

Development and evaluation of an online gambling self-directed program: effective integration into existing services

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Enquiries

Rosa Billi +61 3 9452 2625

rosa.billi@responsiblegambling.vic.gov.au

Victorian Responsible Gambling Foundation

Level 6, 14–20 Blackwood Street

North Melbourne

Victoria 3051

PO Box 2156

Royal Melbourne Hospital

Victoria 3050

Telephone: +61 3 9452 2600

Facsimile: +61 3 9452 2660

ABN: 72 253 301 291

Our vision: A Victoria free from gambling-related harm



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Development and evaluation of an online gambling self-directed program: Effective integration into existing services

Prepared by: Dowling, N., Merkouris, S., Rodda, S., Smith, D., Lavis, T., Lubman, D., Austin, D., Harvey, P., Cunningham, J., & Battersby, M.

Deakin University

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Key terms

| Acronym or term | Description |
|--------------------------|---|
| AACRI | Alcohol Abuse Coping Response Inventory |
| AUDIT-3 | Alcohol Use Disorders Identification Test-3 |
| BLUP | Best linear unbiased predictions |
| BSCQ | Brief Situational Confidence Questionnaire |
| CBT | Cognitive-behavioural therapy |
| CFI | Confirmatory Fit Index |
| CI | Confidence Interval |
| CONSORT | Consolidated Standards of Reporting Trials |
| DSM-5 | Diagnostic and Statistical Manual of Mental Disorders – 5 th edition |
| EGMs | Electronic Gaming Machines |
| EUROHIS-QOL 8-item index | EUROHIS Quality of life 8-item index |
| G-SAS | Gambling Symptom Assessment Scale |
| GA | Gamblers Anonymous |
| GP | General Practitioner |
| GRCS | Gambling Related Cognitions Scale |
| GSD | Guided self-directed |
| Imp | Importance |
| ITT | Intention-to-treat |
| K6 | Kessler 6 Psychological Distress Scale |
| M | Mean |
| MAR | Missing At Random |
| MI | Motivational Interviewing |
| MLE | Maximum Likelihood Estimation |
| MNAR | Missing Not At Random |
| OR | Odds ratio |
| PGSI | Problem Gambling Severity Index |
| PSD | Pure self-directed |
| RMSEA | Root Mean Squared Error of Approximation |
| RCT | Randomised controlled trial |
| SBQ-R | Suicide Behaviors Questionnaire-Revised |
| SD | Standard Deviation |
| SE | Standard Error |
| SEM | Structural Equation Modelling |
| URICA | University of Rhode Island Change Assessment |
| WAI-S | Working Alliance Inventory -short form |

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Executive summary

Project overview

The Victorian Responsible Gambling Foundation engaged leading Australian clinical researchers from Deakin University, Turning Point Alcohol and Drug Services, Statewide Gambling Therapy Service, and the Australian National University to develop and evaluate a high quality online self-directed program for gambling that can be delivered across Victorian services. The goal was to develop a cognitive-behavioural program emulating the intensity and depth of a face-to-face cognitive-behavioural intervention from which more brief and targeted interventions can be developed.

Phase 1 of the project involved the development of an empirically-based 8-week internet-delivered cognitive-behavioural self-directed program for gambling (GAMBLINGLESS. FOR LIFE.). Phase 2 employed a two-arm, parallel group, pragmatic randomised trial to evaluate the effectiveness of the GAMBLINGLESS program delivered under two conditions: (i) pure self-directed (PSD, without any practitioner guidance); this condition served as an active control condition; and (ii) guided self-directed (GSD); this condition was delivered with guidance delivered via email by practitioners from Victorian face-to-face and online gambling treatment services. A pragmatic trial design was selected with a view to decreasing the gap between the context in which most treatment outcome research is conducted and “real world” clinical practice, and maximising the ability to translate the findings into clinical practice. The effectiveness of the program on gambling symptom severity, gambling urges, gambling behaviours (frequency and expenditure), psychological distress, quality of life, and additional help-seeking was investigated at 2- and 3-month follow-up evaluations. Phase 3 explored the acceptability and feasibility of the GAMBLINGLESS program by users and guides; and the degree to which the program could be effectively integrated into clinical practice in existing Victorian services.

Background

Although face-to-face delivery of cognitive-behavioural therapy and motivational interviewing are efficacious in the treatment of problem gambling, only a small proportion of problem gamblers access these services, suggesting that this mode of treatment delivery does not provide sufficient access to evidence-based treatment. There is therefore a need to examine the use of alternative treatment delivery models that capitalise on advances in technology, employ non-traditional service providers, and involve self-directed interventions that can complement existing services. Self-directed and internet-based interventions have several advantages when compared to traditional face-to-face therapies. They are typically shorter and more cost-effective, facilitate immediate treatment, and may be able to reach more people, particularly subpopulations where inequities in services exist. Moreover, the lack of interpersonal contact and sense of anonymity involved in these interventions may attract people who are reluctant to attend traditional in-person services. They can also be non-stigmatising and empowering interventions that allow people to engage in treatment at their own time and pace. Self-directed interventions can range from purely self-directed strategies involving no professional guidance (PSD) to treatments involving minimal support from a health care professional (GSD). The support provided in GSD interventions is typically supportive or facilitative in nature, with the aim of active guidance in the use of a self-directed protocol.

