

Help on demand: Development and feasibility testing of a self-directed mobile app intervention for gambling problems

Brad W. Brazeau, John A. Cunningham, David C. Hodgins

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Abstract

Background: Compared to other mental health problems, self-directed interventions for gambling problems lack in quantity, accessibility, and in some cases, evidence base. Moreover, engagement with these interventions remains modest. Mobile apps may be a viable format to deliver self-directed interventions that enhance user engagement.

Objective: The aims of the current study were to develop a self-directed mobile app intervention for gambling problems and to conduct initial feasibility and acceptability testing with a small sample of Canadian adults with past or present gambling problems (N = 30).

Methods: Participants were invited via email from a list of people who previously volunteered in similar research in our lab. Theory and content of the mobile app intervention were primarily based on a self-directed workbook that has been evaluated in paperback and static web-based formats. The current app prototype included daily gambling diaries, recommended activities based on diary responses, and psychoeducation. It was available for two weeks, after which users provided feedback via surveys (n = 30) and a virtual focus group (n = 8). Quantitative and qualitative feedback, as well as app usage data, were analyzed to provide descriptive statistics and summaries.

Results: Regarding feasibility, median completion time for activities ranged from 48 to 137 seconds. Daily diary completion rate was 51%. One third of activities were accessed via prompt and two thirds on demand. Many participants repeated at least one activity, and all activities were repeated by at least one participant. Results also indicated favourable user reviews, particularly regarding the app's credibility, ease of use, and potential impact. The feedback on some app features was highly variable, such as the perceived utility of daily diaries. Specific recommendations for improvement were provided, such as inclusion of information on concurrent substance use and more interactive psychoeducation.

Conclusions: Overall, the app met or exceeded thresholds for feasibility and acceptability to justify improvements and effectiveness testing on a larger scale. The variability in user feedback underscores the demand for further personalization.

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Original Manuscript

Help on demand:**Development and feasibility testing of a self-directed mobile app intervention for gambling problems**

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Abstract**Background**

Compared to other mental health problems, self-directed interventions for gambling problems lack in quantity, accessibility, and in some cases, evidence base. Moreover, engagement with these interventions remains modest. Mobile apps may be a viable format to deliver self-directed interventions that enhance user engagement.

Objectives

The aims of the current study were to develop a self-directed mobile app intervention for gambling problems and to conduct initial feasibility and acceptability testing with a small sample of Canadian adults with past or present gambling problems (N = 30).

Methods

Participants were invited via email from a list of people who previously volunteered in similar research in our lab. Theory and content of the mobile app intervention were primarily based on a self-directed workbook that has been evaluated in paperback and static web-based formats. The current app prototype included daily gambling diaries, recommended activities based on diary responses, and psychoeducation. It was available for two weeks, after which users provided feedback via surveys ($n = 30$) and a virtual focus group ($n = 8$). Quantitative and qualitative feedback, as well as app usage data, were analyzed to provide descriptive statistics and summaries.

Results

Regarding feasibility, median completion time for activities ranged from 48 to 137 seconds. Daily diary completion rate was 51%. One third of activities were accessed via prompt and two thirds on demand. Many participants repeated at least one activity, and all activities were repeated by at least one participant. Results also indicated favourable user reviews, particularly regarding the app's credibility, ease of use, and potential impact. The feedback on some app features was highly variable, such as the perceived utility of daily diaries. Specific recommendations for improvement were provided, such as inclusion of information on concurrent substance use and more interactive psychoeducation.

Conclusions

Overall, the app met or exceeded thresholds for feasibility and acceptability to justify improvements and effectiveness testing on a larger scale. The variability in user feedback underscores the demand for further personalization.

Keywords: gambling; addictive behaviour; ecological momentary intervention; just-in-time adaptive intervention; mobile app; telemedicine; self-help; self-directed treatment.

Introduction

Background

Those who seek self-directed treatment for many mental health problems are spoiled for choice. In fact, there is so much choice for some disorders that treatment selection itself can be overwhelming [1]. Paper-and-pencil workbooks, web programs, and mobile apps permeate the self-help space, particularly for mood and anxiety disorders [2–4]. Generic mental health apps, including Headspace and Calm, are also highly popular [5,6]. People with gambling problems are not nearly as well supported in their specific needs, some of which are predominant in gambling, such as financial concerns. This gap is unfortunate given that there is a high demand for self-directed gambling treatment. Most gamblers who attempt to change do so independently [7], and many prefer to use self-directed interventions for the privacy, ease of access, and ability to control their pace and level of engagement [8–11]. The current paper describes and contextualizes the development of a self-directed, tailored mobile app for gambling problems specifically designed to enhance user engagement.

Evidence-based self-directed treatment for gambling problems first took hold in the 1990s

and 2000s, mainly in the form of cognitive-behavioural bibliotherapy [12]. In the 2010s, much of the same content was delivered via the web to expand accessibility and cost-effectiveness (Rodda et al., 2018). Multiple theories and treatment approaches were implemented in these resources, many of which were offshoots of CBT or third-wave modalities. Newer technologies, like mobile apps, virtual reality, and artificial intelligence (AI) have become a central focus of self-directed interventions for gambling problems in the 2020s (cf. So et al., 2020). These emerging modes of delivery are especially promising because, in addition to offering all the benefits of 2010s-style web-based interventions, they increasingly permit tailored, responsive, and interactive content rather than static, generalized, or read-only resources. As it stands, however, very few evidence-based options are publicly available to treatment-seeking gamblers.

In a review, Merkouris [15] identified six evidence-based mobile apps for gambling problems. Most were based on pre-existing paperback or web-based workbooks (e.g., Dowling et al., 2021). However, only one French-language app was publicly available. The most thoroughly researched app, *GamblingLess: Curb Your Urge*, specifically targeted transient gambling urges with an array of cognitive, behavioural, and mindfulness-based strategies (Hawker et al., 2021; Merkouris et al., 2020). Preliminary results indicated good acceptability and effectiveness, albeit low uptake and compliance. The same research group has published protocol papers for development of similar mobile apps that vary in their intended audience [19–21]. Other mobile apps for gambling problems are publicly available, but most are solely abstinence-based and do not rely on a recognizable treatment model [22]. For example, most available apps consist only of an abstinence time tracker, while some also include reminder notifications and motivational quotes. Some newer apps contain gambling website blocking software, gambling-related information, and directories of external support services, but very few were developed in conjunction with people with lived experience [23]. Taken together, there are not many viable mobile apps that target gambling problems, but preliminary research on a select few is encouraging.

Perhaps the greatest challenge in offering self-directed interventions for mental disorders, including gambling problems, has been low user engagement [24]. Engagement in this context is often measured in terms of objective and subjective indicators of treatment use, such as the number of activities completed or ratings of subjective appeal [11,25]. Engagement is not simply adherence to an intervention, although adherence is often considered one piece of engagement [26,27]. Rather, engagement likely comprises a combination of behavioural, cognitive, and affective factors, including enjoyment, motivation, and perceived relevance [27,28]. Perski and colleagues [11] proposed that subjective and objective engagement is moderated by the content and delivery of the intervention, the real-world context of its use, and the behaviour it targets. Treatment outcomes are in turn moderated by user engagement. The recent development of tailored and adaptive interventions has been, in large part, a response to the problem of low engagement by improving intervention content and delivery.

