers are far more likely to open texts (94% open rate; Lam, 2018) than emails (25% open rate; Chaffey, 2018), and to respond or take up an offer more quickly (within 90 s on average), compared to 2.5 days for emails (Davey, 2013). These factors may explain why texts are a particularly effective advertising medium (Scharl et al., 2005; Shankar & Balasubramanian, 2009). Nonetheless, both texts and emails are received on smartphones, which consumers can also use to place bets; therefore, both of these direct channels are likely to be effective advertising media.

Link with impulse betting and problem gambling

Because smartphone texts allow for immediate action, texts promoting wagering may encourage impulse betting, which has been linked to problem gambling (Flack & Buckby, 2018; Hing, Li, Vitartas, & Russell, 2018; Russell, Hing, Li, & Vitartas, 2018; Yan, Zhang, Lan, Li, & Sui, 2016). Because people with gambling problems tend to be more impulsive (Russell et al., 2018), they may be more likely to respond to wagering inducements promoted via texts, leading to excessive expenditure.

A key question is whether direct messages have an effect on gambling behavior. This study aimed to determine whether betting expenditure is related to receiving direct messages delivered via email and/or text, and to determine which specific types of inducements delivered via direct message may be most influential. We hypothesized that gambling expenditure would be associated with direct messages, particularly texts.

METHODS

Respondents

The sample for this study consists of 98 sports bettors and 104 race bettors from Australia. All participants had taken part in a previous wagering study conducted by the researchers and had agreed to participate in future research (original study: Hing, Russell, Rockloff, et al., 2018). Respondents were recruited to the original study as regular (at least fortnightly) sports or race bettors, from two sources: account holders with a major Australian-licensed online wagering company, and a database of participants who had participated in previous research conducted by the first and second authors. The wagering company had no further involvement and no access to the data.

This previous study consisted of 15 ecological momentary assessment (EMA) surveys, whereby participants take part in short, regular assessments. We invited those who had completed at least 12 of those 15 EMAs, to maximize response rates. We also specifically invited all those scoring 8+ on the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001), to ensure they were adequately represented in the sample. This led to 194 sports bettors and 218 race bettors being invited to participate.

Inclusion criteria were providing informed consent, aged 18+, gambling at least fortnightly on sports or races in the past 12 months, and willingness to answer multiple short surveys during the study period. Sports bettors were also required to have bet on Australian Football League (AFL) or National Rugby League (NRL), as the study was conducted during the week of the grand finals of those competitions. We also asked respondents whether they were currently opted-in to receiving direct wagering messages and whether they intended to remain opted-in during the data collection period. Respondents who said "no" to either question were excluded.

Sample response rates, along with demographic and PGSI measures, are reported in Table 1. In terms of betting behavior, 96.9% of sports bettors bet on AFL in the past 12 months, and 78.6% on NRL. Among race bettors, 99.0% bet on horse racing, and 67.3% on greyhound racing.

EMA procedure

This study also utilized an EMA design. Respondents were sent a link to an online survey through text message each day for seven consecutive days, and reimbursed $7 for each completed survey (possible maximum compensation of $49, paid in electronic shopping vouchers). These invitations were sent at 4 p.m. each day, and respondents were allowed to

Table 1. Response and eligibility rates and sample characteristics for sports and race bettors

Measure	Sports bettors	Race bettors
Response and eligibility rates		
Invited from original study	194	218
Responded to invitation	111	113
	57.2% of those invited	51.8% of those invited
Met inclusion criteria	102	110
	91.9% of those who responded	97.3% of those who responded
Responded to at least one EMA	98	104
	88.3% of those who responded	92.0% of those who responded
Sample characteristics		
Gender (% male)	92.9	94.2
Age [mean (*SD*)]	41.8 (13.1)	44.7 (12.4)
Age range (years)	20–74	24–72
PGSI: non-problem (%)	20.4	21.2
PGSI: low risk (%)	29.6	25.0
PGSI: moderate risk (%)	36.7	33.7
PGSI: problem gambler (%)	13.3	20.2

Note. SD: standard deviation; EMA: ecological momentary assessment; PGSI: Problem Gambling Severity Index.

respond within 23 hr to complete the survey. Sports bettors were surveyed from September 26 to October 2, 2017 (the week leading up to the NRL and AFL grand finals). Race bettors were surveyed from November 3 to 9, 2017, which was the week of the Melbourne Cup. The NRL and AFL grand finals and the Melbourne Cup are major betting events within Australia, and we expected advertising to be at peak levels during these time periods. Approximately, 65% of each sample completed at least six of the seven EMAs.