In other literatures, there is some evidence that PSD and GSD interventions are effective treatments when compared to control groups, and that GSD interventions are more effective than PSD interventions. These interventions also seem to be acceptable to diverse patients in different treatment settings across different countries. Despite this evidence, there is a paucity of research investigating the effectiveness of self-directed gambling interventions, particularly in relation to GSD interventions.

Although several interventions in the available studies approximate GSD, they generally involve the addition of motivational interviews to workbook only conditions, rather than adding guidance *per se*. These studies suggest that both PSD interventions and interventions approximating GSD produce better outcomes than control groups in the treatment of problem gambling. It remains uncertain, however, as to whether GSD gambling interventions offer advantages over PSD interventions.

Aims and hypotheses

The aim of Phase 1 of this project was to develop an online self-directed cognitive behavioural program for gambling (GAMBLINGLESS. FOR LIFE.). The primary aim of Phase 2 was to employ a pragmatic trial design to investigate the effectiveness of the GAMBLINGLESS program delivered under PSD and GSD conditions. It was hypothesised that the GSD intervention would lead to better outcomes than the PSD intervention at the follow-up evaluations, as assessed by reductions in gambling symptom severity, gambling urges, gambling behaviours and psychological distress, and increases in quality of life and help-seeking. Secondary aims were to: (1) explore the profile of GAMBLINGLESS users; (2) identify the subgroups of problem gamblers who can most benefit from the GAMBLINGLESS program by identifying possible moderators of treatment outcome, as well as predictors of treatment outcomes, treatment engagement and follow-up completion; and (3) identify the processes or mechanisms that are responsible for changes in gambling outcomes following the GAMBLINGLESS program. The aim of Phase 3 was to explore the acceptability and feasibility of the GAMBLINGLESS program by both users and current treatment providers; and the degree to which the program could be effectively integrated into clinical practice in existing Victorian services.

Method

The development of the GAMBLINGLESS program involved the collation of intervention materials, a consensus process by the investigators, adaptation of the content for online delivery, and expert and lay user testing. The GAMBLINGLESS program leveraged the online delivery platform to engage participants through the use of interactive activities such as short videos, audio files, questionnaires and interactive animations. The final program consisted of four modules (13 to 15 activities each), each designed to take approximately 1-2 hours to complete: (1) Getting Ready to Gamble Less (enhancement of readiness and confidence); (2) Taking Action to Gamble Less (identification of behavioural skills and strategies); (3) Thinking Differently to Gamble Less (addressing common gambling-related cognitive distortions); and (4) Gambling Less for Good (managing gambling urges and preventing gambling relapse).

Participants for the pragmatic trial were eligible for inclusion if they: (1) resided in Australia; (2) expressed interest in seeking some type of help for their own gambling problems; (3) were 18 years of age or older; (4) had access to the Internet; (5) had adequate knowledge of the English language; and (6) were willing to take part in the 8 week program and complete brief assessment measures at 2- and 3-months follow-up. Consistent with a typical pragmatic trial, the program was available to any interested individual, regardless of whether they were seeking other forms of assistance. Participants were randomly allocated to PSD or GSD treatment conditions using block randomisation stratified on gender, median age, and problem gambling severity.

PSD and GSD participants were given access to the GAMBLINGLESS program for 14 weeks. Guidance in the GSD condition consisted of a maximum of one contact per week via appointment-based email (across the 8-week trial) with a maximum duration of 20 minutes per contact. Eleven guides were recruited from Victorian gambling treatment services (Gambling Help Online, Gamblers Help services). Overall, 39% of participants completed at least one of the follow-up assessments. Following the trial, in-depth semi-structured interviews were conducted with eight participants and seven guides.

Results

Profile of GAMBLINGLESS users

GAMBLINGLESS users were mostly male, less than 40 years of age, born in Australia, and employed full-time. They most commonly reported having issues with EGMs, horse, harness or greyhound racing, and sports and events betting. Almost all users (96%) were classified in the problem gambling category using the Problem Gambling Severity Index. Using the Gambling Symptom Assessment Scale, 7% were classified in the extreme severity range, 35% in the severe severity range, 49% in the moderate severity range, and 8% in the mild severity range. GAMBLINGLESS users also displayed high levels of psychological distress, poor quality of life, hazardous drinking, and illegal drug use or prescription medication for non-medical reasons. Just under half of users (49%) indicated that their goal was total abstinence, with the remainder indicating that their goal was to reduce problematic gambling activities (27%) or to abstain only from problematic gambling activities (24%). Nearly half of users reported employing a self-direction action in the month prior to registering for the GAMBLINGLESS program. Although GAMBLINGLESS users reported high readiness to change and high importance to change, they reported low confidence in their ability to change and to resist the urge to gamble. Most were classified in the contemplation stage of change (44%), with smaller proportions in the action (30%) and pre-contemplation (27%) stage. They also reported high rates of gambling-related cognitive distortions and low rates of behavioural strategies to cope with gambling temptations.

