# Psychology of Addictive Behaviors

## Patterns and Correlates of Consumer Protection Tool Use by Australian Online Gambling Customers

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*Objective:* Consumer Protection Tools (CPTs; e.g., deposit limits, timeouts) are provided by gambling sites to assist customers to gamble without harms. We aimed to understand how CPTs are used, and by which customers, which is essential to determine their effectiveness. *Method:* We examined the account data of 39,853 customers (median age = 33 years; 84% male) across six Australian wagering sites over 1 year (2018/07/01–2019/06/30). *Results:* Most (83%) customers did not use any CPTs, with low rates of use for deposit limits (15.8%), timeouts (0.55%–1.57%), and self-exclusion tools (0.16%–0.57%) observed. Requiring customers to set a deposit limit or opt-out of setting one led to substantial increases in limit setting. Many customers who used limits later changed them, typically by increasing or removing them. Non-CPT users and deposit limit users were similar in their demographic and gambling characteristics, while comparatively, timeout and/or self-exclusion users were younger and displayed more risky gambling behaviors (e.g., higher net loss and betting frequency). *Conclusions:* Our findings suggest that voluntary deposit limits have inherent limitations in addressing harmful behaviors if consumers can easily increase or remove limits. The study suggests that greater efforts are needed to encourage CPT use among a broad customer base, including default limits requiring opt-out, greater restrictions on increasing or remove limits, and more persuasive communication of the benefits of timeouts.

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**Public Health Significance Statement**
This study of nearly 40,000 online gambling customers in Australia found that most (83%) customers do not use the consumer protection tools (CPTs) available to them. The findings highlight the need for gambling sites and policy makers to implement strategies that encourage the volitional uptake of CPTs. This study identified that a key limitation of current deposit limit tools is the ability to easily increase limits multiple times or remove them altogether, which supports the introduction of greater friction and delays to increase limits and messaging to assist customers to determine, set, and adhere to appropriate limits.

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*Keywords:* online gambling, responsible gambling tools, consumer protection, deposit limits, problem gambling

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The estimated prevalence of online gambling varies between geographic regions in the range of 2%–25% of adults (Gainsbury et al., 2015; Nower et al., 2017; Wardle, Moody, et al., 2011; Wood & Williams, 2009). Of the people who gamble online, population-based surveys indicate that 2.7%–11.1% will experience significant gambling problems, including financial, relational, or emotional problems (Mora-Salgueiro et al., 2021). Recognizing this, many jurisdictions require online gambling providers to offer a range of digital features that aim to facilitate self-directed harm-minimization efforts and support individuals to gamble sustainably (Bonello & Griffiths, 2017; Marionneau & Järvinen-Tassopoulos, 2017). These include the ability to set limits on the amount of money one can deposit into their online account ("deposit limits'," also referred to as "pre-commitment") in a specified period (typically 1, 7, or 30 days), activity statements that detail betting activity and expenditure, and the ability to deactivate one's account temporarily ("timeouts" or "take a break") or permanently self-exclude. These features are varyingly referred to as responsible gambling (Auer et al., 2018), social responsibility (Griffiths et al., 2009), or Consumer Protection Tools (CPTs; Gainsbury et al., 2020), the latter of which is used here.

Research investigating the efficacy of CPTs as harm reduction strategies is limited, although the few existing studies appear mostly supportive of their use. For example, individuals who voluntarily set deposit limits have been found to reduce the number of days on which they place bets, their frequency of betting, the overall amount they wager (Nelson et al., 2008), and the time they spend gambling (Auer et al., 2018). Heirene and Gainsbury (2020) found that online wagering customers in Australia who set a deposit limit in response to a message prompting them to set a limit reduced their gambling expenditure, intensity, and losses to a significantly greater extent than a control group; although, this finding was only observed among those with low-to-mid levels of these variables pre-limit. Luquiens et al. (2019) found online poker players who voluntarily use short-duration self-exclusions (timeouts) and self-exclusions significantly reduce their gambling time and expenditure post-exclusion, although this reduction was not observed among those most heavily involved.

Attitudinal surveys of user-experiences with CPTs indicate that the tools are generally positively perceived. In one survey of 570 customers from Svenska Spel, a Swedish online gambling company, 70% rated deposit limits as quite or very useful and 42% said the same of self-exclusion options (11% and 26%, respectively, responded "don't know"; Griffiths et al., 2009). Similarly, in Gainsbury et al.'s (2020) survey of 564 online wagering customers in Australia, 61%–71% were satisfied or very satisfied with their use of activity statements, deposit limits, and timeout tools. In relation to the mandatory implementation of CPTs, Auer et al. (2018) found 79% of 2,352 online gambling customers registered with a Norwegian Government-owned site agreed in part or entirely with a statement that they viewed a new global loss limit imposed by their operator positively. However, whether this finding would generalize to customers of private gambling sites and other cultures remains unknown. In land-based settings, deposit limits (e.g., casinos, Australian clubs), there is evidence that moderate risk gamblers reduce their expenditure and involvement after setting limits, but the effect on high-risk gamblers remains inconclusive and some individuals have been found to set limits higher than their typical expenditure pre-limit (Thomas et al., 2016).

CPTs are intended to support online gambling customers by functioning as early intervention measures to prevent gambling problems from developing (Gainsbury et al., 2020; Ladouceur et al., 2017). Thus, their use is not intended only for those already experiencing harms, although more restrictive tools like temporary and permanent self-exclusion may be most relevant and particularly useful for those at high-risk of experiencing gambling harms. Tools like activity statements and deposit limits could benefit all individuals who gamble by increasing informed choice and preventing over-spending (Gainsbury et al., 2020). But the limited existing evidence suggests rates of engagement with CPTs are low. In a survey of 566 individuals registered with Svenska Spel, 56% reported using deposit limits, 40% had used a gambling self-assessment test, and only 17% reported using timeout facilities (Griffiths et al., 2009). More recent studies indicate lower rates of use in other countries. Gainsbury et al. (2020) found the reported use of activity statements was high (88.4%) among online wagering customers in Australia ($n = 564$), but few reported using deposit limits (24.5%) and timeouts (8.1%). A study by the U.K.'s Gambling Commission (2019) found only 9% of 6,425 participants who gambled surveyed reported using limit setting, 3% used self-assessments, 3% used timeouts, and 2% self-excluded from a specific product.