The problem of low user engagement has been underscored in the gambling field as intervention usage data has revealed just how modest user engagement tends to be. In our recent trial of a static self-directed web program for problem gambling [29], we found that 40% of participants did not complete any modules, but those who completed more modules experienced greater reductions in gambling problems. Similar findings were documented in our own past work (Hodgins et al., 2019) and that of others (Merkouris, 2023). This general observation is somewhat surprising given how positively users rate such interventions, and how self-directed change directly addresses barriers to traditional face-to-face treatment, such as stigma and lack of privacy (Andersson & Titov, 2014; Hodgins & el-Guebaly, 2000).

Study Objectives

The primary aim of the current study was to contribute to the growing literature on evidence-based mobile apps for gambling problems by developing a self-directed mobile app intervention grounded in content from our previously developed static workbook. The intervention was designed

to facilitate greater engagement relative to static self-directed interventions by making the content more appealing and the delivery more responsive to individual needs. We then aimed to conduct initial feasibility and usability testing with a small sample of Canadian adults with past or present gambling problems, and subsequently solicit their feedback.

Methods

Ethical Considerations

The current study received ethical approval from the Conjoint Faculties Research Ethics Board (CFREB) at the University of Calgary (REB23-0794). Participants were remunerated with up to CAD\$40 in electronic gift cards for their participation. Deidentified data from Qualtrics, *MetricWire*, and Microsoft Teams were stored separately from personally identifying information in an encrypted file.

Participants

Canadian adults with past or present gambling problems were recruited over three months via email contact from researchers. These email invitations were sent to 100 participants from a previous gambling self-help trial (Brazeau et al., 2024) who had volunteered to be contacted for future research. We received 71 responses to an eligibility survey on Qualtrics, of which 33 were eligible, consented, and enrolled. Participants were eligible if they resided in Canada, were aged 18 years or older, and scored 5 or greater [31] on the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). Those with past problems were asked to respond to the PGSI based on their gambling at the peak of their problem instead of the typical past-year timeframe. This approach was used to ensure participants without current gambling problems previously had a problem severity consistent with the app's likely audience, that is, people with moderate to severe gambling problems [33].

Most of those excluded from the current study were excluded because they did not complete the eligibility survey in full or did not respond to the initial email contact after they were found to be eligible. Three participants were subsequently dropped because they did not create an account with the mobile app and did not respond to follow-up emails.

Procedure

Enrolled participants were emailed a link and brief instructions to download and register with the third-party app, labelled *Catalyst by MetricWire* in the Apple App Store and Google Play Store. Users interacted with our intervention via the *Catalyst* mobile app. We selected this platform to host our intervention because it was used successfully by our colleagues to develop a similar gambling intervention in Australia (Dowling et al., 2021; Merkouris et al., 2020).

Participants were not given specific instructions for engaging with the app content but were informed it was still under development and the researchers would be interested in their feedback. Participants had access to the app for two weeks, after which they completed a brief feedback survey on Qualtrics and were compensated with an electronic gift card valued at CAD\$20. Then participants were also randomly selected and invited to participate in a focus group facilitated remotely by author BWB and two research assistants on Microsoft Teams. Focus group discussions employed a semi-structured interview guide to elaborate on user experiences with the app as well as their quantitative feedback. Participants who provided written or oral feedback were compensated with an additional electronic gift card valued at CAD\$20.

Intervention

Theoretical framework

The intervention was grounded in the transtheoretical model (TTM) of behaviour change [34,35], self-determination theory (SDT) [36], motivational interviewing (MI; Miller & Rollnick, 2023), and the cognitive-behavioural (CBT) model of gambling [38]. TTM informs on the process of change, SDT and MI on the motivations for change, and CBT on concrete strategies for change. Taken together, the intervention worked to elicit and strengthen intrinsic motivations, which are associated with an increased readiness for change and subsequent success [39]. Specific, practical, evidence-based strategies were offered to achieve self-determined goals. These strategies generally

fell into the categories of stimulus control (e.g., limiting access to gambling opportunities), behavioural activation (e.g., replacing gambling with other activities), and cognitive-motivational (e.g., reframing cognitive distortions, especially around risk and probability). Goal selection was also based on a harm reduction approach in that users could choose to maintain their current level of gambling, cut down in various ways, or quit completely. Evidence suggests that a pre-treatment abstinence goal generally does not confer an advantage over moderation in terms of gambling treatment outcomes, although abstinence may be more popular among those with severe gambling problems [40].

Content development

App content was primarily adapted from paperback and online versions of an original self-directed workbook *Becoming a Winner: Defeating Problem Gambling* [41]. That workbook was grounded in the same theoretical framework as the current mobile app. Both the paperback and online versions have demonstrated effectiveness for treating gambling problems [29,30,42–46]. Additional educational content was added based on historical user requests for more audiovisual material as well as evidence for newly developed *Lower-Risk Gambling Guidelines* [47]. Content of the final intervention prototype consisted of a daily check-in survey, ten interactive activities, and ten non-interactive educational resources.

App features and user flow

Immediately upon enrolment, users completed three brief assessments in the app: notification time preference, gambling self-assessment, and treatment goal selection. The display of those assessments are shown in Figure 1. Time preference referred to push notifications for the daily check-ins. The self-assessment contained the nine PGSI items and specific feedback based on calculated level of risk (Figure 2), which was intended to inform users when selecting a treatment goal. Goal options included abstinence, moderation, and maintenance. Those who chose moderation or maintenance were given several options for setting limits, such as limiting the number of gambling types or the amount of time or money spent over a specified time frame.

Figure 1. Intervention home page on the first day.

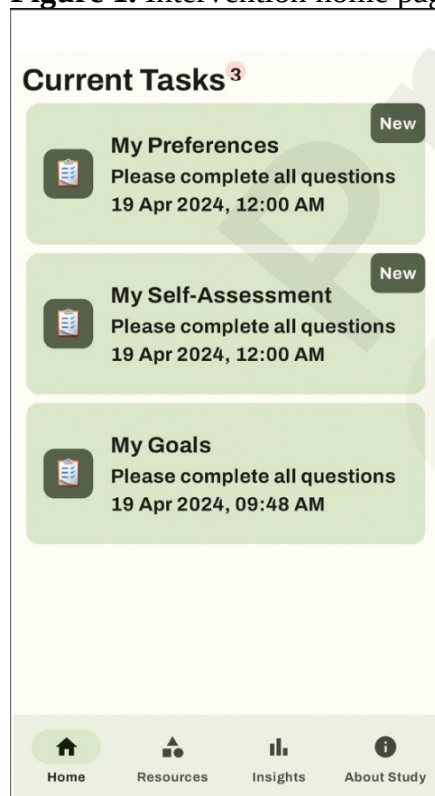
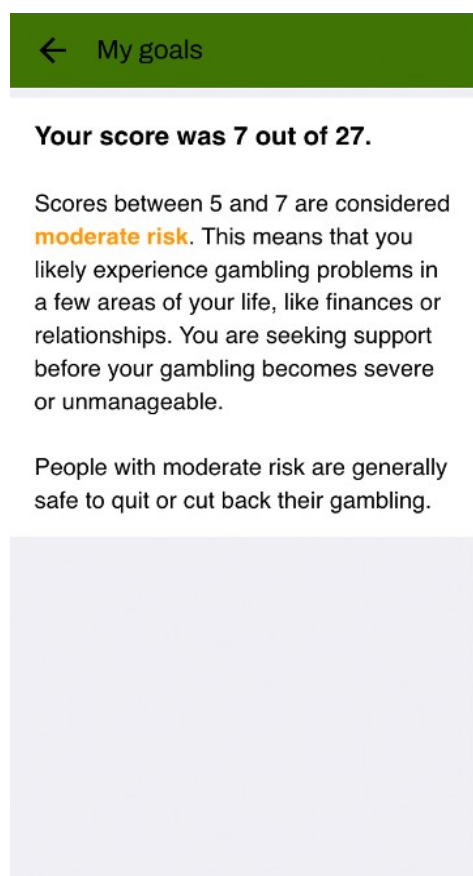


Figure 2. Sample self-assessment feedback.