Effectiveness of the GAMBLINGLESS program

There were no significant differences between the PSD and GSD conditions on almost all outcome measures at the 2- or 3-month follow-up evaluations. The only exception was for gambling frequency, whereby the GSD group reported a greater reduction in days gambled than the PSD group; however, there were significant reductions in gambling frequency for both groups at the 3-month follow-up evaluation. There was also a significant reduction in gambling frequency within treatment groups at the 2-month follow-up evaluation. There were statistically and clinically significant reductions in gambling symptom severity, gambling urges, and psychological distress within treatment groups at the 2- and 3-month follow-up evaluations ($d=0.36-1.36$). On gambling symptom severity, 50% of users recovered, 14% improved, 34% showed no real change, and 3% deteriorated; for psychological distress, 32% of users recovered, 15% improved, 45% experienced no real change, and 9% deteriorated. There were significant reductions in gambling expenditure and improvements in quality of life at the 2-month, but not the 3-month, follow-up evaluation. In contrast, there was a significant increase in high-intensity intervention help-seeking at the 3-month, but not the 2-month, follow-up evaluation. These findings confirm the effectiveness of both PSD and GSD interventions, but suggest that the addition of guidance does not improve outcomes for self-directed interventions.

Subgroups benefiting most from the GAMBLINGLESS program

There were few significant predictors of treatment outcomes (clinically significant change on gambling symptom severity), treatment engagement (completing at least one module activity), or follow-up completion (completion of at least one follow-up assessment). Psychological distress and readiness to change were the only significant independent positive predictors of treatment outcomes; and gender, age, and gambling activity preference did not moderate treatment outcomes. Age, additional help-seeking, and internet use were the only significant independent positive predictors of treatment engagement. Additional help-seeking and internet use were also significant independent positive predictors of follow-up completion; the interaction between sex and age was also statistically significant, indicating that older males were more likely to complete at least one follow-up assessment relative to other subgroups of users.

Mechanisms or processes of change

The only significant difference between the PSD and GSD conditions on the hypothesised process measures was on the confidence ruler, whereby greater improvement was identified for users allocated to the GSD intervention than the PSD intervention, at the 3-month follow-up evaluation. Users in the GSD condition, but not in the PSD condition, significantly improved on this measure from baseline to the 3-month follow-up. Across both interventions, gambling-related cognitions, behavioural coping with gambling temptations and gambling-related self-efficacy significantly improved at both the 2- and 3-month follow-up evaluations compared to baseline scores. There was no significant change in the importance ruler or readiness to change; and unexpectedly, the readiness ruler deteriorated from baseline to the 2-month follow-up evaluation. These findings suggest that the constructs targeted by the GAMBLINGLESS program generally improved following user exposure to the program, but that the addition of guidance to self-directed interventions does not improve these mechanisms of change. Moreover, a series of cross-lagged panel designs employed to explore the presumed reciprocal causation between gambling symptom severity and each of the hypothesised process variables revealed that there were no significant cross-lagged paths, suggesting that these variables are not responsible for the changes in gambling symptom severity outcomes following treatment.

Acceptability and feasibility of the GAMBLINGLESS program

Like most online self-guided psychological interventions, low engagement was a limitation of the GAMBLINGLESS program, with only one-third of users (33.0%) completing one activity. Despite the accessibility of all activities, users started at module one then progressively dropped off their participation as the program progressed. User ratings indicated that the most helpful activities included coping with lapses, identifying the benefits of gambling less, deciding to quit or cut back, and calculate money spent gambling. The GAMBLINGLESS program was positively evaluated by the majority of users in terms of ease of use (76%), convenience (71%), engagement (59%), layout (65%), enjoyment (69%), concerns about privacy (15%), satisfaction (68%), acceptability (58%), usefulness of information (70%), comprehension of information (82%), credibility (76%), likelihood of returning (74%), and internet as the mode of delivery (78%). The most commonly reported additional needs from treatment were learning how to relax better, improving physical health, learning skills to keep from returning to gambling, helping to overcome boredom, and finding enjoyable ways to spend free time.

The in-depth user and guide interviews were generally consistent with these findings. There was general agreement from both groups that the GAMBLINGLESS program was helpful and users reported that the program was effective. There were mixed views about the intensity of the program, with some users feeling challenged and others feeling overwhelmed. Both users and guides positively evaluated the program content, its look and feel, and the privacy aspects. All users, whether they received guidance or not, indicated that some kind of support and encouragement is important and should be included in future versions of the program. Although users who received guidance indicated that they had developed relatively strong personal bonds with their guides, guides reported low levels of user engagement and some frustration with the limitations of their role. They also expressed dissatisfaction with the amount of information provided on user access and progress through the modules.

Clinical implications

This is the first study in Australia to examine the effectiveness of a guided online self-directed gambling intervention. As most individuals with a gambling problem do not seek face-to-face treatment, the GAMBLINGLESS program may help address the gap in available treatment options and potentially reach subgroups of people who would otherwise not receive, or have access to, psychological interventions. Overall, the GAMBLINGLESS program displayed good outcomes and was

positively evaluated by the majority of users and guides. There was general agreement that GAMBLINGLESS could, and indeed should, be integrated into service delivery to expand the suite of services available to people with gambling problems. Some issues requiring consideration before integrating this program into the service system include:

GAMBLINGLESS program content: (1) The availability of an online self-directed program is warranted in Victoria; (2) The delivery of online self-directed programs with a cognitive-behavioural therapeutic orientation is appropriate; (3) Positively rated program content should be retained, while less positively rated program content should either be redeveloped or excluded; (4) Users may benefit from supplementary content or additional resources related to depression, stress and anxiety, boredom and loneliness, physical health, and anger management; and (5) The availability of contact details for multiple help options across the course of the program should be retained.