Only two studies have directly investigated volitional CPT use via site data, and these have found actual rates of use are lower than the self-reported figures derived in the studies above. Nelson et al. (2008) found only 1.2% of 47,134 subscribers to *bwin* (a European gambling site) voluntarily set spend limits, while Auer and Griffiths (2013) found 5% of 100,000 *win2day* (an Austrian-based site) subscribers engaged in some type of voluntary self-limiting behavior. The self-limiting behavior in both studies involved changes to pre-existing mandatory limits, potentially increasing customers' awareness of limit tools.

The understanding of online gambling customers' engagement with CPTs gained from extant studies is limited for several reasons. Most have relied on self-reported rates among self-selected samples (Gainsbury et al., 2020; Gambling Commission, 2019; Griffiths et al., 2009) and therefore the rates reported may be unreflective of actual usage. In those studying rates of usage directly (Auer & Griffiths, 2013; Nelson et al., 2008), only limit setting has been investigated and the findings may not generalize to environments where no mandatory limits are imposed, as is the case for many online gambling sites worldwide, including the U.K. and Australia. Existing studies have only involved a single gambling site within each region and therefore it remains unclear whether rates of use may differ between sites. Research relating to how these tools are used initially (e.g., monetary limit amounts) and over time (e.g., changes to limits after setting them) is also absent, precluding an understanding of whether these tools are being used in a way that could actually facilitate harm minimization. Finally, the characteristics (e.g., age, frequency of gambling, net result) of those who voluntarily use CPTs are poorly understood and therefore it remains unclear whether more restrictive tools such as timeouts and self-exclusion are being utilized by the intended target groups (i.e., those at most risk of experiencing gambling harms) and whether particular groups (e.g., older/younger adults) are less likely to use CPTs and may therefore require targeted promotions. Thus, overall, little is known about the natural engagement with these tools by online gambling customers. Yet their provision is required by legislation in

several countries, including several EU states (Marionneau & Järvinen-Tassopoulos, 2017) and Australia (Department of Social Services, 2018), and debates continue regarding voluntary as compared to mandatory use of limits.

In the present study, we sought to overcome the limitations of previous studies of CPT use by using customer account data from multiple gambling sites in Australia to investigate engagement with these tools. We aimed to (a) characterize the use of CPTs by online wagering customers in terms of the number of individuals who use them, (b) investigate patterns of use (e.g., typical limit values selected, changes to deposit limits), (c) explore differences in CPT use across multiple sites, and (d) identify demographic (e.g., age and gender) and wagering-related (e.g., average daily stake, betting frequency) characteristics associated with the use of different CPTs. Using data from Australian sites presents several unique opportunities: very few studies have accessed online gambling account data in Australia (Gainsbury et al., 2012; Gainsbury & Russell, 2015; Heirene & Gainsbury, 2020). Further, concerns regarding high rates of problem gambling among individuals engaged in online gambling have recently led to the development of an Australian-wide customer protection framework (Department of Social Services, 2018). Among other policies, this framework required all sites to implement a system by May 2019 whereby all customers had to set a deposit limit or actively opt-out of setting one. Thus, as an additional aim, we investigated the effect of this policy on the uptake of deposit limits to determine its efficacy in encouraging use.

## Method

### Design

This study involved the retrospective analysis of de-identified account tracking data for customers registered with six prominent online wagering operators in Australia. Data were provided for a period of 12 months (2018/07/01–2019/06/30). Operators were asked to randomly select customers from the entire cohort who

had registered with their site within 5 years preceding the 12-month window to ensure consistency between samples. For inclusion, customers were required to have wagered at least once during the window of interest. No further eligibility criteria were used in order to study samples that were representative of each operator's customer base.

The CPTs of interest were deposit limits, temporary timeouts, and self-exclusion as the use of these can be tracked through routinely collected account data and they were offered by all operators involved in the study (see Table 1 for a definition of each of the tools). All operators offered these CPTs throughout the full duration of the period studied. As one aim of this study was to understand the characteristics associated with CPT use, we selected several indicators of problem gambling to compare CPT and non-tool users. Current evidence suggests the following variables are positively associated with gambling-related problems in online settings: amount staked, frequency of gambling, gambling intensity (number of bets divided by active betting days), variability in amount staked (Behavioural Insights Team [BIT], 2018; Braverman & Shaffer, 2010; Griffiths et al., 2010). In addition to these variables, we selected several additional variables of theoretical interest in this context to compare CPT and non-tool users, including gaps between consecutive bets and between betting days (shorter breaks between bets is thought to be indicative of problem gambling in land-based settings: Delfabbro et al., 2016), net loss (i.e., total amount staked minus winnings), and the total and average amount deposited. It is important to note, however, that we used this collection of variables as proxy indicators of problem gambling risk, and we did not have access to customers' reported problem gambling levels.

### Sample Data

Data requested for each customer included age, gender, postcode, date of registration, and—for the 12-month period studied—any use of deposit limits, timeout or self-exclusion tools (including start date and time, duration, amount [for limits], and, if relevant, end date and

**Table 1**
*Prevalence of CPT Use Among People Who Gamble Online (N = 39,853)*

| CPT | Description | N (%) | <1.9 (1st) | <3.1 (2nd) | <6.0 (3rd) | ≥6.0 (4th) |
|---|---|---|---|---|---|---|
| | | | N (%) by "median bets per day" quartiles | | | |
| Deposit limit | A self-determined limit on the amount of money one can deposit into their account over a specified period of time (e.g., 24 hr; 2 weeks) | 6,313 (15.8%) | 1,313 (21%) | 1,501 (24%) | 1,560 (25%) | 1,939 (31%) |
| Short timeout | The ability to temporarily deactivate one's account for a duration ranging from hours to 6 months (<175 days) | 624 (1.57%) | 24 (3.8%) | 50 (8.0%) | 122 (20%) | 428 (69%) |
| Long timeout | The ability to temporarily deactivate one's account for a duration ranging from 6 months to 1 year (175–369 days) | 220 (0.55%) | 16 (7.3%) | 16 (7.3%) | 43 (20%) | 145 (66%) |
| Temporary self-exclusion | The ability to temporarily deactivate one's account for an extended duration ranging from 1 to 5 years (370–1849 days) | 64 (0.16%) | 6 (9.4%) | 5 (7.8%) | 11 (17%) | 42 (66%) |
| Permanent self-exclusion | The ability to temporarily deactivate one's account for 5 or more years (≥1850 days) | 229 (0.57%) | 14 (6.1%) | 21 (9.2%) | 32 (14%) | 162 (71%) |