Check-ins were prompted once daily via push notifications at the user-selected time. Each check-in began with a reminder of the user's treatment goal and queried whether the goal was met that day. Users then indicated how many minutes and dollars they gambled. Those who did not gamble were asked to rate their overall mood and gambling urges on 10-point scales based on the past 24 hours. Those who did gamble responded to analogous items that queried mood and urges just prior to gambling. Those who gambled were also asked to indicate relevant settings (e.g., casino, online), types (e.g., sports betting, slot machines), and motivations (e.g., social, emotional) for their recent gambling. Personal data regarding gambling duration and expenditures were graphed in a separate tab within the app. In total, daily check-ins contained four questions for non-gamblers and ten for gamblers.

Over the first week, interactive intervention activities were triggered based on user responses to check-ins. All activities, including untriggered ones, then became available in buffet style after the first week and could be completed as many times as desired and in any order. The activities included a thought record, gambling calendar, decisional balance exercise, values card sort, confidence ruler, trigger identification and management, reflection on past behaviour changes, strategies to make amends with others, and relapse prevention plan. All of these activities included multiple choice and open-ended text responses. See Figures 3 and 4 for samples responses in the thought record. Responses were then piped into a progress report on the final day.

Figure 3. Sample of the multiple-choice response options on the thought record.

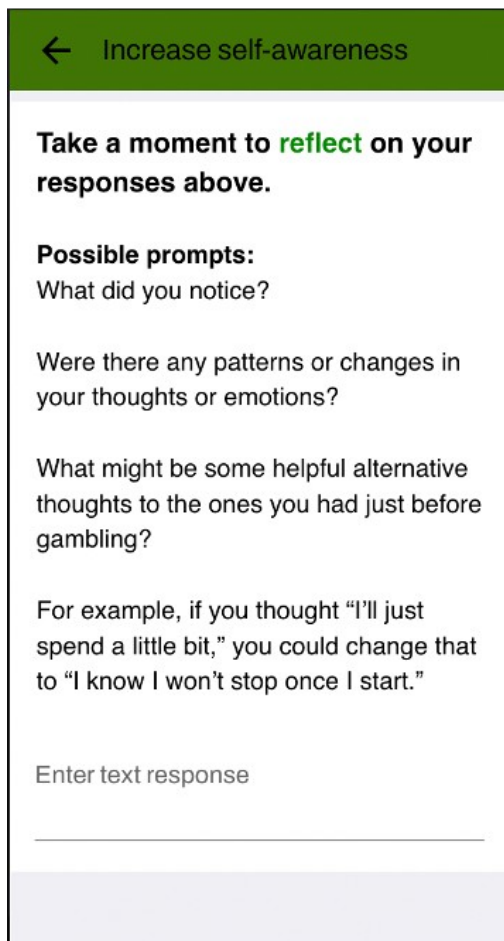
← Increase self-awareness

Which **emotions** did you feel just before gambling?

Select all that apply.

- ☐ **Joyful** (e.g., excited, happy, energized)
- ☐ **Angry** (e.g., frustrated, irritable, resentful)
- ☐ **Sad** (e.g., depressed, disappointed, grieved)
- ☐ **Fearful** (e.g., anxious, uncertain, suspicious)
- ☐ **Apathetic** (e.g., numb, bored, listless)

Figure 4. Sample of the open-ended response options on the thought record.



← Increase self-awareness

Take a moment to reflect on your responses above.

Possible prompts:

What did you notice?

Were there any patterns or changes in your thoughts or emotions?

What might be some helpful alternative thoughts to the ones you had just before gambling?

For example, if you thought “I’ll just spend a little bit,” you could change that to “I know I won’t stop once I start.”

Enter text response

Five non-interactive educational resources were available immediately upon enrolment for the duration of the study. These included a video on gambling and the brain, links to the *Lower-Risk Gambling Guidelines* including information on the guidelines, types of gambling, and gambling-related harms, and a list of Canadian resources and helplines for further support. The remaining resources became available in the same manner as the interactive intervention activities (i.e., based on diary responses in the first week, then available in buffet style in the second week). These remaining resources comprised brief articles on common cognitive distortions, addictive features of gambling, cognitive-behavioural coping skills, urge surfing, and strategies for limiting access to money and gambling opportunities.

On any given day except the final day, users received a maximum of two notifications. The first notification prompted the daily check-in, and the second one prompted one relevant activity or resource. On the final day, after the progress report was viewed, users were prompted to rate each of the activities, resources, and other app features they engaged with throughout the study. They rated each activity and resource on a 4-point Likert scale from “not at all helpful” to “extremely helpful.” Users were enabled to skip any given rating if they did not complete the activity or view the resource.

Measures

User feedback

On the post-intervention Qualtrics feedback survey, participants completed the user version of the Mobile App Rating Scale (uMARS), which assesses user perceptions of the intervention’s engagement, functionality, aesthetics, information quality, and subjective quality [48]. Mean subscale scores of 3 or greater are typically considered acceptable for recommending use with a

target behaviour (cf. Masterson-Creber et al., 2016). Additional questions on the uMARS pertain to overall ratings, user likelihood of paying for the app and recommending it to others, projected use over the next year, and perceived impact on various aspects of behaviour change (e.g., increased knowledge of problem behaviour or importance of behaviour change). All 29 quantitative items on the uMARS are ranked on a 5-point Likert scale. The uMARS has demonstrated excellent inter-rater reliability and internal consistency ($\alpha = .90$) [48]. We additionally asked users on the Qualtrics survey to rank order the most and least important features of the app.

App usage data

App usage data were automatically measured within the *MetricWire* platform. These data recorded which diaries and activities were completed and how many times, duration to complete each activity and diary, and delay between push notifications and app use. User device type (i.e., Apple or Android) was also recorded.

Data Analyses

Quantitative data were analyzed using R and RStudio [50]. Results include means and standard deviations for continuous data as well as counts and percentages for categorical data. There were no missing data on the PGSI or uMARS. Only the available data for app usage were analyzed.

Qualitative data (i.e., open-text survey responses and focus group discussion) were informally summarized by author BWB in consultation with the research assistants who co-facilitated the focus group. A formal qualitative analysis was not conducted as these data were limited in scope and intended to contextualize or provide brief examples of quantitative data rather than to add significant new information. However, random selection of participants, use of a semi-structured interview guide, and inclusion of both recurring themes and outlier opinions were used to reduce bias.

Results

Participants

The sample ($N = 30$) had a mean age of 44.0 years ($SD = 12.4$). Participants were mainly from Ontario (33%) or Alberta (23%), but all ten Canadian provinces except Prince Edward Island were represented by at least one participant. Most were White (73%), employed (63%), female (60%), and in a married or common law relationship (53%).