The EMA methodology allows the behavior of interest to be assessed as it occurs, or close to when it occurs, reducing recall issues and increasing accuracy compared to regular surveys (Stone & Shiffman, 1994). This design also allowed comparison of intended versus actual expenditure, using longitudinal analyses.

Measures

Respondents initially completed a baseline survey that determined eligibility and captured mobile phone number and email address (to send survey links and compensation), postcode, types of sports or races they had bet on, and frequency of betting on these, which Australian-based operators they have accounts with, how often they bet with each operator within the past 12 months, and the PGSI.

The daily EMA surveys captured the number of emails, texts, and/or phone calls the respondents had received from wagering operators in the previous 24 hr; actual sports or race-betting expenditure over the previous 24 hr; and intended sports or race-betting expenditure over the next 24 hr. Very few phone calls were received, so they were not included in analyses. Respondents were asked to forward all direct messages received to a mobile phone number (for texts), or an email address (for emails), which were monitored by the research team.

Statistical analysis

The research team coded the content of all texts and emails forwarded by respondents by date at which the message was

received and type of inducement (if applicable, bonus winnings, refund stake, match stake/deposit, sign up, and bonus odds offers). Other inducements were also coded (e.g., refer a friend offers), but were not included in analyses due to their low frequency. This coding was conducted by one researcher, and verified by a second researcher, based on a preexisting classification of inducements (Hing et al., 2015). Each message was coded using an anonymous respondent ID, so the content could be linked to their EMA data, specifically intended and actual betting behavior.

We conducted longitudinal analyses on two dependent variables, intended betting expenditure and actual betting expenditure. Both variables were zero-inflated, so both were modeled in two-stage hurdle models: comparing those who reported $0 versus $1+ (i.e., those who did and did not intend to bet, and those who did and did not actually bet), and then, among those who intended to bet (or actually bet), how much they intended to bet (or actually bet). Each hurdle model was applied separately to sports and race betters, for intended and actual expenditure.

The independent variables (IVs) in the linear mixed-effects models were related to the direct messages. Initially, the total number of direct messages received was the IV. Then, we used the number of emails and texts received (channel) separately as IVs, followed by the number of each inducement (content).

All analyses were initially conducted as bivariate analyses. We then conducted multivariate models separately for direct message channel and content, to control for other possible explanatory factors: the respondent's problem gambling status (PGSI 8+) and whether or not the day was a signature betting day (Melbourne Cup, AFL grand final, and NRL grand final). For actual betting expenditure, we also examined controlling for intended expenditure (i.e., comparing intended spend in the next 24 hr to reported actual spend in that 24 hr). For sports bettors, intention was not significantly associated with betting expenditure, whereas for race bettors, the association was *negative*, contrary to findings from a similar study (Hing, Russell, Rockloff, et al., 2018). Therefore, we did not control for intention in

subsequent analyses. We also explored interactions with problem gambling status, for both direct messaging channel and content, and for intended and actual betting expenditure, none of which were statistically significant.

The $1+ components of intention and betting expenditure were right-skewed, and thus the natural logarithm of each was taken prior to analysis. We used the lme4 package (Bates, Mächler, Bolker, & Walker, 2015) in R software (R Core Team, 2017); the glmer function for 0 versus 1+ dependent variables, and the lmer function for expenditure (log dollar value) when respondents reported betting. Both random effects (individual ID) and fixed effects (all other variables) were specified. The unit of analysis was each day for each bettor.

Ethics

All participants gave informed consent and were informed they could withdraw at any time. Data were anonymized before analysis. The study was approved by Human Research Ethics Committee of CQUniversity Australia, clearance numbers H16/06-178 and H16/08-234.

RESULTS

Content of messages received

Over the course of 7 days, the 98 sports bettors reported receiving 364 emails and 228 texts, an average of 3.7 ($SD = 3.5$) and 2.3 ($SD = 2.6$) per respondent, respectively. The 104 race bettors reported receiving 671 emails and 442 texts, an average of 6.5 ($SD = 6.8$) and 4.3 ($SD = 4.9$) per respondent, respectively. Sports bettors forwarded 98 emails and 111 texts to the research team (26.9% and 48.7%, respectively), whereas the race bettors forwarded 481 emails and 241 texts (71.7% and 54.5%, respectively). Most messages were related to the AFL or NRL grand finals for sports bettors, and the Melbourne Cup for race bettors.