*Note.* It is important to note that these definitions of timeouts and self-exclusion are not necessarily those used by each operator. Substantial variability was evident in the specific timeout and self-exclusion durations offered by operators and we have grouped these into the above categories.

time) and details of transactions (i.e., date, time, and amount for deposits and withdrawals) and all bets placed (i.e., date, time, amount, sport, odds, and outcome; all monetary values in $AUD). Collecting these variables allowed us to analyze CPT use and compare it with wagering behavior. Data were provided for a total of 51,632 customers across the six sites. Prior to analysis, an extensive process of filtering the data according to our eligibility criteria was undertaken to remove any customers who did not wager or who registered within the window of interest (additional details on this process can be found in the Supplemental Materials), resulting in a final sample of 39,853 customers.

## Ethics

All data were de-identified prior to sharing with the research team, which is in agreement with the terms and conditions of operators who can share anonymized consumer data with an authorized third party. Direct consent from wagering customers was not obtained, which is consistent with the National Health and Medical Research Council (2018) as the benefits from undertaking the research using a naturalistic design justified the low risks associated with collecting customers' de-identified data. Approval to carry out the study was obtained from the University of Sydney Human Research Ethics Committee (reference number: 2018/400).

## Data Analysis

Analysis was carried out using the statistical programming language R version 4.0.0 (R Core Team, 2020). Scripts used for analysis and all R packages used are listed on Open Science Framework (https://osf.io/23ejv/). The characteristics of the customers (e.g., median age, gender distribution) and wagering activity (e.g., time of wagers, net outcome) were compared across operators to ensure no operator's data diverged notably from others (potentially indicating a biased sample selection; see Table 2).

We performed multiple omnibus tests and pair-wise comparisons to compare subgroups of customers and so we set α at 0.001 for all analyses to reduce the experiment-wise Type-I error rate (Benjamin et al., 2018). All statistical analyses conducted were exploratory and should be interpreted as such (Bender & Lange, 1999).

## Results

The characteristics of the 39,853 customers included in our final sample are presented in Table 2. Notably, the demographic and wagering characteristics of the samples provided by each operator appear relatively similar, with some expected variation. Accordingly, all outcomes were calculated using the entire sample of customers from all six operators.

## Prevalence of CPT Use

In total, 6,713 (16.8%) customers used at least one CPT during the 1-year study window and 33,140 (83.2%) did not use any tools. Table 1 displays the frequency of use for each CPT, along with the definition of the tools. Deposit limits were most frequently used, followed by short timeouts, permanent self-exclusion, long-term

**Table 2**
*Sample Characteristics (n, %, Median, Interquartile Range) by Operator and Overall*

| Characteristic | Operator 1 $N = 1,890\ (4.7\%)^a$ | Operator 2 $N = 9,391\ (24\%)^a$ | Operator 3 $N = 8,245\ (21\%)^a$ | Operator 4 $N = 3,973\ (10\%)^a$ | Operator 5 $N = 850\ (2.1\%)^a$ | Operator 6 $N = 15,504\ (39\%)^a$ | Overall $N = 39,853\ (100\%)$ |
|---|---|---|---|---|---|---|---|
| Gender | | | | | | | |
| Female | 127 (6.7%) | 1,149 (12%) | 696 (8.4%) | 462 (12%) | 75 (8.8%) | 2,600 (17%) | 5,109 (13%) |
| Male | 1,763 (93%) | 8,242 (88%) | 7,549 (92%) | 3,059 (77%) | 759 (89%) | 12,033 (78%) | 33,405 (84%) |
| Unknown | 0 (0%) | 0 (0%) | 0 (0%) | 452 (11%) | 16 (1.9%) | 871 (5.6%) | 1,339 (3.4%) |
| Age | 34.00 | 35.00 | 31.00 | 35.00 | 33.50 | 32.00 | 33.00 |
| | [27.00–43.00] | [27.00–46.00] | [26.00–38.00] | [27.00–46.00] | [26.00–43.00] | [26.00–40.00] | [26.00–42.00] |
| Unknown | 0 | 0 | 0 | 0 | 0 | 20 | 20 |
| No. days since opening account | 926.56 | 884.28 | 888.00 | 1,018.00 | 774.50 | 1,043.48 | 972.20 |
| | [561.71–1,507.56] | [603.57–1,335.58] | [527.00–1,336.00] | [720.00–1,565.00] | [450.25–1,236.75] | [655.16–1,533.67] | [615.04–1,438.13] |
| Total bets | 63.00 | 55.00 | 38.00 | 24.00 | 22.00 | 43.00 | 41.00 |
| | [9.00–366.75] | [9.00–281.00] | [7.00–159.00] | [6.00–100.00] | [5.00–74.75] | [10.00–173.00] | [8.00–184.00] |
| No. active days | 13.00 | 14.00 | 12.00 | 7.00 | 6.00 | 14.00 | 12.00 |
| | [3.00–52.00] | [3.00–51.00] | [3.00–44.00] | [2.00–23.00] | [2.00–19.75] | [3.00–46.00] | [3.00–43.00] |
| Net result | $-95.14 | $-80.00 | $-72.21 | $-22.00 | $-75.12 | $-72.00 | $-65.80 |
| | [−715.10–22.26] | [−515.30–−1.00] | [−391.23–−5.00] | [−129.30–−20.00] | [−340.53–−27.47] | [−309.76–−10.00] | [−358.50–−4.44] |

*Note.* [a] Statistics presented: n (%); median [25%–75% percentiles]; "Active days" defined as a day during which at least one bet was placed; "Net result" refers to the overall outcome for customers for the entire 1-year study window; total bets and no. active days were also calculated for the entire 1-year study window.