In terms of gambling behaviour, 87% of participants regularly gambled in public settings and 40% in private settings. Additionally, 80% regularly gambled online. They engaged in about 4.6 types of gambling ($SD = 2.5$), the most popular of which were instant tickets (77%), lottery tickets (70%), video lottery terminals (VLTs) or slot machines (63%), bingo (60%), and raffles (53%). Most participants (73%) had ongoing (versus historical) gambling problems. The mean PGSI score was 12.7 ($SD = 6.1$) regardless of current problem status. Most participants (80%) had previously received some form of support for gambling problems outside the context of a research study, but all had participated in the self-guided web intervention trial from which they were recruited. Only five reported they had used a mobile app similar to the current one and seven others heard of similar apps but never used them.

Feasibility

App usage and compliance

About 63% of users accessed the app from an iOS device; the rest used Android. The mean completion rate for daily diaries was 51% over two weeks, and this rate was relatively consistent each day. The mean submission time was 4:00 PM. All 238 diary submissions except three were started within five seconds of the respective push notification. Mean duration for the diary was 14 seconds for users who did not gamble on the diary day and 61 seconds for users who did gamble. In terms of in-app assessments, all users except one completed their notification preferences, PGSI self-assessment, and treatment goal selection. Two users changed the time of their daily diary notification after their initial selection.

Median completion time for intervention activities ranged from 48 to 137 seconds. Means were higher (2 to 12 minutes) because a small subset of users took over one hour to complete activities and typically provided thorough open-ended responses. The most frequently completed activity was the reflection on past behavioural changes, which was completed by 83% of users ($n = 25$). The next most frequently completed activities were the decisional balance exercise, identification of triggers, making amends, and relapse prevention plan, all completed by 77% of users ($n = 23$). The remaining activities were the thought record (73%, $n = 22$), progress report (73%, $n = 22$), gambling calendar (70%, $n = 21$), values card sort (67%, $n = 20$), and importance, confidence, and commitment rulers (57%, $n = 17$). Many participants repeated at least one activity, and all activities were repeated by at least one participant. The most commonly repeated intervention was the thought record, which 23% of users ($n = 7$) completed two to seven times. Of the 331 total interventions completed, 36% were diary-prompted based on specific user data and a subsequent push notification; the rest were user-prompted (on demand). For diary-prompted interventions, the mean delay from notification to activity start time was 82 minutes 29 seconds ($Mdn = 2$ minutes 31 seconds).

Technical difficulties

Some technical difficulties were encountered but none appeared to prompt disengagement from the app according to user feedback. The most common issue was improper variable displays (e.g., push notifications stated “Hello participantFirstName” instead of actual names). There were also limitations of certain question formats and notification timing options in the *MetricWire* platform. All identified technical difficulties were resolved as soon as possible during the study.

Acceptability

Feedback was gathered from participants in three ways: general feedback on Qualtrics (100% response rate, $n = 30$), specific feature ratings within the app (50% response rate, $n = 15$), and a one-hour virtual focus group. Regarding the focus group, ten participants were randomly selected and invited to participate. Of those ten, eight consented to the focus group, six ultimately attended, and two provided written feedback via email instead. Two participants did not respond to the invitation.

General survey feedback

Quantitative feedback on Qualtrics was primarily collected via the uMARS (Table 1). Of the four objective domains, functionality was rated the highest on a five-point scale, followed by information, aesthetics, and engagement. The highest rated subdomains were information credibility, ease of use, and gesture functionality. The lowest rated subdomains were customization, interactivity, and entertainment value. All subdomains except customization surpassed the acceptability threshold of 3.00.

Table 1. uMARS ratings out of 5 for each domain and subdomain.

Domain	Subdomain	<i>M (SD)</i>
Engagement	Entertainment	3.10 (1.16)
	Interest	3.54 (1.07)
	Customization	2.83 (0.79)
	Interactivity	3.10 (1.00)

	Target audience	4.17 (0.54)
	Total	3.36 (0.70)
Functionality	Performance	4.17 (0.83)
	Ease of use	4.27 (0.74)
	Navigation	4.23 (0.77)
	Gestures	4.27 (0.74)
	Total	4.23 (0.64)
Aesthetics	Layout	3.79 (0.90)
	Graphics	3.80 (1.10)
	Appeal	3.60 (0.72)
	Total	3.74 (0.75)
Information	Quality	4.07 (0.74)
	Quantity	4.03 (0.85)
	Visual	4.13 (0.73)
	Credibility	4.33 (0.80)
	Total	4.14 (0.60)

Note: uMARS = Mobile App Rating Scale, user version.

Overall, the mean star rating for the app was 3.57 stars out of 5 ($SD = 0.82$). About 23% ($n = 7$) indicated they would be somewhat likely to pay for the app. The remainder were either ambivalent (30%, $n = 9$), somewhat unlikely (17%, $n = 5$), or extremely unlikely (30%, $n = 9$); none were extremely likely. In terms of projected use over the next year if access were available, 3% ($n = 1$) said never, 17% ($n = 5$) said 1 to 2 times, 40% ($n = 12$) said 3 to 10 times, 33% ($n = 10$) said 10 to 50 times, and 7% ($n = 2$) said more than 50 times. The dispersion of responses was similar when users were asked if they would recommend the app to others with gambling problems; 3% ($n = 1$) said they would not recommend it to anyone, 13% ($n = 4$) said they would recommend it to very few people, 43% ($n = 13$) said some people, 10% ($n = 3$) said many people, and 30% ($n = 9$) said they would definitely recommend it to anyone with gambling problems.

As part of the uMARS, participants were then asked to rate the perceived impact the app would have in various domains. Those who endorsed a clear or strong positive impact (versus somewhat, minimal, or no positive impact) were 63% ($n = 19$) for knowledge about gambling problems, 43% ($n = 14$) for further help-seeking, 40% ($n = 12$) for attitude toward change, 40% ($n = 12$) for motivation to change, 33% ($n = 10$) for importance of change, and 30% ($n = 9$) for concrete change in gambling behaviours. Across all domains, one person consistently reported no anticipated positive impact, but the remainder endorsed minimal or somewhat positive impacts. The user with uniformly negative ratings did not provide any qualitative responses to elaborate on their ratings.

In addition to the uMARS, participants were asked to select up to five of the most and least important aspects of the app for achieving the primary goal of reducing gambling problems (Table 2). The response options were derived from the uMARS. The aspects of greatest importance were ease of use, interactivity, and quality of information. The aspects of least importance were entertainment value, invitation of user feedback, and overall layout. Aspects of greater disagreement included entertainment value, visual appeal, customization, and amount of information, as these were all rated among the most and least important by at least 30% of users.

Table 2. Perceived most and least important aspects of the app.