Texts were generally text-only, with no images. Some texts included a link to a webpage where respondents could take up a promotion, whereas others functioned as advertising. For example "Get $2 for Dustin Martin to win the Brownlow Medal by 2+ votes (max $20) AND we're giving you the chance to create your own Brownlow Medal betting markets! Use #BrownlowCYO on Twitter to submit your market." In contrast, emails contained more rich information, images, and often more than one offer or inducement.

Some types of inducements were not sufficiently prevalent to be included in analyses. Those included were refund stake offers, match stake/deposit offers, bonus winnings, and (for sports bettors only) sign-up offers and bonus odds offers.

Expenditure and intention to spend

Intention and actual betting behavior varied by day. For example, on the day after the grand finals, only 15.2% of sports bettors intended to bet, whereas approximately 90% of each group reported intending to bet on the Melbourne Cup or grand finals. Median intended

expenditure on any day ranged $40–$110 for race bettors, and $20–$50 for sports bettors, and median actual expenditure ranged $40–$116 for race bettors and $20–$50 for sports bettors.

The relationship between direct messages and intended betting

Tables 2 and 3 present results for betting intention. For both groups, those who received more direct messages, regardless of channel or content, were significantly more likely to intend to bet in the next 24 hr, and for sports bettors, intend to bet more than those who received fewer direct messages.

In terms of direct message channel, for both groups, the number of emails received (but not texts) were positively associated with both a higher intention to bet and intention to bet larger amounts. These results remained significant when controlling for individual differences, problem gambling status, and whether it was a signature betting day (Melbourne Cup, AFL, or NRL grand final).

The results for content were less clear. For race bettors, receiving refund stake offers were associated with a *lower* intention to bet. This was not significant when controlling for problem gambling status and signature betting days. For sports bettors, no specific inducement types were associated with either intention to bet, or amount intended to be bet, whether controlling for problem gambling status and signature betting days or not.

The relationship between direct messages and actual betting

As noted above, a surprising result for race bettors was that *lower* intention to bet (lagged from the previous 24 hr) was associated with *higher* likelihood of actually betting and amount of money bet. For sports bettors, no relationship was found between intention and betting behavior (Tables 4 and 5).

For both race and sports bettors, receiving more direct messages, regardless of channel or content, was associated with greater likelihood of betting. Number of direct messages received was also positively associated with the amount of money bet for race bettors, but not sports bettors.

For both race and sports bettors, the number of texts received was positively associated with both the likelihood of actually betting and the amount bet, and this remained significant when controlling for signature betting days and problem gambling status. For sports bettors, the amount of emails received was positively associated with placing a bet, but not the amount of money bet. The number of emails was not associated with placing a bet or amount of money bet for race bettors. All relationships remained significant when controlling for signature betting days and problem gambling status.

Among race bettors, receiving more refund stake offers and bonus odds offers was related to actually placing bets in bivariate models, but not in multivariate models. The same inducements, as well as sign-up offers and match stake/ deposit offers, were positively associated with amount of money bet, but these were not significant when controlling for other factors. For sports bettors, receiving more bonus

Table 2. Longitudinal models examining associations with betting intention for race bettors, based on direct message (DM) channel and content