**Figure 1**

*Intersections of CPT Use Among People Who Gamble Online*
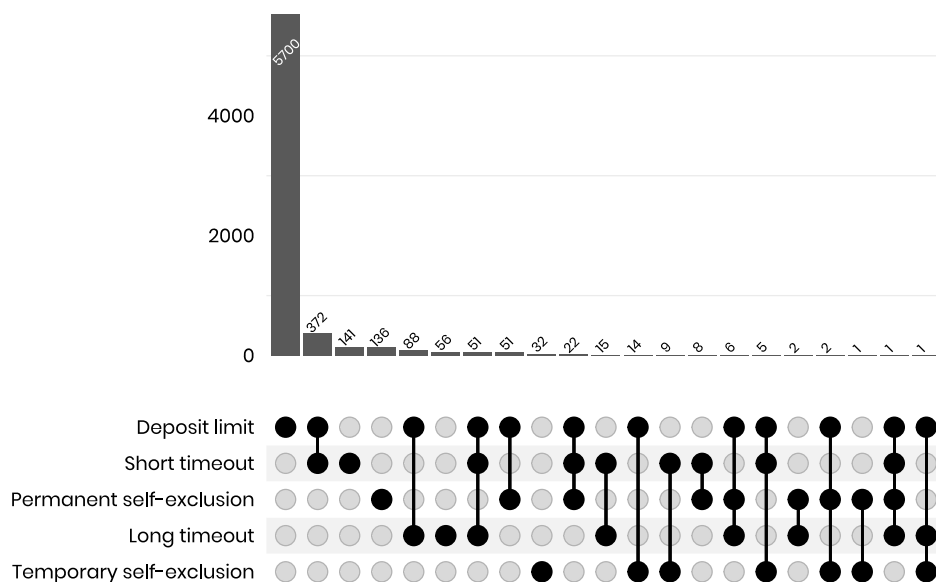


*Note.* This plot shows the "intersection size" for each tool, or the number of customers using all possible combinations of tools and the number using each tool in isolation (for example, this plot shows that 372 customers used a deposit limit and short timeout, and 141 used just a short timeout).

timeouts, and temporary self-exclusion. We calculated prevalence rates for the sample when divided into quartiles based on the median number of bets per active betting day as a measure of gambling intensity (Table 1). Rates of use for all tools increased linearly with each quartile. This was particularly pronounced for the timeout and self-exclusion tools, where 66%–75% of users were within the fourth quartile ($\geq$6 bets per day) and only 25%–34% were in the first three quartiles. Next, we investigated whether customers used multiple CPTs throughout the 1-year window. Figure 1 displays the number of people who used each tool in isolation, along with each of the "intersections" of tool use (i.e., the number of customers using each possible combination of CPTs).

Based on the distribution and overlap of CPT use presented in Figure 1, we decided to divide customers into the following categories for comparison: (a) None/non-users: customers who used no CPT at any point during the study ($n = 33,140$, 83.2%), (b) Limit setters: customers who used deposit at any point during the study, but not timeouts or self-exclusion ($n = 5,700$, 14.3%), and (c) Timeout & self-exclusion users: customers who used timeouts and/or self-exclusion at any point during the study

window, and who may have also used deposit limits during this time ($n = 1,013$, 2.54%). The number of customers by operator within each of these CPT use groups is displayed in Table 3. We used Chi-square tests of independence to determine whether the proportions of these groups differed significantly between operators. The proportion of limit setters was significantly different between operators, $\chi^2(5, N = 39,853) = 4,213.01$, $p < .001$, with a large effect size, Cramer's $V = 0.325$, 95% CIs [0.315–0.335]. Similarly, the proportion of timeout & self-exclusion users was significantly different between operators, $\chi^2(5, N = 39,853) = 319.04$, $p < .001$, although the effect size was small, $V = 0.089$ [0.079–0.988].

As outlined in our introduction, the Australian Government's Department of Social Services (2018) mandated an opt-out scheme for limit setting in May 2019, which required all online gambling operators in Australia to make their customers either set a deposit limit or actively choose not to use a limit (the ability to gamble was suspended until this decision had been made). We looked to see whether the introduction of this system affected uptake of the deposit limit tool (see Figure 2), although this analysis was

**Table 3**

*Differences in the Prevalence of CPT Use Between Operators*

| CPT use group | Operator 1 $N = 1,890$[a] | Operator 2 $N = 9,391$[a] | Operator 3 $N = 8,245$[a] | Operator 4 $N = 3,973$[a] | Operator 5 $N = 850$[a] | Operator 6 $N = 15,504$[a] |
|---|---|---|---|---|---|---|
| None | 1,770 (94%) | 8,821 (94%) | 7,449 (90%) | 3,538 (89%) | 497 (58%) | 11,065 (71%) |
| Limit setters | 22 (1.2%) | 213 (2.3%) | 698 (8.5%) | 257 (6.5%) | 310 (36%) | 4,200 (27%) |
| Timeout and self-exclusion | 98 (5.2%) | 357 (3.8%) | 98 (1.2%) | 178 (4.5%) | 43 (5.1%) | 239 (1.5%) |

*Note.* [a] Statistics presented: *n* (%).

**Figure 2**

*Effect of an Opt-Out Policy on Deposit Limit Uptake Rates*
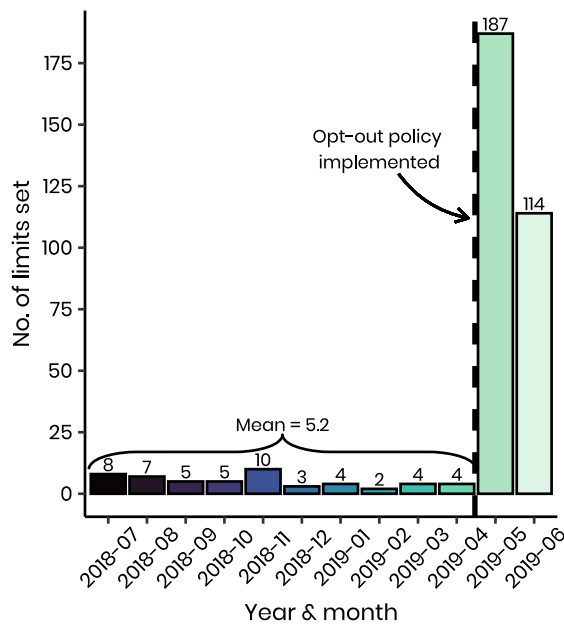


*Note.* This figure shows the impact of a policy change that made customers set a limit, or opt-out of setting one, on subsequent uptake rates. The bars represent the number of deposit limits set each month by the customers of Operator 5 ($N = 850$) throughout the study period (07/2018–/06/2019). The sharp increase in uptake seen in May 2019 corresponds with the introduction of a mandatory opt-out scheme. See the online article for the color version of this figure.

restricted to customers from one operator as all others had already implemented a form of opt-out strategy prior to May 2019. As can be seen, there was a precipitous increase in the number of limits set by Operator 5's customers in May 2019 (up by 3,496% from the average number of limits set in the preceding 10 months), corresponding to the introduction of the opt-out scheme.