Aspect	Most important ($n = 30$ responses)	Least important ($n = 27$ responses)
Entertainment value, n (%)	11 (37)	16 (59)
Visual appeal	11 (37)	10 (37)
Customization	9 (30)	9 (33)

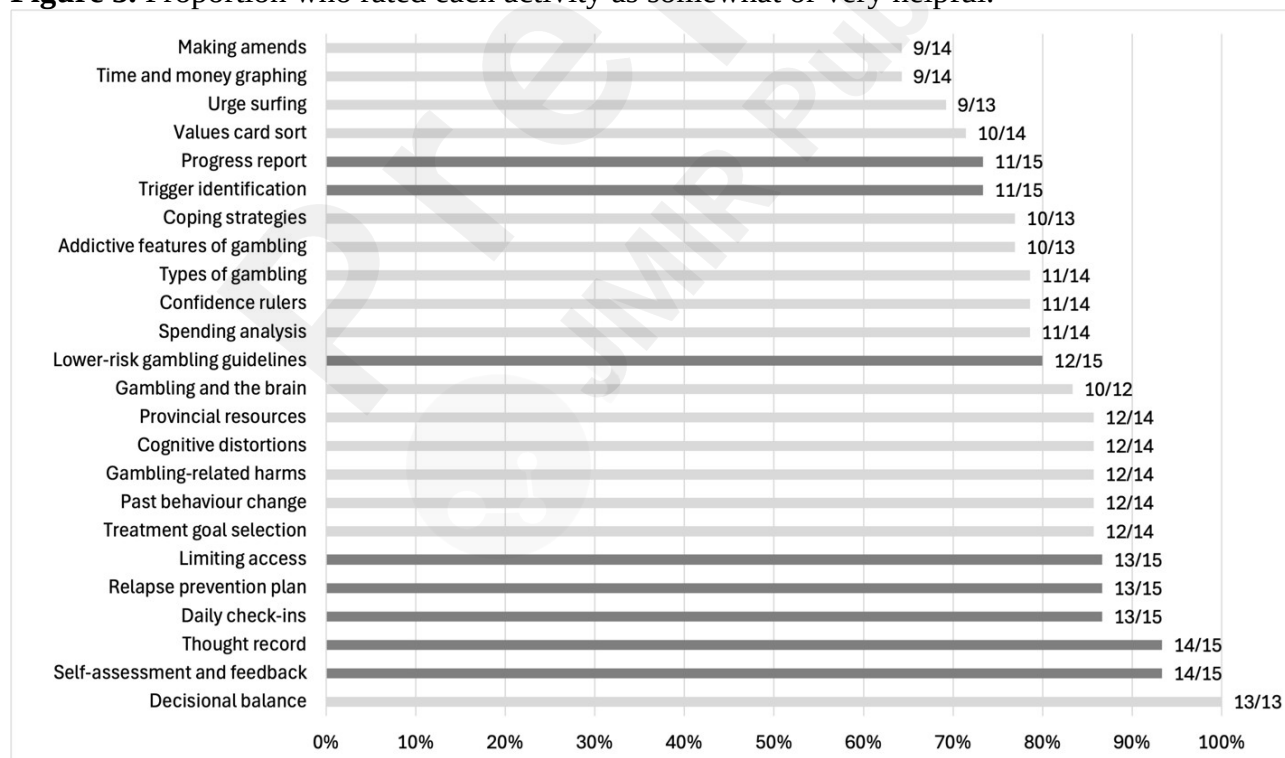
Interactivity	16 (53)	5 (19)
Invitation of user feedback	8 (27)	12 (44)
Appropriate for target audience	11 (37)	5 (19)
Performance and speed	5 (17)	5 (19)
Ease of use	17 (57)	0 (0)
Overall layout	6 (20)	12 (44)
Amount of information	13 (43)	9 (33)
Quality of information	14 (47)	2 (7)
Credibility of information	13 (43)	4 (15)

Similar response variability was observed in the open-ended feedback. For instance, one user requested more open-ended text responses, and six emphasized open-ended reflections as one of the most helpful app features. In contrast, another user found open-ended items too taxing. The majority of users found the app simple, clean, and easy to navigate, but the connotation of these evaluations varied; some liked the simple design, and some disliked it. There was greater agreement on the beneficial quantity, quality, and credibility of information in the app, although some users provided suggestions for additional resources (e.g., for concurrent substance use or special populations, such as Indigenous gamblers).

Specific in-app feedback

Feedback was elicited from 15 participants (50%) within the app on the final day of enrolment. Ratings are summarized below (Figure 5) in terms of the percentage of users who identified each activity as somewhat or very helpful (versus minimally or not at all helpful). All interventions and resources were completed by at least 12 of the 15 users who provided in-app feedback (80%).

Figure 5. Proportion who rated each activity as somewhat or very helpful.



Note: Numerators in the figure represent the number of people who rated each activity as somewhat or very helpful. Denominators represent the total number of people who rated each activity. Those who skipped the question, or those who responded they did not recall completing the activity, were excluded from denominators. Dark grey bars represent activities completed and rated by all 15

feedback respondents.

Focus group feedback

The sample was too small to evaluate whether focus group attendees and non-attendees differed in their app ratings, so we could not determine whether focus group responses were biased (for or against) the app. However, attendees provided both positive and constructive feedback.

By far the most salient theme of the focus group was expanding opportunities for user choice. This conclusion was largely driven by the group's high variability in individual preferences. For instance, some strongly preferred thought-provoking and open-ended reflections, while others gravitated toward more efficient checkboxes or multiple-choice. The same pattern was observed with respect to information medium, such that some preferred audiovisual resources whereas others preferred text. Similarly, some liked the consistency of check-in questions to reduce cognitive load, while others felt disengaged by the repetition. Most users found the check-ins to be the most helpful part of the app, particularly to track spending and remain focused on treatment goals, but two strongly preferred other activities and resources. Some users felt overwhelmed by the amount of information requested or provided by the app, while others desired more data tracking or informative resources. One user provided suggestions for modifications to existing resources (e.g., display all the same information in both text and visual format). Two users would have liked more time with the app to track their gambling behaviours, and one suggested gamification to enhance engagement. This variability in user suggestions and preferences was consistent with the relatively lower customization ratings on the uMARS. Participants provided some feasible technical suggestions for implementing choice (e.g., constantly available rather than time-limited expenditure log).

Areas of greater agreement included the frequency of notifications, utility of tracking and graphing expenditures, and rating scales for mood and urges. Most users found the frequency of notifications (i.e., once or twice daily) to be just right. A number of minor technical suggestions were also provided to further enhance ease of use (e.g., including an orientation page for first-time users and editing how buttons link to various pages within the app).

Discussion

The results of this study indicate sufficient acceptability and feasibility to incorporate user feedback and conduct effectiveness testing on a larger scale. On the whole, users responded positively to the app prototype, including efforts designed to improve engagement, such as customized notification times, graphs of personal diary data, and tailored recommendations. Users believed the app was credible, easy to use, and appropriate for the target audience – factors which they indicated were among the most important for app developers to consider. The highest-rated activities were the decisional balance exercise, self-assessment feedback, and thought record; the latter was also the most repeated. Interactive activities were more often used and repeated than read-only articles, suggesting that personalization and interactivity may increase engagement. Median completion time was consistently below 2.5 minutes for activities and one minute for diaries, minimizing the cognitive demand on users. Despite relatively lower ratings on the uMARS regarding entertainment value and aesthetics, the majority of users indicated these factors were among the least important in the effectiveness of the app to help people reduce gambling-related problems. All this feedback is consistent with our own past work (e.g., Brazeau et al., 2024) and that of others [51]. Overall, the app prototype was rated 3.6 out of 5, and 83% of users would recommend the app to at least some others struggling with gambling problems. Importantly, however, it cannot be assumed that acceptability at this stage will translate to engagement [51].