Independent variables	Intend (ref. = no)			Intend (amount and log)		
	Bivariate	Multivariate (channel)	Multivariate (content)	Bivariate	Multivariate (channel)	Multivariate (content)
Number of DMs	0.140 (0.051)**			0.066 (0.042)		
DM channel						
Number of emails	0.229 (0.081)**	0.255 (0.089)**		0.129 (0.061)*	0.173 (0.066)**	
Number of texts	0.137 (0.096)	0.166 (0.116)		0.018 (0.091)	0.043 (0.099)	
DM content						
Number of DMs with no inducements	0.151 (0.121)		0.185 (0.143)	0.121 (0.076)		0.139 (0.075)
Number of DMs with sign up offer	−0.048 (0.063)		−0.079 (0.119)	−0.058 (0.051)		−0.171 (0.123)
Number of DMs with refund stake offer	−0.139 (0.056)*[a]		−0.122 (0.080)	−0.086 (0.046)		−0.094 (0.068)
Number of DMs with match stake/deposit offer	0.224 (0.201)[a]		0.555 (0.316)[a]	−0.009 (0.046)		0.128 (0.106)
Number of DMs with bonus odds offer	−0.024 (0.092)		0.083 (0.118)	0.005 (0.082)		0.080 (0.093)
Number of DMs with bonus winnings offer	0.085 (0.121)		0.133 (0.164)	0.127 (0.098)		0.207 (0.127)
Control variables						
Melbourne Cup day (ref. = no)	−1.426 (0.298)***	−1.753 (0.326)***	−1.551 (0.400)***	−0.963 (0.247)***	−1.142 (0.259)***	−0.810 (0.305)**
PGSI: PG (ref. = no)	−0.541 (0.397)	−0.507 (0.425)	−0.176 (0.593)	0.216 (0.503)	0.220 (0.478)	−0.136 (0.623)
Random effect						
Individual ID	[b]	1.238	1.375	[b]	1.599	1.669
Constant	[b]	0.881 (0.223)***	1.092 (0.299)***	[b]	2.747 (0.231)***	2.822 (0.279)***
Observations		567	375		404	277
Log likelihood		−321.023	−205.169		−883.247	−608.130
AIC		654.046	430.338		1,780.493	1,238.260
BIC		680.088	469.5009		1,808.503	1,278.124

Note. AIC: Akaike information criterion; BIC: Bayesian information criterion; PGSI: Problem Gambling Severity Index; PG: problem gambling.
[a]Model would not converge with raw scores, so number of match stake offers was log transformed for these analyses. [b]Varies by individual model.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Longitudinal models examining associations with betting intention for sports bettors, based on direct message (DM) channel and content

Independent variables	Intend (ref. = no)			Intend (amount and log)		
	Bivariate	Multivariate (channel)	Multivariate (content)	Bivariate	Multivariate (channel)	Multivariate (content)
Number of DMs	0.352 (0.084)***			0.202 (0.074)**		
DM channel						
Number of emails	0.485 (0.111)***	0.465 (0.114)***		0.254 (0.089)**	0.221 (0.089)*	
Number of texts	0.169 (0.162)	−0.024 (0.173)		0.051 (0.159)	−0.038 (0.155)	
DM content						
Number of DMs with no inducements	−0.019 (0.195)		0.012 (0.200)	−0.191 (0.177)		−0.154 (0.173)
Number of DMs with refund stake offer	0.113 (0.129)		0.132 (0.147)	0.072 (0.122)		0.078 (0.129)
Number of DMs with match stake/deposit offer	−0.110 (0.163)		−0.087 (0.172)	−0.095 (0.169)		−0.047 (0.172)
Number of DMs with bonus winnings offer	0.101 (0.129)		0.102 (0.146)	0.007 (0.129)		−0.004 (0.136)
Control variables						
AFL grand final day (ref. = no)	1.262 (0.318)***	1.187 (0.327)***	1.417 (0.429)***	0.970 (0.251)***	0.834 (0.254)**	0.987 (0.337)**
NRL grand final day (ref. = no)	−0.864 (0.312)**	−0.515 (0.322)	−0.797 (0.422)	−0.983 (0.274)***	−0.675 (0.278)*	−0.658 (0.363)
PGSI: PG (ref. = no)	−0.167 (0.453)	−0.320 (0.471)	−0.255 (0.582)	0.406 (0.510)	0.250 (0.510)	0.268 (0.589)
Random effect						
Individual ID (SD)	a	1.119	1.148	a	1.328	1.116
Constant	a	−0.463 (0.207)*	−0.208 (0.254)	a	1.802 (0.233)***	1.986 (0.267)***
Observations		509	317		314	198
Log likelihood		−314.639	−199.465		−657.077	−414.769
AIC		643.279	416.930		1,330.154	849.539
BIC		672.906	450.760		1,360.149	882.421

Note. SD: standard deviation; AIC: Akaike information criterion; BIC: Bayesian information criterion; PGSI: Problem Gambling Severity Index; PG: problem gambling; AFL: Australian Football League; NRL: National Rugby League.

aVaries by individual model.

*p < .05. **p < .01. ***p < .001.