## Patterns of CPT Use

We found that customers most commonly used a deposit limit first before using timeouts or engaged with both on the same day (Figure 3A).[1] The most frequent way in which customers changed their deposit limit was by increasing it (i.e., making it less restrictive), followed by decreasing it, and then removal of the limit altogether (Figure 3B). When broken down by CPT use groups, those who only used deposit limits were proportionally more likely to increase their limit than those who used timeouts and/or self-exclusion and limits, while the latter group was more likely to decrease or remove their limit (Figure 3B). Many customers made multiple changes to their limits (Figure 3C) and those who changed the greatest number of times became increasingly more likely to reduce or remove their limit (Figure 3D). All sites offered different deposit limit durations (1, 7, and 30 days) and there were a similar number of each limit duration set by customers. Similarly, the median monetary limit set was almost identical for daily ($100), weekly ($100), and monthly ($108) limits for all limit setters and there was little difference between the two CPT use groups.

## Correlates of CPT Use

Table 4 presents comparisons between the three CPT use groups in relation to their demographic and gambling-related characteristics. To enable comparisons between variables with grossly different magnitudes, we normalized each variable to have a mean for the entire sample 0 and a *SD* of 1. The "bestNormalize" R package was used to identify the optimal transformation for each variable. Following the transformations, Levene's tests revealed that the homogeneity of variance assumption was not met for any of the variables. As a result, Welch's *F* tests were used to compare differences in means between the three groups. All tests were significant at our reduced α level of <.001 (see Table 4). Omega Squared ($\omega^2$) values with 95% confidence intervals were also calculated to estimate the magnitude of effects (Lakens, 2013), all of which were in the small range.

As all omnibus *F* tests indicated significant variation between mean group scores, post-hoc comparisons were performed using Games-Howell tests and Cohen's *d* effect sizes with 95% confidence intervals were calculated to estimate the magnitude of group differences (see Figure 4). As this is the new area of enquiry, we had no previous investigations on which to judge the size of effects in this study and so the conventional ranges proposed by Cohen (1988; i.e., small ≥0.2–<.05; medium ≥0.5–<0.8; large ≥0.8) were used as guides for interpretation (Vacha-Haase & Thompson, 2004); however, we also included a negligible range (<0.2) to indicate that in effect was so small that it is unlikely to be of interest in this context.

As can be seen in Figure 4, there were differences in total number of bets, bets per day, active days, median stake, *SD* of daily staked amounts and daily results, and total amounts deposited when comparing the timeout and self-exclusion group with non-tool users and with deposit limit users, and few notable differences between deposit limit users and non-tool users. Alongside these comparisons, we compared differences in the gender distribution between these groups using Chi-squared tests. Timeout and self-exclusion users were proportionately more likely to be male (male = 90.8%, female = 5.63%, unknown = 3.55%) compared to non-users (male = 83.6%, female = 12.8%, unknown = 3.57%) and limit setters (male = 83.8%, female = 14.07%, unknown = 2.09%). The difference was significantly different, $\chi^2(2, N = 38,514) = 52.85, p < .001$, with a small effect size, $V = 0.037 [0.027–0.047]$.[2]

To summarize the effects that were non-negligible and statistically significant, timeout and self-exclusion users were younger and more likely to be male than non-CPT users and limit setters in relation to their demographic characteristics. In relation to gambling behavior, timeout and self-exclusion users placed more bets and bet on more days (only relative to non-CPT users, and not limit setters), had higher median stake amounts, lost more money, had smaller breaks between betting days, had greater variability in their daily

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[1] We broke down these figures by operator and observed that most of the customers who first used limits and timeouts on the same day came from one gambling site and that this phenomenon was rare among customers from other sites.

[2] Customers with an unknown gender were not included in this chi-square analysis. The gender comparison was not included in Table 4 as it is a categorical variable and therefore required a different type of analysis to all other variables compared.