The largest gap between suggested importance and actual app delivery was for tailoring factors (e.g., interactivity, customization). Indeed, the most consistent theme in the feedback was the lack of consistency, underscoring the need for a more personalized experience. One major area of diverging opinion related to information medium and quantity. This critique applied to both the amount of information provided and the amount requested from users through check-ins and activities. Specifically, some users wanted more information and were content to input their data,

while others felt overwhelmed by what was already provided and burdened by what was requested from them. Despite these critiques, users agreed on the high quality and credibility of information, and overall rated the quantity of information 4.03 out of 5 on the uMARS. This finding is especially positive given that users felt the app could be most impactful in terms of increasing knowledge about gambling problems.

A more pressing area of disagreement related to the perceived utility and willingness to complete the daily check-ins. Many users believed the check-in, along with the associated graphing of personal gambling data and recommended activities and resources, were the most helpful parts of the app. Others found the daily diaries to be tedious and preferred to access activities and resources at their leisure. In fact, two thirds of app engagement was on demand rather than based on tailored recommendations. In one sense, this finding is promising in that users will access an intervention without requiring prompting. In another sense, it presents a challenge given that one of the primary means to personalize an intervention is by recommending various activities based on data provided in check-ins. Put another way, more data provided by users yields more tailored recommendations. This problem becomes more salient when considering that diary completion rate was only 51% over two weeks. Diary completion rates have varied substantially in studies employing momentary assessments of gambling behaviour [17,52–55]. It is likely that with advancements in AI and machine learning (ML), it will be much more feasible to tailor interventions based on dynamically evolving individual needs in real-time, minimizing the cumbersome trial-and-error approach currently employed [56]. However, AI and ML often require a very large amount of data to operate. The burden on users to provide data for tailoring may be reduced in part by passive sensor data [57]. Still, AI and ML do not provide a short-term solution, as there remain unresolved concerns about the risks of using AI and ML to inform gambling treatment [58,59] and general mental health treatment [60,61].

In addition to the mixed feedback, several relatively uncontroversial suggestions for improvement were provided by users. These suggestions included displaying more information in both text and visual format, making the read-only resources more interactive, offering more than two weeks with the app for ongoing tracking of gambling data, providing additional information for special populations (e.g., Indigenous gamblers) or concurrent substance use, and implementing gamification to enhance engagement. On the last point, it has been cautioned that gamification should strengthen, and not detract from, treatment content [62]. Other areas for improvement to consider include integrating the LRGs throughout the app and querying concurrent substance use and positive coping strategies in the daily check-ins.

This study presents with some limitations. First, our sample was small and drawn from a highly selective pool of participants who had already participated in previous studies we conducted. Therefore, their feedback may not necessarily generalize to other subpopulations of gamblers. Moreover, we did not solicit feedback from clinicians, other gambling researchers, or people with at-risk or low-severity gambling problems. Taken together, the feedback we received from our sample may not be representative of all stakeholders or broader population needs. However, as noted, the feedback was relatively consistent with past work. Second, the qualitative feedback we gathered was relatively succinct and could have benefitted from a more thorough mixed-methods approach. Third, there were limitations inherent to the use of a third-party software to host our intervention. Certain planned features and functionality, particularly those related to personalization, were not feasible within *MetricWire*'s platform. Some minor technical difficulties were encountered as expected, but *MetricWire* support was responsive, and all difficulties were quickly resolved. While *MetricWire* provided an appropriate and cost-effective means to conduct this initial stage of testing, it would be sensible to develop independent software in the future. Finally, the results of this study do not bear on the primary purpose of the app – that is, to enhance engagement and reduce gambling problems.

Overall, this preliminary study provides justification for further app testing. In fact, there are two ongoing trials using a refined version of this app, both of which will evaluate engagement and

effectiveness. Participants responded very positively to the app prototype and agreed on its credibility, ease of use, and potential impact. Some areas of disparate opinion were encountered, the most pressing of which pertained to daily diaries and personalization. This app has the potential to narrow the gap in evidence-based self-guided treatments for gambling problems and provide the help they want and need on demand.

Data Availability

Cleaned anonymized data will be made available to others by the authors upon request via email. R code for statistical analyses will similarly be made available upon request. Data and code can be requested from the corresponding author (brad.brazeau@ucalgary.ca) beginning 3 months after publication.

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Conflicts of Interest

None declared.

Authors' Contributions

CRedit Contributions: **BWB:** Conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, software, visualization, writing – original draft, writing – review & editing. **JAC:** Conceptualization, funding acquisition, writing – review & editing. **DCH:** Conceptualization, funding acquisition, methodology, project administration, resources, supervision, validation, writing – review & editing.

Abbreviations

AI = artificial intelligence; CBT = cognitive-behavioural therapy; MI = motivational interviewing; ML = machine learning; PGSI = Problem Gambling Severity Index; uMARS = Mobile App Rating Scale, user version.