Look and feel of the GAMBLINGLESS program: (1) Greater integration between the user and guide interface is required; (2) The program could be offered in smaller segments and more frequently; (3) The program may benefit from additional strategies to enhance motivation to engage in the program; (4) Users may benefit from a more individualised approach in which they are directed to relevant activities based on their needs; and (5) There should be continued identification of academic developers and university affiliation to enhance the credibility of the program.

User suitability: (1) Further effort is required to target gamblers with lower gambling severities; (2) The program content, look and feel may not need to be personalised to individual user characteristics; (3) Further screening could ensure users have access to services that most fit their needs; (4) Users should continue to be provided the option of non-abstinence treatment goals; and (5) There is the potential for users residing in other states to access a Victorian online self-directed gambling program.

Delivery of guidance or support: (1) There needs to be a rethink on the nature of support; (2) Screening is required to link user needs to the type and amount of support; (3) Automated guidance should be avoided and peer guidance may be a valuable addition to the program; (4) Guidance can be reasonably provided by email, telephone, or via other avenues, such as chat; (5) Screening should include determining the type of support, best person to provide support, modality of support, amount of support needed, and over what duration support is provided; (6) The potential benefit of adding therapeutic contact to the program must be balanced against the preference of some users for the anonymity and convenience of using an unguided intervention; and (7) Integration of the program into existing services requires workload allocation to this activity.

Screening, assessment, and evaluation: (1) Subsequent evaluations of online self-directed programs may consider employing the Gambling Symptom Assessment Scale as a measure of gambling symptom severity prior to treatment and as a measure of change; (2) Online self-directed programs need to adequately screen for psychiatric comorbidity and provide referral information or resources that adequately address these issues; and (3) Research including a non-treatment control group are required before definitive statements are made regarding the efficacy of the program.

Improvement in user management systems: (1) Guides should have access to increased user information to enhance tailored guidance; (2) Information could include user demographics, assessment information, content completed, and time in the program; and (3) User management and communication should be undertaken in one system using the guide's own work email.

Training and supervision: (1) Guides should be selected based on attitudes towards providing minimal support or trained to avoid role conflict; (2) Training should require guides to complete the program as a participant; and (3) Counsellors could be selected for guidance based on their practice of cognitive-behavioural therapy, their willingness to employ an alternative theoretical orientation to their own; or their willingness to undertake training in cognitive-behavioural therapy.

Background

The material in this chapter has been copied directly from the following article:

Merkouris, S. S., Rodda, S. N., Austin, D., Lubman, D. I., Harvey, P., Battersby, M., . . . Dowling, N. A. (2017). GAMBLINGLESS. FOR LIFE. study protocol: A pragmatic randomised trial of an online cognitive-behavioural program for disordered gambling. *BMJ Open*.

The full-text of this article can be found at <http://bmjopen.bmj.com/content/7/2/e014226>. Changes have been made to the original material. The substantive changes are:

- Insertion of additional material on guided self-directed interventions (delivery, acceptability, cost-effectiveness, mechanisms of change, and subgroups for whom guided self-directed interventions are most appropriate);
- The restructure of the aims to delineate the 3 phases of the project. This includes the addition of the aim for Phase 1 (the development of GAMBLINGLESS) and the separation of the Phase 3 aim from the secondary aims (acceptability, feasibility and effective integration);
- The term problem gambling has replaced the term disordered gambling as this term is commonly employed in the Australian context; and
- The addition of gambling urges as a secondary outcome.

Introduction

Gambling disorder is defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as problematic gambling behaviour that is persistent and recurring, and leads to substantial impairment and disruption to personal, family or vocational pursuits (American Psychiatric Association, 2013). The term problem gambling is also utilised to describe gambling problems along a continuum of harm, from gambling that results in no adverse consequences to problem gambling that leads to adverse consequences to the gambler, their friends and family, and the community (Neal, Delfabbro, & O'Neil, 2005). Although problem gambling prevalence rates vary across jurisdictions, standardised international problem gambling prevalence rates have been estimated at 2.3% (Williams, Volberg, & Stevens, 2012). In Australia, national estimates identify rates of 0.4 to 0.6% for problem gambling, 1.9 to 3.7% for moderate risk gambling, and 3.0 to 7.7% for low risk gambling (Dowling, Youssef, et al., 2016; Gainsbury et al., 2014). The consequences of problem gambling are far-reaching and include financial, legal and occupational difficulties, family and relationship breakdown, and intimate partner violence (Delfabbro, 2008; Dowling, Jackson, et al., 2014). Furthermore, problem gambling is highly comorbid with mental health disorders, such as mood, anxiety, alcohol and drug use disorders, impulse control disorders, and personality disorders (Dowling, Cowlshaw, et al., 2014; Dowling et al., 2015).