Table 4. Longitudinal models examining associations with actual betting behavior for race bettors, based on direct message (DM) channel and content

Independent variables	Spend (ref. = no)				Spend (amount and log)			
	Bivariate	Multivariate (channel)	Multivariate (content)	Multivariate (content v2)	Bivariate	Multivariate (channel)	Multivariate (content)	Multivariate (content v2)
Intention (lagged, ref. = no)	−0.631 (0.270)*							
Intention (lagged, amount, and log)					−0.090 (0.029)**			
Number of DMs	0.140 (0.049)**				0.091 (0.021)***			
DM channel								
Number of emails	0.123 (0.068)	0.016 (0.077)			0.057 (0.032)	−0.032 (0.031)		
Number of texts	0.352 (0.107)***	0.276 (0.116)*			0.268 (0.044)***	0.200 (0.047)***		
DM content								
Number of DMs with no inducements	0.061 (0.108)		0.034 (0.109)		0.001 (0.037)		−0.010 (0.034)	
Number of DMs with sign up offer	0.050 (0.062)		−0.245 (0.165)		0.077 (0.025)**		0.049 (0.057)	0.049 (0.057)
Number of DMs with refund stake offer	0.166 (0.066)*		0.110 (0.082)	0.173 (0.202)	0.099 (0.022)***		0.049 (0.031)	0.048 (0.031)
Number of DMs with match stake/deposit offer	0.050 (0.054)		0.068 (0.133)		0.046 (0.023)*		−0.049 (0.049)	−0.052 (0.048)
Number of DMs with bonus odds offer	0.208 (0.100)*		0.158 (0.119)	0.204 (0.251)	0.134 (0.041)**		0.063 (0.044)	0.062 (0.044)
Number of DMs with bonus winnings offer	0.140 (0.124)		0.165 (0.178)		0.034 (0.049)		−0.016 (0.057)	
Control variables								
Melbourne Cup day (ref. = no)	1.523 (0.396)***	1.382 (0.403)***	2.131 (0.650)**	2.019 (0.197)***	0.820 (0.113)***	0.675 (0.118)***	0.655 (0.136)***	0.659 (0.134)***
PGSI: PG (ref. = no)	−0.305 (0.290)	−0.265 (0.309)	0.294 (0.484)		0.780 (0.359)*	0.770 (0.356)*	0.596 (0.486)	0.597 (0.484)
Random effect								
Individual ID	a	0.484	0.732	0.665	a	1.833	2.120	2.110
Constant	a	0.717 (0.167)***	0.692 (0.219)**	0.799 (0.197)***	a	3.957 (0.166)***	4.077 (0.207)***	4.072 (0.206)***
Observations		567	375	375	404	404	277	277
Log likelihood		−321.900	−198.315	−200.40	−612.826	−612.826	−426.276	−421.939
AIC		655.800	416.629	410.759	1,239.651	1,239.651	874.552	861.879
BIC		681.843	455.898	430.340	1,267.661	1,267.661	914.416	894.495

Note. v2 version of the multivariate models for content only includes the content that was significant in the bivariate analyses. v2 model for spend (ref. = no) failed to converge, and the results here are based on log number of DMs with each offer (+1), which converged. AIC: Akaike information criterion; BIC: Bayesian information criterion.

[a]Varies by individual model.

*p < .05. **p < .01. ***p < .001.

Table 5. Longitudinal models examining associations with actual betting behavior for sports bettors, based on direct message (DM) channel and content

Independent variables	Spend (ref. = no)				Spend (amount and log)		
	Bivariate	Multivariate (channel)	Multivariate (content)	Multivariate (content v2)	Bivariate	Multivariate (channel)	Multivariate (content)
Intention (lagged, ref. = no)	−0.043 (0.283)						
Intention (lagged, amount, and log)					0.023 (0.031)		
Number of DMs	0.504 (0.099)***				0.003 (0.034)		
DM channel							
Number of emails	0.428 (0.118)***	0.413 (0.131)**			−0.027 (0.040)	−0.019 (0.039)	
Number of texts	0.948 (0.204)***	0.832 (0.220)***			0.084 (0.074)	0.076 (0.072)	
DM content							
Number of DMs with no inducements	0.584 (0.237)*		0.706 (0.278)*	0.702 (0.272)**	0.077 (0.077)		0.086 (0.077)
Number of DMs with refund stake offer	0.199 (0.142)		0.146 (0.168)		−0.047 (0.051)		−0.087 (0.056)
Number of DMs with match stake/deposit offer	−0.013 (0.168)		0.239 (0.199)		−0.023 (0.070)		−0.007 (0.074)
Number of DMs with bonus winnings offer	0.360 (0.150)*		0.342 (0.177)	0.382 (0.170)*	0.044 (0.053)		0.071 (0.059)
Control variables							
AFL grand final day (ref. = no)	2.156 (0.441)***	2.375 (0.464)***	3.115 (0.699)***	2.999 (0.687)***	0.298 (0.103)**	0.346 (0.106)**	0.191 (0.140)
NRL grand final day (ref. = no)	0.871 (0.328)**	1.387 (0.361)***	1.805 (0.521)***	1.707 (0.506)***	0.185 (0.113)	0.274 (0.116)*	0.131 (0.150)
PGSI: PG (ref. = no)	−0.088 (0.444)	−0.201 (0.504)	−0.445 (0.662)		0.760 (0.381)*	0.756 (0.384)*	0.772 (0.433)
Random effect							
Individual ID	a	1.190	1.344	1.335	a	1.197	1.040
Constant	a	−0.350 (0.220)	−0.152 (0.290)	−0.077 (0.252)	a	3.486 (0.157)***	3.578 (0.176)***
Observations		509	317	317		314	198
Log likelihood		−282.552	−171.586	−172.889		−435.011	−275.512
AIC		579.104	361.173	357.779		886.022	571.024
BIC		608.731	395.003	380.332		916.017	603.907