**Figure 3**
*Patterns in the Use of Deposit Limits Among People Who Gamble Online*
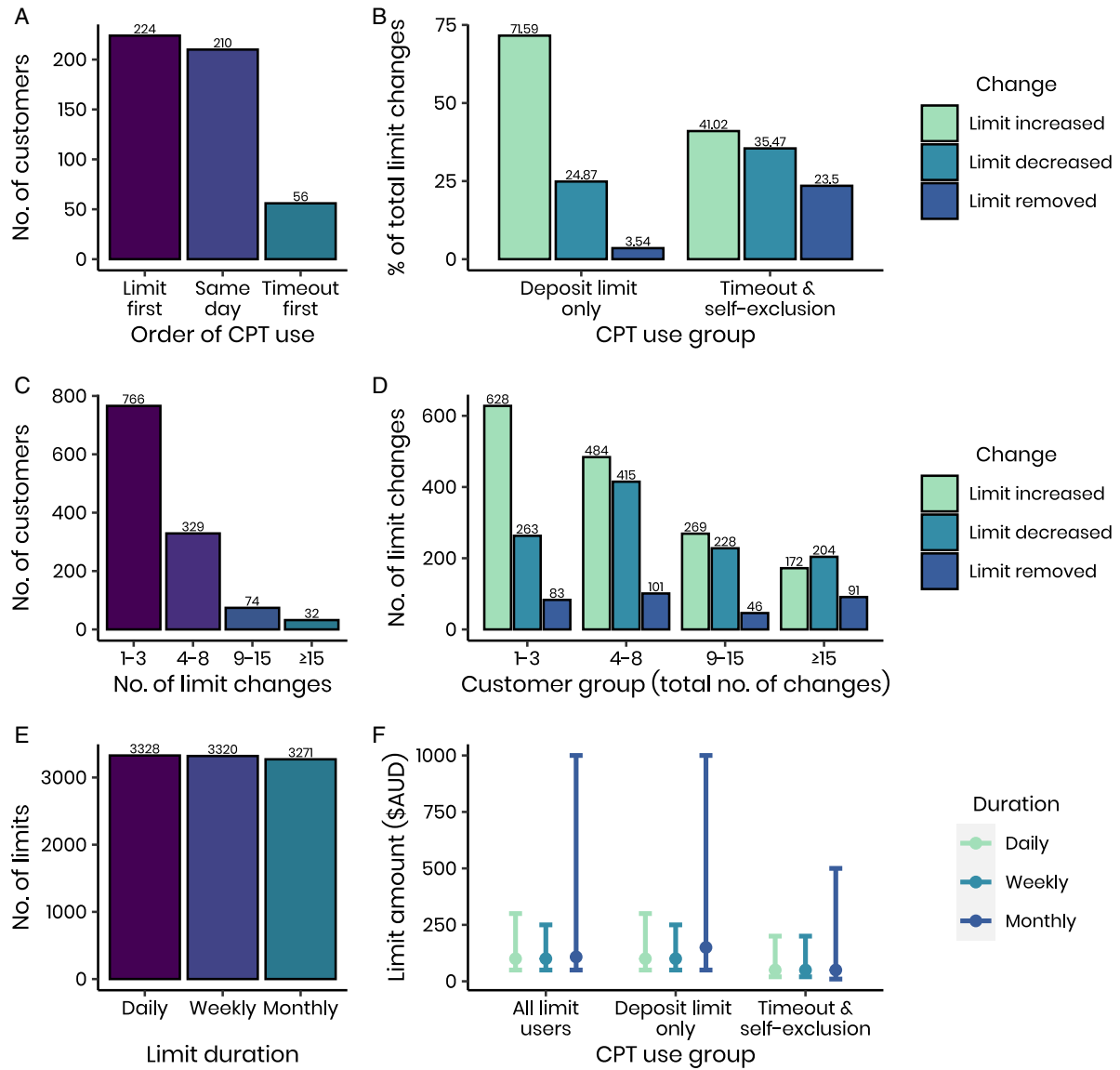


*Note.* Panel A displays the order in which customers used deposit limits and timeouts (for customers who used both tools); Panel B presents the types of limit changes made by CPT use groups (percentages of total changes made by group); Panel C shows the number of customers who made increasingly more changes to their deposit limits; Panel D displays the types of limit changes made by customers who made different numbers of total limit changes; Panel E shows the number of limits set of each duration; Panel F presents the median dollar amount of the limits set by duration and CPT use group (bars represent the 25th and 27th percentiles). See the online article for the color version of this figure.

amount staked and net result, bet more times per active day, and deposited more money into their accounts in the 1-year window.

## Discussion

The overarching aim of this study was to better characterize consumer engagement with the CPTs online gambling sites offer their customers. We gained unprecedented access to large datasets of customer account data from six different gambling sites in Australia for a 1-year period (July 2018–June 2019). Using this

data, we have provided novel insights into the number of those who use these CPTs and their characteristics, as well as the ways in which these tools are used. We found nearly 16% of customers used deposit limits and less than 2% used the timeout or self-exclusion tools. These rates are considerably lower than those for deposit limit (24.5%) and timeout (8.1%) use self-reported by online wagering customers in Australia recently (Gainsbury et al., 2020). This may suggest that those who volunteer to participate in survey research may not be representative of the wider population of online gambling customers or that they potentially inaccurately recall or report

**Table 4**

*Comparisons Between CPT Use Groups' Transformed Demographic and Gambling-Related Characteristics: Omnibus F-Tests*

| Variable | Transformation applied | Limit setters~ N = 5,700 | None~ N = 33,140 | Timeout & SE~# N = 1,013 | Omega Sq^ ($\omega^2$) | Welch's F test | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | p | F | df |
| Age | Arcsinh | −0.063 (0.985) | 0.021 (1.004) | −0.317 (0.879) | 0.0034 [0.0024–0.0047] | <.001 | 84 | 22,532 |
| Socioeconomic status | Yeo-Johnson | −0.057 (0.995) | 0.012 (1.001) | −0.063 (0.981) | 0.0006 [0.0002–0.0012] | <.001 | 14 | 22,494 |
| No. days since opening account | Box Cox | −0.082 (0.940) | 0.011 (1.010) | 0.096 (0.960) | 0.0013 [0.0007–0.0021] | <.001 | 29 | 22,518 |
| Active days | Square root | 0.112 (1.034) | −0.029 (0.991) | 0.317 (1.013) | 0.0050 [0.0037–0.0065] | <.001 | 97 | 22,486 |
| Total no. bets | Arcsinh | 0.111 (0.984) | −0.043 (0.994) | 0.769 (0.914) | 0.0182 [0.0157–0.0209] | <.001 | 424 | 22,517 |
| Stake* | Yeo-Johnson | −0.193 (0.988) | 0.015 (0.996) | 0.599 (0.894) | 0.0146 [0.0124–0.0170] | <.001 | 340 | 22,524 |
| Net result | Arcsinh | −0.088 (0.948) | 0.030 (1.003) | −0.499 (1.016) | 0.0081 [0.0065–0.0100] | <.001 | 162 | 22,501 |
| Mean time between wagers | Yeo-Johnson | −0.083 (1.027) | 0.017 (1.000) | −0.075 (0.816) | 0.0014 [0.0007–0.0023] | <.001 | 26 | 22,493 |
| Days between betting days* | Square root | 0.017 (0.971) | 0.011 (1.016) | −0.257 (0.486) | 0.0019 [0.0011–0.0029] | <.001 | 134 | 22,862 |
| SD of daily stake | Yeo-Johnson | −0.117 (1.031) | −0.018 (0.976) | 1.133 (0.831) | 0.0383 [0.0345–0.0424] | <.001 | 927 | 22,397 |
| SD of daily result | Yeo-Johnson | −0.130 (1.003) | −0.007 (0.989) | 0.883 (0.867) | 0.0244 [0.0213–0.0278] | <.001 | 541 | 22,393 |
| Bets per active day* | Box Cox | 0.052 (0.973) | −0.040 (0.989) | 1.019 (0.938) | 0.0280 [0.0250–0.0313] | <.001 | 632 | 22,511 |
| Amount deposited* | Yeo-Johnson | −0.156 (0.884) | 0.023 (1.016) | 0.154 (1.012) | 0.0047 [0.0034–0.0063] | <.001 | 102 | 22,497 |
| Total amount deposited | Yeo-Johnson | −0.009 (1.008) | −0.032 (0.987) | 0.978 (0.823) | 0.0277 [0.0245–0.0312] | <.001 | 721 | 22,524 |