While a diverse range of treatment options for problem gambling are currently available, recent systematic reviews have indicated that cognitive-behavioural therapy (CBT) and Motivational Interviewing (MI) are efficacious in treating problem gambling (Cowlshaw et al., 2012; Gooding & Tarrier, 2009; Thomas et al., 2011; Yakovenko, Quigley, Hemmelgarn, Hodgins, & Ronksley, 2015). These reviews have primarily focussed on face-to-face delivery of these interventions, as this has been the dominant funded model of treatment to date. Evidence, however, indicates that only a small proportion of problem gamblers (8-17% in Australia) (Productivity Commission, 2010) access specialist face-to-face gambling services, suggesting that this mode of treatment delivery does not

provide sufficient access to evidence-based treatment (Wilson & Zandberg, 2012). Barriers to accessing face-to-face treatment include personal factors, such as shame and denial and resource limitations, such as the limited availability of trained clinicians, time requirements, treatment costs, scheduling conflicts, childcare requirements, and geographic inaccessibility (Suurvali, Cordingley, Hodgins, & Cunningham, 2009). There is therefore a need to examine the use of alternative treatment delivery models that capitalise on advances in technology, employ non-traditional service providers, and involve self-directed interventions that can complement existing services (Kazdin & Blase, 2011). The adoption of these models reflects the movement towards 'stepped care' approaches in the literature for many mental health disorders (Coull & Morris, 2011; Lovell et al., 2008). Stepped care seeks to maximise clinical benefits by providing low intensity evidence-based interventions to a proportion of clients in the first instance. These interventions are generally classified under the broad category of self-help, where cognitive-behavioural manuals or protocols are independently employed by clients and facilitated through 'help-technologies', in the form of written or online materials.

Self-directed interventions

Traditionally, self-directed materials have been administered in the form of written self-directed workbooks. Increasingly, however, self-directed materials are being delivered via internet-based technologies. Self-directed and internet-based interventions have several advantages when compared to traditional face-to-face therapies. They are typically shorter and more cost-effective, facilitate immediate treatment, and may be able to reach more people, particularly subpopulations where inequities in services exist (Garvin, Striegel-Moore, & Wells, 1998; Wagner, Penelo, & Wanner, 2013; Wilson & Zandberg, 2012). Moreover, the lack of interpersonal contact and sense of anonymity involved in these interventions may attract people who are reluctant to attend traditional in-person services (Rodda, Lubman, Dowling, Bough, & Jackson, 2013; Rodda, Lubman, Dowling, & McCann, 2013). Online interventions have also been found to be non-stigmatising and empowering interventions that allow people to engage in treatment at their own time and pace (Lal & Adair, 2014). Self-directed interventions can range from purely self-directed strategies involving no professional guidance (pure self-directed [PSD], self-guided, or unguided self-directed) to treatments involving minimal support from a health care professional (guided self-directed [GSD]) (Lovell et al., 2008; Wilson & Zandberg, 2012). PSD interventions have been shown to be an effective treatment for several disorders, including depression, anxiety disorders (i.e., generalised anxiety disorder, panic disorder and social phobia) and bulimia nervosa, when compared to waitlist controls or treatment as usual (Bowman, Scogin, Floyd, Patton, & Gist, 1997; Carter & Fairburn, 1998; den Boer, Wiersma, & van den Bosch, 2004; Furmark et al., 2009; Lidren et al., 1994; Nordin, Carlbring, Cuijpers, & Andersson, 2010).

The support provided in GSD interventions is typically supportive or facilitative in nature, with the aim of actively guiding patients in the use of a self-directed protocol (Andersson, Carlbring, Berger, Almlöv, & Cuijpers, 2009; Cuijpers, Donker, van Straten, Li, & Andersson, 2010). Generally, guides do not deliver therapeutic content, but rather provide motivational support, monitor progress, clarify information contained within the self-directed protocol, review activities to ensure the correct application of techniques by the patients and address any technical questions or other issues that may arise (Andersson et al., 2009; Wagner et al., 2013; Wojtowicz, Day, & McGrath, 2013). GSD interventions are more readily disseminated than traditional therapies as they can be implemented by a wide range of mental health providers (Coull & Morris, 2011; Wilson & Zandberg, 2012).

There is considerable variability within GSD interventions in terms of the quantity of guidance provided, the technology employed to deliver the guidance (i.e., email, telephone, face-to-face), and the level of expertise and training required for effective implementation. Most studies provide guidance through weekly scheduled contacts (Andersson et al., 2009; Andersson & Cuijpers, 2008). A recent meta-analysis defined GSD as consisting of no more than 12 sessions (contacts) with a maximum

duration of 20 minutes each (Cuijpers et al., 2010). Similarly, in another meta-analysis, guidance consisted of no less than 30 minutes and no more than three hours in total (Coull & Morris, 2011). Interestingly, several studies have found no differences between GSD interventions with minimal or extensive email support (Fledderus, Bohlmeijer, Pieterse, & Schreurs, 2012; Vernmark et al., 2010), implying that an increase in therapist contact beyond a certain threshold may not facilitate further gains. Most GSD intervention studies deliver guidance via the telephone; however a growing number have successfully provided the guidance via internet-based platforms. Wojtowicz et al. (2013) found that most GSD intervention participants selected email-based guidance over telephone-based guidance, but that those who chose telephone-based guidance completed more program modules. These findings may suggest that telephone-based support improves retention through enhanced engagement and rapport, however, future research is required to evaluate treatment delivery formats. Some studies have employed non-specialists to deliver the guidance, however the implementation of evidence-based treatments indicate that the application of GSD requires training to competency (Wilson & Zandberg, 2012). Wilson and Zandberg (2012) propose a three stage training framework for GSD interventions: (1) Clients receive an evidence-based protocol via workbook or internet; (2) The mental health provider receives a therapist manual to guide patients to use the treatment protocol effectively; and (3) The provider is trained in the use of the therapist manual, including supervision to address specific problems as they arise. They argue that studies that implement quality control procedures such as careful clinician selection, training, and supervision and the use of treatment manuals eliminate therapist effects. In contrast, minimal training or ongoing supervision of GSD interventions can result in more negative treatment outcomes (Walsh, Fairburn, Mickley, Sysko, & Parides, 2004).