Note. SD: standard deviation; AIC: Akaike information criterion; BIC: Bayesian information criterion; PGSI: Problem Gambling Severity Index; PG: problem gambling; AFL: Australian Football League; NRL: National Rugby League.
v2 version of the multivariate models for content only includes the content that was significant in the bivariate analyses.
aVaries by individual model.
*p < .05. **p < .01. ***p < .001.

winning inducements, as well as direct messages with no inducements, was positively associated with placing a bet, and these remained significant when controlling for other factors. However, no specific inducements were associated with amount of money bet among sports bettors.

DISCUSSION AND CONCLUSIONS

The results indicate a clear relationship between direct messaging from wagering operators and both intention to bet, as well as actual betting behavior, including amount bet. This aligns with the broader literature on the effectiveness of direct messaging (Davey, 2013; Doherty, 2014; Drossos et al., 2013; Kowalke, 2014; Scharl et al., 2005; Shankar & Balasubramanian, 2009), as well as previous findings in gambling research (Hing, Russell, Rockloff, et al., 2018). Crucially, our analysis controlled for individual variability and thus the observed effects relate to influences of direct marketing within individuals.

The channel used for direct messages is an important factor, with emails associated with intention, but texts associated with actual expenditure. This is likely related to texts having a higher open rate and faster response rate compared to emails (Davey, 2013; Fallows, 2003; Lam, 2018), making texts a particularly effective marketing tool (Scharl et al., 2005; Shankar & Balasubramanian, 2009). The connection between texts and subsequent immediate betting behavior indicates an impulsive response to this marketing, in line with previous push-marketing findings (Unni & Harmon, 2007). Given the relationship between impulse betting and problem gambling (Flack & Buckby, 2018; Hing, Li, et al., 2018; Russell et al., 2018; Yan et al., 2016), we expected an interaction between problem gambling status and amount of texts received, both in terms of likelihood of betting and actual betting expenditure. The current results instead suggest that these texts prompt impulsive betting across all PGSI groups. This is concerning because impulse betting reflects impaired control and uninformed decision-making, which leads to betting more than intended (Hing, Russell, Li, & Vitartas, 2018).

In contrast to texts, emails influenced only betting *intentions*. This may be because our analyses related direct messages received to gambling intention and behavior *within the same 24 hr period*, and emails are not acted upon for 2.5 days on average (Davey, 2013). More cumulative effects of direct messaging on consumers are an avenue for future research (Gotlieb, Scholl, Ridout, Goldstein, & Shah, 2017; Hing, Russell, Rockloff, et al., 2018; Houston & Weiss, 1975; Palda, 1965).

Intention was not associated with actual betting behavior for sports bettors, and for race bettors, *lower* intention was associated with betting behavior. Previous gambling research (Hing, Russell, Rockloff, et al., 2018), as well as theories of planned behavior (Ajzen, 1991; Fishbein & Ajzen, 1975), has generally found that intention predicts behavior. When an EMA methodology was used in weeks without signature betting events, intention was strongly associated with behavior (Hing, Russell, Rockloff, et al., 2018). The present finding suggests that intentions to abstain, or to bet smaller amounts, can easily be broken in

these peak betting weeks. This may not be *solely* due to direct marketing. Other factors may be involved, including other advertising, and perceived or actual social pressure, which is a key predictor of gambling intention and behavior (Dahl, Tagler, & Hohman, 2018; Hing, Vitartas, Lamont, & Fink, 2014; Larimer & Neighbors, 2003; Martin et al., 2010; Moore & Ohtsuka, 1999; Neighbors et al., 2007), and is likely to be high around signature betting days. Because EMAs are short, we could not capture all relevant information, and note this for future research.