*Note.*   ~ = M (SD); ^ = value [95% CI]; * = Median values computed from raw scores (for example, for each customer a "median amount staked" value was computed, and this was included in the analysis); #SE = self-exclusion. Socioeconomic status was determined by using IRSAD (Index of Relative Socio-economic Advantage and Disadvantage) scores [IRSAD scores summarize information about the economic and social conditions of people and households within an area, including both relative advantage (e.g., % employed as professionals; % of high-income earners) and disadvantage (e.g., % of unemployed; % of low-income earners). A summary IRSAD figure is computed for each census area. A low score indicates relatively greater disadvantage and a lack of advantage in general. It is important to note that each customer's IRSAD score was determined using their postcode and is not therefore based on socio-economics factors specific to them. Thus, while postcodes can provide some indication of the relative socio-economics status of customer using the IRSAD index, each person is likely to vary to some degree from this summary score].

their use of CPTs and may be consistent with evidence that self-selecting samples may have inflated rates of problem gambling (Pickering & Blaszczynski, 2021). We also found that rates of CPT use, particularly timeouts and self-exclusion, were higher among those who gambled more intensely (i.e., bets per active day), providing objective data to support increased self-reported problem gambling among those using timeouts (Gainsbury et al., 2020) and self-exclusion (Motka et al., 2018). Although our sample was randomly selected by each operator from their pool of customers and therefore should provide an approximately representative indication of CPT use rates at the population level, this finding demonstrates how rates may vary in online gambling samples depending on variations in the number of high-intensity betters.

There may be several reasons why online gambling customers do not use the CPTs available to them. There may be a lack of awareness of some tools. Gainsbury et al. (2020) found 14.5% of Australian wagering customers were unaware of the deposit limit tool and 34.2% were unaware of timeouts, although awareness of deposit limits should now be greater given the opt-out policy. There may also be social barriers to engagement with CPTs. Procter et al. (2019) found Australian wagering customers' reported low subjective norm scores in relation to CPT use, indicating that they thought people in their lives did not use and/or value these tools. Differences in the ease-of-access between gambling sites could impact uptake. The rates of CPT use varied significantly between operators, highlighting the value of conducting online gambling research with customers from multiple sites and indicating that legislation requiring CPT use needs to be

highly specific about how the tools are promoted and where they are placed to encourage customer uptake.

We discovered that engagement with limit setting substantially increased among customers from one operator in May 2019, corresponding with the introduction of a government-mandated opt-out limit scheme. This finding is consistent with research in the health and medical fields which supports the value of switching from opt-in to opt-out systems for encouraging health-promoting and altruistic decision making (e.g., vaccination, organ donation; Chapman et al., 2010; Matjasko et al., 2016) and has important implications for how gambling sites offer non-restrictive CPTs that could be useful for all customers (i.e., not just those already experiencing gambling problems). For example, using an opt-out system could be useful for increasing engagement with a new CPT offered by some Australian sites which sends "check-in" messages to customers after they spend a certain amount of time or money or place a particular number of bets. The success of the opt-out scheme observed here is also consistent with messaging studies that have aimed to increase CPT uptake. These studies have found that reducing friction or effort required to access tools from messages is more strongly related to uptake than variations in message content (BIT, 2018; Heirene & Gainsbury, 2020; Kim et al., 2014). However, before deciding which CPTs should be implemented via an opt-out system or encouraged via messaging it is important that future studies evaluate the harm-reducing qualities of new and existing CPTs on online sites as quality trials are scant (cf. Heirene & Gainsbury, 2020).

Exploring patterns in the use of CPTs, we found that many customers who use deposit limits altered or removed the limit

**Figure 4**

*Comparisons Between CPT Use Groups' Demographic and Gambling-Related Characteristics: Cohen's d Effect Sizes With 95% Confidence Intervals*
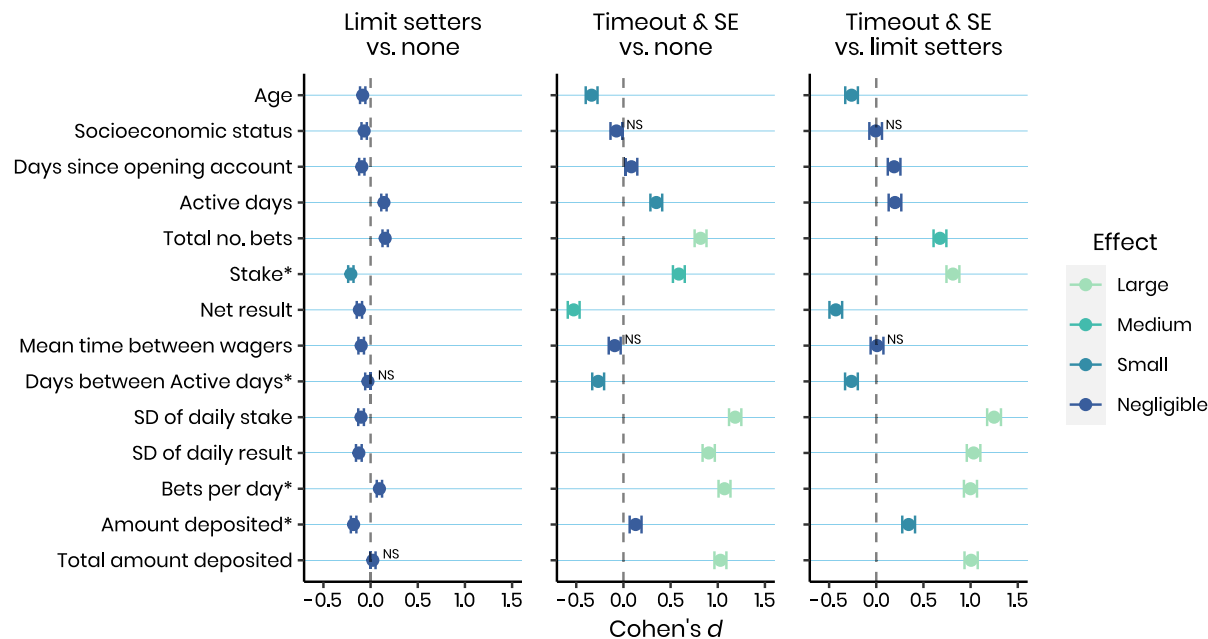