GSD interventions have also been shown to be efficient and effective independent treatments, with clinical guidelines recommending GSD for several disorders including depression, anxiety, bulimia nervosa, and binge eating disorder (National Institute for Clinical Excellence (NICE), 2004). There is evidence that GSD interventions are more effective than treatment as usual or waiting list control groups (Coull & Morris, 2011; Hirai & Clum, 2006; Sanchez-Ortiz, Munro, & Stahl, 2011) and more effective than PSD interventions for these disorders (Carter & Fairburn, 1998; Hirai & Clum, 2006; Wojtowicz et al., 2013). Moreover, randomised controlled studies have shown that GSD interventions as a sole treatment can be as effective as more intensive face-to-face therapies for several disorders, such as depression and anxiety (Bailer et al., 2004; Cuijpers et al., 2010; Hirai & Clum, 2006; Thiels, Schmidt, Treasure, Garthe, & Troop, 1998).

The acceptability of GSD interventions to both clients and health professionals is critical to its broad implementation. It has been argued that the “low intensity” nature of GSD interventions might undermine client confidence and result in poor compliance (Waller & Gilbody, 2009; Walsh et al., 2004). However, studies have found that GSD interventions seems to be acceptable to diverse patients in different treatment settings across different countries (Carrard et al., 2011; Lovell et al., 2008; Nordgreen et al., 2012; Wilson & Zandberg, 2012). Moreover, the dropout rates for GSD in traditional randomised controlled trials (RCTs) are comparable to other interventions (Bailer et al., 2004; Thiels et al., 1998), although this is not the case in automated trials of internet interventions that feature broad and unfiltered participant catchment, high and anonymous accessibility, ease of enrolment, and little personal or financial commitment (Christensen, Griffiths, Groves, & Korten, 2006; Christensen, Griffiths, Mackinnon, & Brittcliffe, 2006). Further research exploring the relevance, acceptability, and key components of GSD intervention provision from the perspective of clients and their guides would enhance our understanding of GSD interventions.

Adoption of effective treatments depends on the balance of costs and benefits. It has been argued that GSD is a cost-effective intervention as it can be administered by health providers across fewer sessions of shorter duration than standard psychotherapies (Waller & Gilbody, 2009; Wilson & Zandberg, 2012). For example, several studies have revealed encouraging results for the cost-

effectiveness of GSD for eating disorders (Lynch et al., 2010). From a public health perspective, GSD interventions can be more cost-effective than current specialty psychological therapies even if they have a lower efficacy because of their savings in terms of therapist contact and their potential to reach a large number of individuals with mental health disorders (Andersson & Cuijpers, 2008; Wilson & Zandberg, 2012).

A key difference between GSD and PSD interventions is the presence of therapist contact and the potential impact of therapist factors upon GSD intervention effectiveness (Coull & Morris, 2011; Cuijpers et al., 2010). As such, the increased benefit shown in GSD interventions may be due to common factors in all psychotherapies regardless of theoretical orientation, such as the therapeutic alliance (Richardson & Richards, 2006). The comparable effects of GSD and face-to-face interventions suggest that positive therapeutic alliances can be formed with minimal contact with the therapist, including email contact (Andersson et al., 2009; Cuijpers et al., 2010). Therefore, well-functioning relationships are determined by the nature, rather than the intensity, of the contact (Cuijpers et al., 2010). In fact, in some studies, the therapeutic alliance in online counselling has been rated higher than face-to-face comparison groups (Hanley & Reynolds, 2009; Holmes & Foster, 2012). An understanding of how GSD interventions fit in the broader context of available interventions will be enhanced by further investigation of how process and outcome criteria are similar and different for various treatment modalities.

It is important to identify the predictors of treatment adherence and outcomes for GSD interventions so that they can be offered to the subgroups of clients who are most likely to respond and modified for those who are unlikely to respond. However, there is little evidence on predictors of treatment outcome for GSD and even less on moderators of change (i.e., factors that interact with different treatments to produce differential outcome). In particular, there is mixed evidence regarding whether psychological problems and problem severity are associated with GSD intervention outcomes (Wilson & Zandberg, 2012). Wilson and Zandberg (2012) argue that GSD interventions are not necessarily contraindicated for clients with comorbid psychiatric conditions or a high problem severity. Thematic analyses conducted by Jones et al. (2012) found that reasons for discontinuing GSD were related to perceptions of the GSD program, practicalities of the program, and readiness to change. It has been argued that discussions of expectations regarding the program, the role of the guide, and the active role of the client, may enhance compliance with GSD interventions (Jones et al., 2012; Khan, Bower, & Rogers, 2007). Further identification of nonspecific predictors and moderators of treatment outcome would enhance the ability to determine the groups of clients for whom GSD should be recommended.