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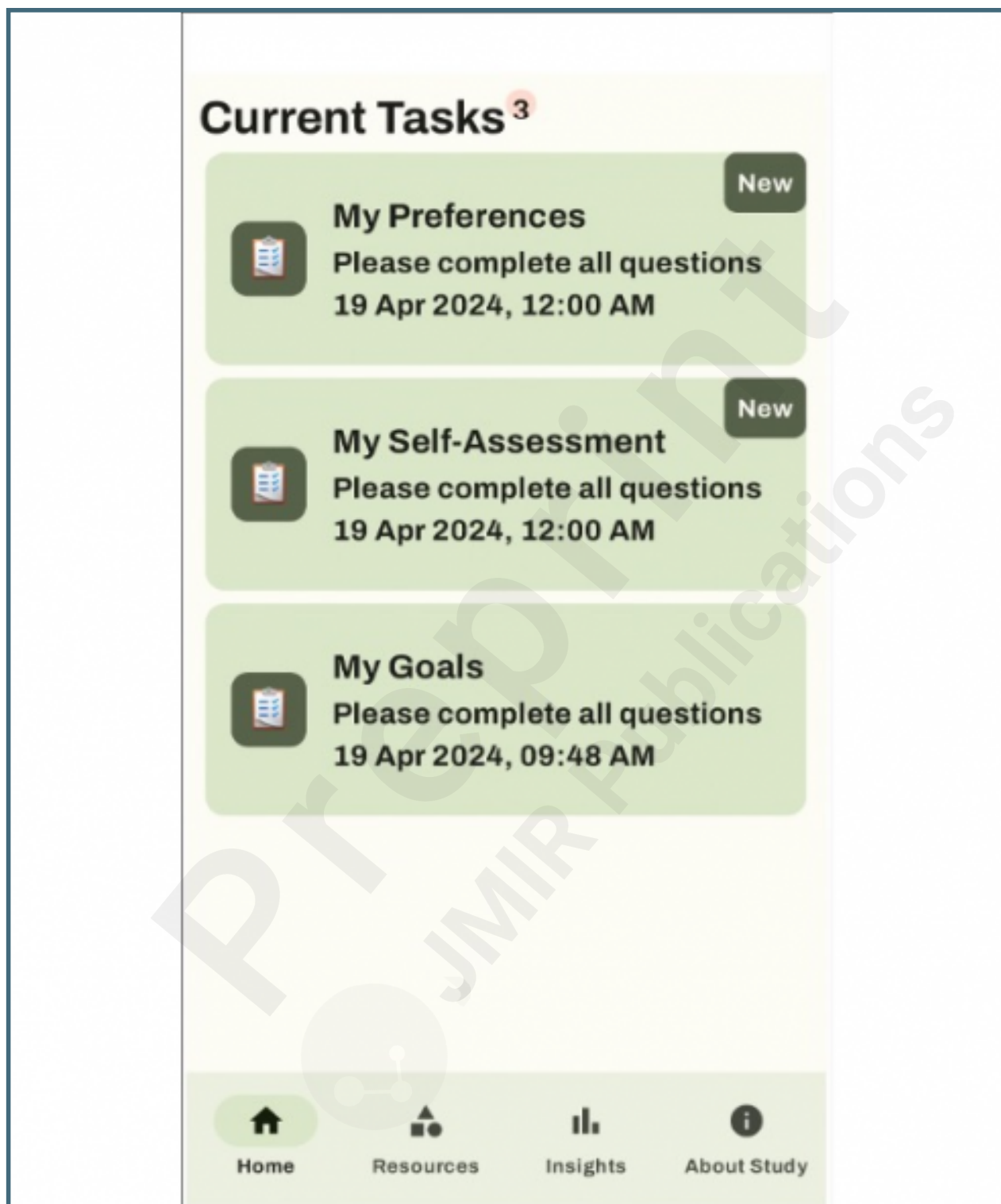
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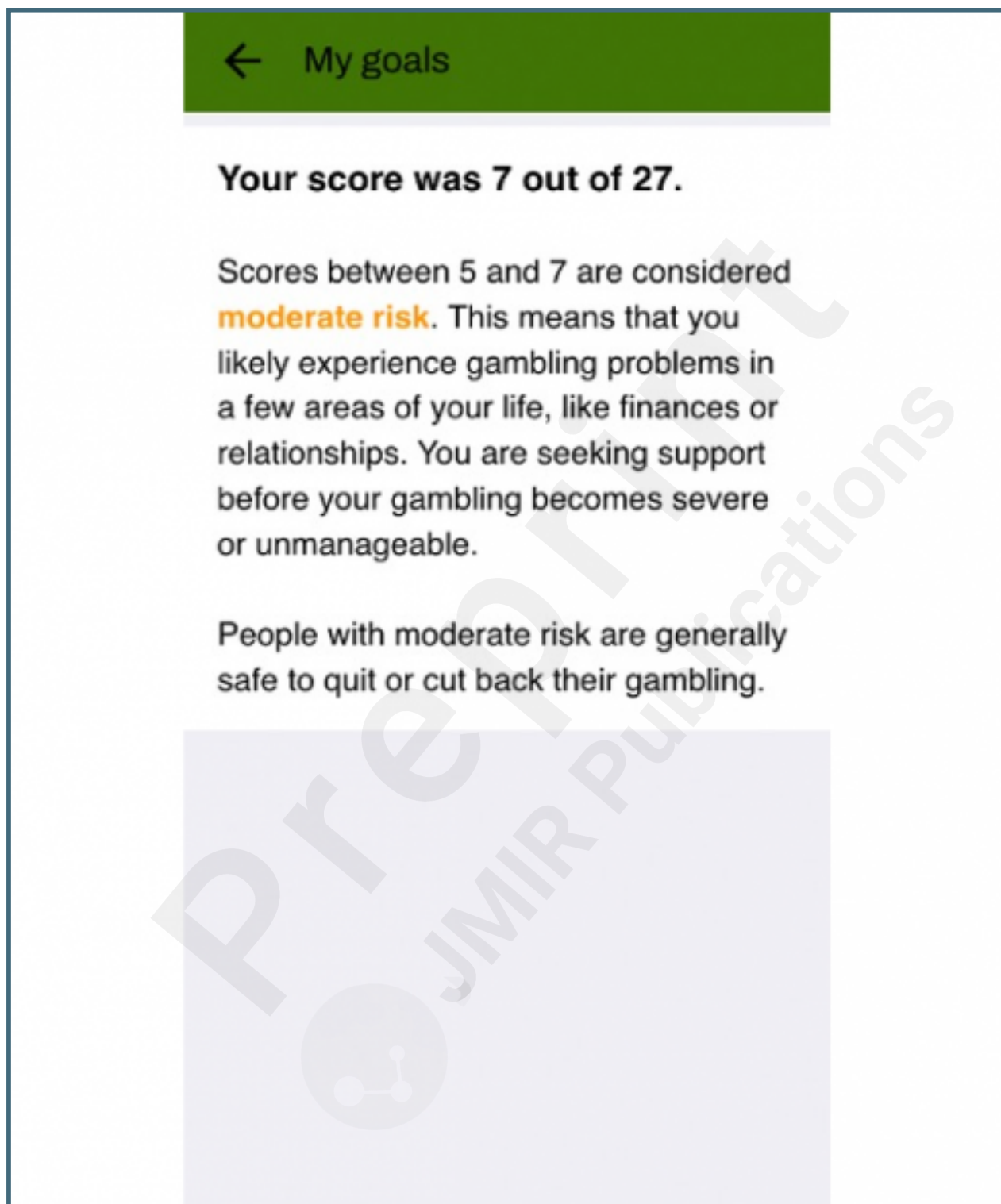
Supplementary Files

Figures

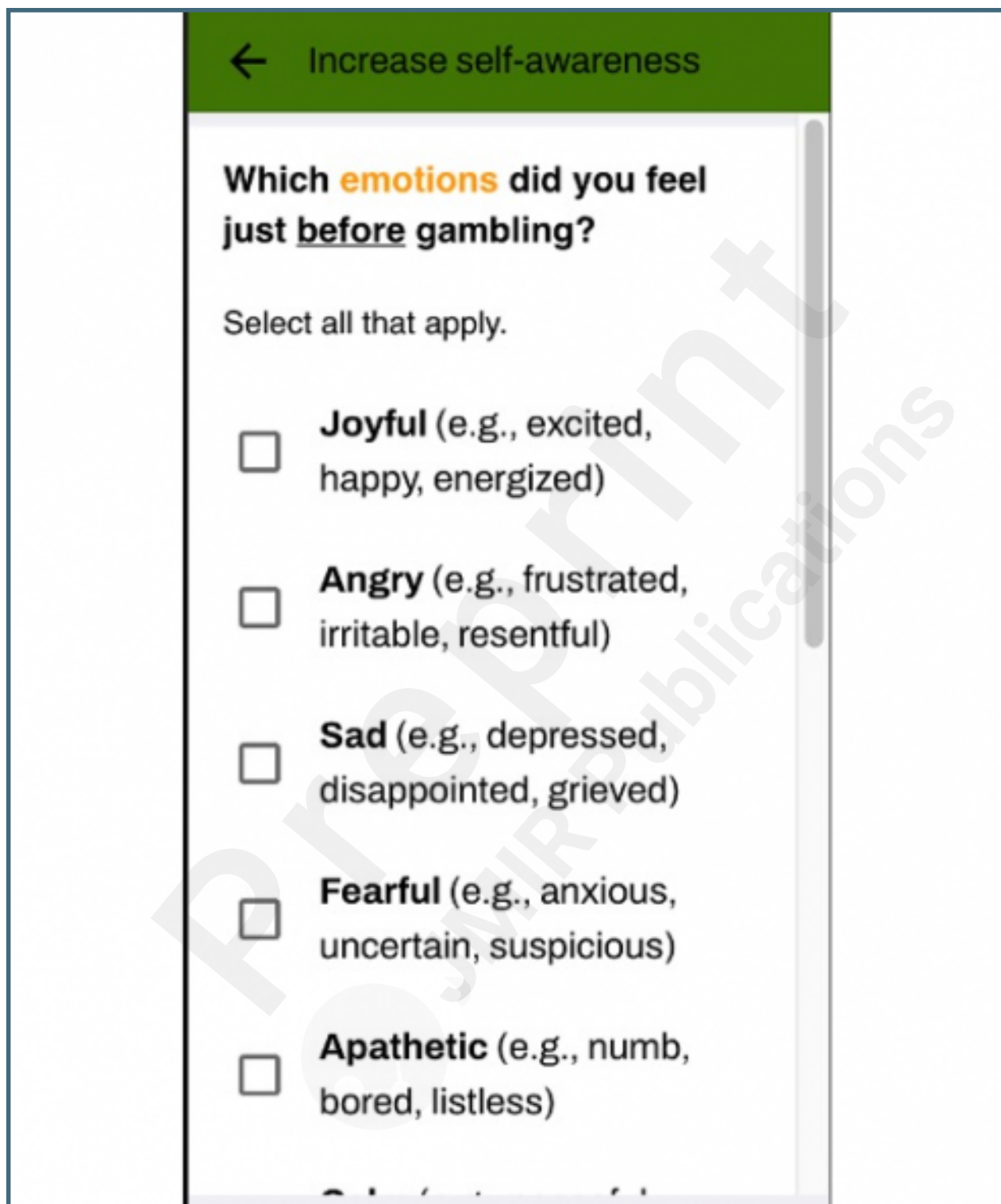
Intervention home page on the first day.