*Note.* Effects sizes are colored according to their magnitude: negligible (<.2), small (≥0.2–<.05), medium (≥0.5–<0.8), and large (≥0.8). NS = difference between groups not statistically significant at $p < .001$ (Games-Howell tests). * = Median values computed from raw scores (for example, for each customer a "median amount staked" value was computed, and this customer-level aggregate was used for analysis). The complete outcomes from all Games-Howell tests and the numerical values for the effect sizes and confidence intervals displayed here can be found in the Supplemental Materials. See the online article for the color version of this figure.

amount after setting it. Those who used timeouts and/or self-exclusion and limits and those who frequently changed their limit were proportionately more likely to reduce or remove their limits, which could be in-keeping with a more at-risk customer group who are attempting to restrict their gambling (reduction) or chase losses (removal). Future studies should assess the value of using the number of deposit limit changes as individual makes as an indicator of risky gambling. The finding that limits are often increased or removed by customers who may be at risk of experiencing gambling problems suggests gambling sites need to increase the friction required to increase and remove limits—perhaps by increasing the delay before the change comes into effect and presenting the option to reverse these changes throughout the delay period—and implement strategies that can assist customers to set and adhere to appropriate limits. Experimental studies suggest pop-up messages can encourage individuals using gaming machines to stick to predetermined limits (Tabri et al., 2019; Wohl et al., 2013) and such messages have shown promise in encouraging customers to set limits on online sites (Heirene & Gainsbury, 2020). However, the overall low adoption rate of limit setting we observed in this study may support the value of site-level, mandatory limits. European research indicates that many customers are not opposed to mandatory limits and do not report gambling with other operators once they reach the global limit (Auer et al., 2018).

Comparisons between deposit limit users, timeout and/or self-exclusion users, and non-tool users revealed substantial differences

between timeouts and self-exclusion users and the other groups. Compared to non-CPT users and limit setters, timeout and self-exclusion users were younger, more frequently male, they placed more bets and bet on more days,[3] had higher median stake amounts, lost more money, had a smaller gap between betting days, had greater variability in their daily staked amount and net result, bet more times per active day, and deposited more money into their accounts over the year. By contrast, there were few notable differences between users of deposit limits and non-tool users. These findings support the view that those who use timeouts and self-exclusions are more at-risk of or already experiencing gambling problems (BIT, 2018; Braverman & Shaffer, 2010) and is consistent with higher self-reported problem gambling among tool users compared to non-users (Gainsbury et al., 2020).

The higher rates of risky gambling (e.g., higher stake amounts, losses, betting frequency) observed among timeout and self-exclusion users in this study may question the purported harm-reducing capabilities of these tools, although notably we only compared aggregated values for the year and did not compare the effect using each tool had on customers' gambling behavior from pre- to post-CPT use. There is a need for studies to utilize account data to explore the impact of voluntary CPT use over time on customers' indicators of risk (e.g., high daily wager amounts,

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[3] Only relative to non-tool users.

frequency gambling), particularly for timeout and temporary self-exclusion tools as only one study (to the authors' knowledge) has formally evaluated their effects in the online context and this focused solely on online poker players (Luquiens et al., 2019).

## Strengths and Limitations

This was the first (to the authors' knowledge) study to investigate CPT use across multiple gambling sites using objectively recorded account data and thus the findings provide an understanding of CPT engagement that is both novel and representative of online gambling in Australia. The sample size of customers studied was very large, further increasing the representativeness of findings and ensuring that high levels of power were achieved for statistical analyses. Still, there are limitations to the findings reported here. For example, online gambling in Australia is restricted to sports and race wagering and therefore the findings may not extend to jurisdictions where other forms of gambling (e.g., online poker, casino games) are common. We were also unable to obtain self-reported measures of problem gambling (Caler et al., 2016) and gambling harm (Delfabbro & King, 2019) to compare with account data and instead relied on proxy indicators of these variables (e.g., total no. bets, median amount deposited). Further, we were unable to examine some of the mostly commonly used CPTs reported in other studies such as activity statements (Gainsbury et al., 2020) and self-assessments (Forsström et al., 2016, 2020), which may have provided further insights into the uptake and effectiveness of CPTs. Finally, the customer account data used here does not include indicators of race or ethnicity and so we have no means of determining the generalizability of our findings along these factors.

## Conclusions

The findings presented here can inform harm prevention specialists and policymakers in their efforts to reduce the harm associated with online gambling by providing an enhanced understanding of customer engagement with current harm-minimization strategies. Our findings indicate that the uptake of CPTs (deposit limits, timeouts, and self-exclusion) is low among online gambling customers in Australia despite new legislation requiring mandatory customer exposure to these. Combined with evidence that many people who gamble are unaware of CPTs (Auer et al., 2018; Gainsbury et al., 2020), our study suggests greater efforts are needed to promote awareness of these tools and encourage their uptake. We identified groups with lower rates of timeouts and self-exclusion use (e.g., older adults and females) which can be used to direct promotional efforts. The development of strategies for effectively communicating the potential benefits of timeouts is particularly warranted given the very low uptake rates and dearth of research on the promotion of tools other than limits. We found that an opt-out limit scheme substantially increased deposit limit use which, in conjunction with the finding of responsible gambling messaging studies (e.g., Heirene & Gainsbury, 2020), suggests strategies that reduce the effort required for customers to access and utilize CPTs may be useful for encouraging their use. We identified a key limitation of the deposit limit tool currently offered on Australian sites (i.e., the ability to easily increase limits multiple times or remove them altogether) which supports the introduction of greater friction and delays to increase limits and messaging to assist customers to determine, set, and adhere to appropriate limits.

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