Efficacy of self-directed interventions for problem gambling

Despite the evidence in other fields, there is a paucity of research investigating the effectiveness of self-directed interventions for the treatment of problem gambling. One of the first studies in this area found that a self-directed manual (with or without an assessment interview) reduced gambling behaviour at 3-month and 6-month follow-up, however, an in-depth assessment interview did not further improve outcomes (Dickerson, Hinchey, & Legg, 1990). Several randomised controlled studies have since been conducted to examine the efficacy of a self-directed workbook combined with a single 20 to 45 minute MI therapy session, a self-directed workbook only condition and a wait-list control condition (Hodgins, Currie, Currie, & Fick, 2009; Hodgins, Currie, & el-Guebaly, 2001). An RCT by Hodgins et al. (2001) demonstrated that the MI plus self-directed workbook condition produced better outcomes than the self-directed only and wait-list control conditions at one month follow-up. Although the differences between the two workbook conditions were not maintained at the 12-month follow-up evaluation, the MI plus self-directed workbook condition was found to be more effective than the workbook only condition at the 24-month follow-up (Hodgins, Currie, el-Guebaly, & Peden, 2004; Hodgins et al., 2001). A subsequent study by Hodgins et al. (2009) revealed that the MI plus self-directed workbook condition was more effective than the self-directed workbook only and wait-list

control conditions at post-treatment and 12-months follow-up, however, the addition of six telephone booster sessions in the MI and self-directed workbook group did not further improve outcomes. Similarly, Abbott et al. (2012) compared the effectiveness of a standard telephone treatment, a single brief motivational interview, a single brief motivational interview plus self-directed workbook, and a brief motivational interview plus workbook plus four booster motivational interviewing sessions. Contrary to expectations, all treatment conditions produced comparable outcomes at the 12-month follow-up evaluation.

A randomised controlled trial, conducted by Petry et al. (2006) compared a Gamblers Anonymous (GA) referral control condition with a GA referral plus CBT-based self-directed workbook condition and a GA referral plus therapist-delivered CBT condition. This study found that both CBT conditions (therapist-delivered and self-directed) produced better outcomes at post-treatment compared to the GA referral only condition. Lastly, LaBrie et al. (2012) randomised participants to either a guided self-directed toolkit, a self-directed toolkit or a wait-list control condition. The toolkit consisted of three sections based on a combination of inoculation, stage change and relapse prevention theory. In this study, guidance consisted of only one telephone call to discuss the toolkit at the beginning of treatment. This study found no difference between the self-directed toolkit and guided self-directed toolkit interventions, however both interventions reduced gambling abstinence compared to the wait-list control at the three-month follow-up evaluation.

Despite their advantages, few studies have examined the use of online platforms for the delivery of self-directed interventions for the treatment of problem gambling (Carlbring & Smit, 2008; Casey et al., 2017). Carlbring and Smit (2008) conducted a RCT involving an 8-week internet-based CBT program with minimal therapist contact compared to a wait-list control. The internet-based program involved four MI-based modules and four CBT-based modules. All modules contained information and exercises and ended with essay-style questions and, participants were required to post at least one message on an online discussion group for each module. The therapist contact involved emails on homework assignments and a weekly telephone call, lasting on average 15 minutes, with the aim of providing positive feedback, encouragement and to respond to questions about the program. Findings revealed that the Internet-based program resulted in significant improvement in gambling symptom severity, anxiety, depression and quality of life that was maintained up to 36 months post-treatment.

Casey et al. (2017) evaluated the effectiveness of an RCT involving internet-based CBT, internet-based CBT comprising the monitoring, feedback, and support modules only (internet-MFS), and a waitlist control. Results found that the internet-based CBT program resulted in significant improvements in gambling related behaviour, depression, anxiety, stress, and quality of life relative to the waitlist control group at post-treatment and that these therapeutic gains were maintained at the 12 month follow-up evaluation. In contrast, the Internet-MFS group resulted in fewer improvements. This study also compared the effect sizes of the internet-based CBT program and the delivery of the CBT program delivered face-to-face by the same research team in an earlier study. The findings revealed that the face-to-face CBT program was superior in improving gambling-related cognitions, but no differences were found between groups for gambling expenditure, gambling frequency, gambling urge, and gambling refusal self-efficacy. Despite the limited evaluation of online self-directed programs in the gambling field, this is an area of research that is growing. Currently, several ongoing trials are being conducted in Canada, including a RCT evaluating an online self-directed cognitive-behavioural and motivation therapy intervention for problem gamblers (Hodgins, Fick, Murray, & Cunningham, 2013), and a RCT evaluating an online intervention for problem gamblers with co-morbid mental health symptoms (Cunningham et al., 2016).

Conclusion

Taken together, these studies provide mixed evidence for the efficacy of self-directed interventions for problem gambling. Although the available studies have focussed on PSD interventions, several of the intervention arms in these studies approximate GSD. These arms, however, generally involve the addition of motivational interviews to workbook only conditions, rather than adding guidance *per se*. Overall, the findings suggest that both PSD interventions (Casey et al., 2017; LaBrie et al., 2012; Petry et al., 2006) and interventions that approximate GSD (Carlbring & Smit, 2008; Hodgins et al., 2009; Hodgins et al., 2001; LaBrie et al., 2012) produce better outcomes than wait-list control groups in the treatment of problem gambling. It remains uncertain, however, as to whether GSD interventions offer advantages over PSD interventions for problem gamblers, with limited evidence suggesting that GSD-like interventions are more effective than PSD (Hodgins et al., 2009; Hodgins et al., 2001) or produce comparable outcomes (LaBrie et al., 2012).