The relationship between inducements and intention was either not significant, or did not remain significant when controlling for problem gambling status and signature betting days. However, inducements that were associated with placing a bet were refund stake and bonus odds offers for race bettors (although not in multivariate models), and bonus winnings offers for sports bettors. These findings are generally in line with previous research (Hing, Russell, Rockloff, et al., 2018). Inducements were not associated with the amount of actual expenditure, potentially because inducements are often capped (e.g., match your deposit up to $100). Furthermore, the number of direct messages containing *no* inducements was associated with betting behavior for sports bettors and thus they may simply serve as a cue to bet. Such marketing cues have been identified as particularly powerful in progressing people along a consumption continuum, from non-use toward addiction (Martin et al., 2013).

Higher risk gamblers tend to have accounts with numerous operators (Brown, 2017; Gainsbury, 2015; Gainsbury, Russell, Blaszczynski, & Hing, 2015; Hing, Cherney, et al., 2014). These consumers will therefore receive more direct messaging overall, further increasing their expenditure, exacerbating their gambling problems and consequent harm. Placing conservative limits on how frequently operators can message individual consumers could help protect bettors with multiple accounts. However, the private nature of direct messages makes them difficult to monitor and regulate. Another way to reduce direct messaging would be to require operators to only contact consumers who have accounts (as is the case in NSW), and who have opted-in (instead of the current opt-out system), where they would not receive direct messages unless specifically requested. Another alternative would be to establish a Do Not Direct Message register, similar to the existing Do Not Call register (Do Not Call Register Act, 2006), which would prohibit operators contacting consumers who have registered, acting as a multioperator opt-out system. Do Not Call registers are effective at reducing direct contact by industry (Sahin & Francillon, 2018), and could help reduce harm related to direct messaging by limiting exposure.

Research into US pharmaceutical advertising has noted the difficulty of regulating direct marketing (Gibson, 2014; Henney, 2000; Mackey, 2016; Taylor, Franke, & Maynard, 2000). Gibson (2014) concluded that third party oversight and industry self-regulation are important in regulating direct marketing, although gambling industry self-regulation has been criticized (Selin, 2016). A complementary approach is consumer education, which does not aim to remove the onus of responsibility from industry, but instead empowers consumers to make informed decisions around their gambling

behavior (Hing, Russell, & Hronis, 2016; Martin et al., 2013). For example, consumers could be educated about ways to minimize or eliminate direct messaging (e.g., opting out), or how to resist urges to bet impulsively when such messages are received. Consumers could also be educated about when messages breach standards, and how to report them if they do.

Limitations and strengths

The limitations of this study include not all direct messages received were forwarded to the research team; the relatively small sample of respondents (due to budget constraints); that expenditure and intention were self-reported; not all relevant variables could be captured in the short EMA surveys; and that the relationship between receiving direct messages and expenditure or intention were for a 24-hr window. The latter limitation meant that more cumulative advertising or inducement influences were not captured in the present analyses. While the present design aims to reduce recall bias and subjectivity (evidenced by the researchers coding message content), causation cannot be inferred from these results.

Despite these limitations, this study has the following strengths: daily surveys reduced recall bias, particularly for expenditure; intention to bet and subsequent actual expenditure could be compared; a longitudinal analysis that had the power to find these significant effects and minimize bias due to missingness; and the capture and analysis of the content of actual direct messages sent to consumers. On the whole, the methodology provides a robust measurement and analysis of betting intention, actual betting behavior, and exposure to direct messaging.

CONCLUSIONS

The results from this study confirm that direct messages are influential on betting behavior, with participants betting even when not intending to do so, even when controlling for individual differences, PGSI status, and major betting days. The most influential direct message factor was receiving direct messages via text. Particularly, betting based on texts is likely to be unplanned and impulsive in nature, which is a concern because this is a known risk factor for problem gambling and gambling-related harm. As such, direct messages are an effective but also potentially harmful marketing tool.

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