Sample self-assessment feedback.



Sample of the multiple-choice response options on the thought record.



The image shows a screenshot of a mobile application interface for a thought record. At the top, there is a green header bar with a white left-pointing arrow and the text "Increase self-awareness". Below the header, the main content area has a white background. It starts with the question "Which **emotions** did you feel just before gambling?" where "emotions" is in orange. Below the question is the instruction "Select all that apply." followed by five multiple-choice options, each with an unchecked checkbox to its left. The options are: "Joyful (e.g., excited, happy, energized)", "Angry (e.g., frustrated, irritable, resentful)", "Sad (e.g., depressed, disappointed, grieved)", "Fearful (e.g., anxious, uncertain, suspicious)", and "Apathetic (e.g., numb, bored, listless)". A large, light gray watermark "Preprint JMIR Publications" is diagonally across the center of the screen.

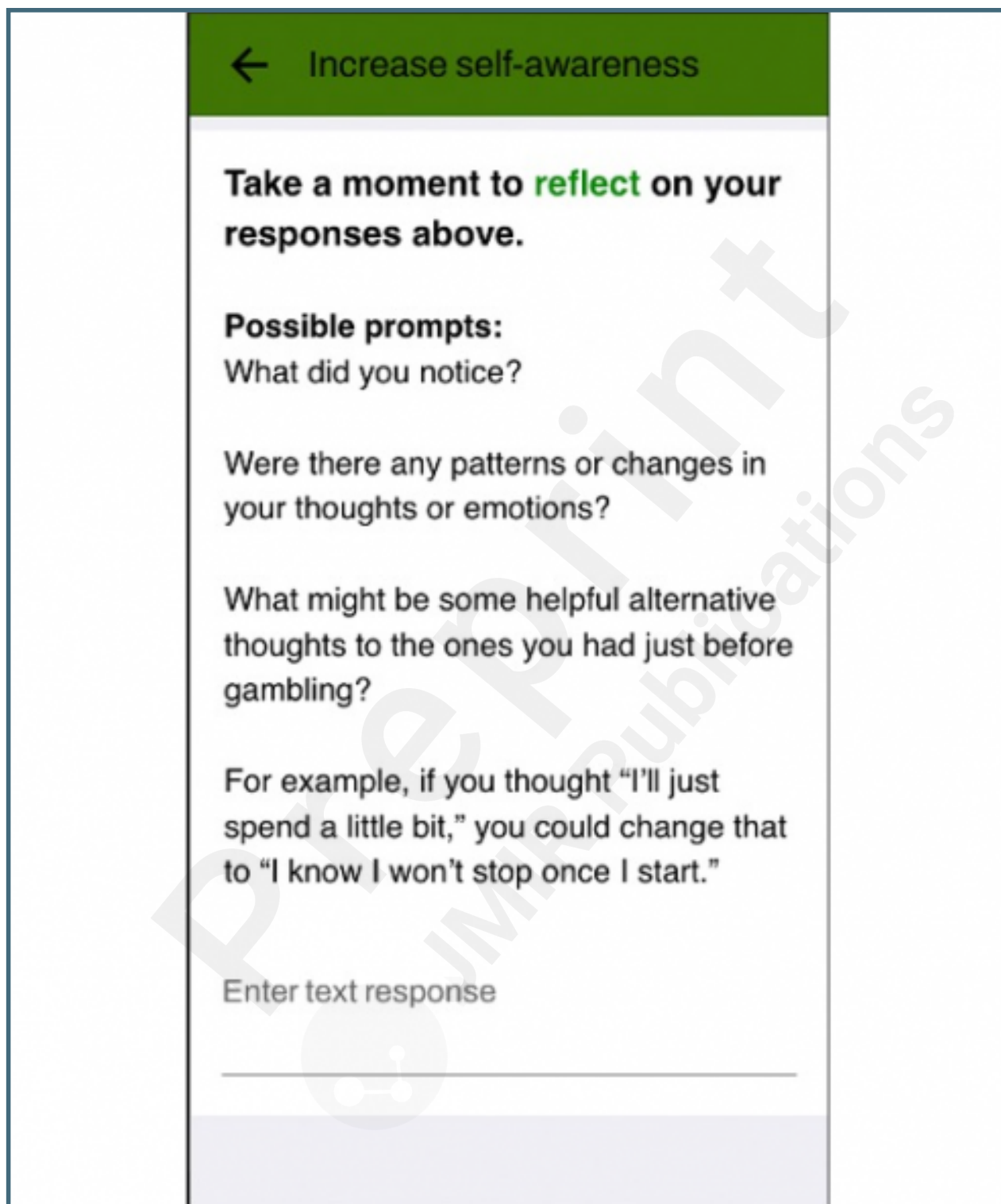
← Increase self-awareness

Which **emotions** did you feel just before gambling?

Select all that apply.

- ☐ **Joyful** (e.g., excited, happy, energized)
- ☐ **Angry** (e.g., frustrated, irritable, resentful)
- ☐ **Sad** (e.g., depressed, disappointed, grieved)
- ☐ **Fearful** (e.g., anxious, uncertain, suspicious)
- ☐ **Apathetic** (e.g., numb, bored, listless)

Sample of the open-ended response options on the thought record.



← Increase self-awareness

Take a moment to **reflect** on your responses above.

Possible prompts:

What did you notice?

Were there any patterns or changes in your thoughts or emotions?

What might be some helpful alternative thoughts to the ones you had just before gambling?

For example, if you thought “I’ll just spend a little bit,” you could change that to “I know I won’t stop once I start.”

Enter text response

Proportion who rated each activity as somewhat or very helpful.