As such, further research is required to evaluate the effectiveness of self-directed interventions for problem gambling, and specifically comparing the differential effectiveness of GSD and PSD interventions. Based on the limitations of the current evidence base, this research should examine the effectiveness of a GSD intervention comparable to that in other addiction and mental health fields, where guidance is defined as minimal therapist contact that is facilitative in nature, and consists of more than a single session (Cuijpers et al., 2010). Although GSD interventions can be implemented by a wide range of treatment providers, research is required to determine the real-world applicability of such interventions. A pragmatic trial design will allow for the evaluation of these interventions in current services, and produce results that are generalisable and applicable in current services, through the use of current treatment providers serving as guides (Patsopoulos, 2011). In addition, the use of a qualitative methodology, which has been recommended as an important adjunct to any randomised controlled trial (Lewin, Glenton, & Oxman, 2009), will allow for further exploration of the acceptability and feasibility of implementing GSD interventions in current Victorian gambling treatment services, and the degree to which the program could be effectively integrated.

Aims and hypotheses

This project included multiple phases. Phase 1 aimed to develop an online self-directed cognitive behavioural program for gambling (GAMBLINGLESS. FOR LIFE.) that can be delivered across Victorian and other Australian services. The aim was to develop a comprehensive and intensive cognitive-behavioural program that emulates the intensity and depth of a face-to-face cognitive-behavioural intervention, and from which more brief and targeted interventions can be developed.

The primary aim of Phase 2 was to investigate the effectiveness of the online self-directed cognitive-behavioural program for gambling (GAMBLINGLESS. FOR LIFE.) on gambling symptom severity, gambling urges, gambling behaviours (frequency and expenditure), psychological distress, quality of life and additional help-seeking. A two-arm, parallel group, pragmatic randomised trial was conducted. The GAMBLINGLESS program was delivered under two different conditions: (i) PSD (without any practitioner guidance); this condition will serve as an active control condition; and (ii) delivered with guidance delivered via email by practitioners from existing gambling treatment services (GSD).

It was hypothesised that the GSD intervention would lead to better outcomes than the PSD intervention at the two and three month follow-up evaluations, as assessed by reductions in gambling symptom severity, gambling urges, gambling behaviours and psychological distress, and increases in quality of life and help-seeking.

Secondary aims were to:

- (1) explore the profile of GAMBLINGLESS users;
- (2) identify the subgroups of problem gamblers who can most benefit from the GAMBLINGLESS program by identifying possible moderators of treatment outcome, as well as predictors of treatment outcomes, treatment engagement and follow-up completion; and
- (3) identify the processes or mechanisms that are responsible for changes in gambling outcomes following the GAMBLINGLESS program.

The aim of Phase 3 was to explore the acceptability and feasibility of the GAMBLINGLESS program by both users and current treatment providers; and the degree to which the program could be effectively integrated into clinical practice in existing Victorian and other Australian services.

Method

The material in this chapter has been copied directly from the following article:

Merkouris, S. S., Rodda, S. N., Austin, D., Lubman, D. I., Harvey, P., Battersby, M., . . . Dowling, N. A. (2017). GAMBLINGLESS. FOR LIFE. study protocol: A pragmatic randomised trial of an online cognitive-behavioural program for disordered gambling. *BMJ Open*.

The full-text of this article can be found at <http://bmjopen.bmj.com/content/7/2/e014226>. Changes have been made to the original material. The substantive changes are:

- The addition of information describing pragmatic trial designs;
- A brief description of the Victorian services from which the program guides were employed (Gambling Help Online and Victorian Gamblers Help services);
- Scoring of the K6 based on Australian norms;
- Categorising help-seeking behaviours based on high-intensity help-seeking (outcome measure), low-intensity help-seeking (outcome measure) and self-directed actions (descriptive measure);
- Identification of the selected items employed to measure gambling-related cognitions and readiness to change;
- The statistical analysis section has been updated to reflect the analysis conducted for this report;
- The term problem gambling has replaced the term disordered gambling; and
- The addition of gambling urges as a secondary outcome.

Phase 1: Development of the GAMBLINGLESS. FOR LIFE. Program

The GAMBLINGLESS program was developed as an 8-week internet-delivered cognitive-behavioural self-directed program designed to help people with gambling programs. The program consists of four modules, each ranging from 13 to 15 activities (see Table 1). Each module was designed to take approximately one to two hours to complete. While it was recommended that participants complete all modules and activities in numerical order, the GAMBLINGLESS program allowed participants to complete as many activities as they liked, and in any order they chose. As one of the aims of this study was to explore the acceptability and feasibility of this comprehensive program, with a view to developing a more refined brief program in the future, it was not anticipated that participants will complete all activities in each module.

In **Module 1 – Getting Ready to Gamble Less**, participants gained a better understanding and awareness of their gambling and how they may have wanted it to change. This MI-based module started with exercises relating to assessing participants gambling behaviour and exploring motivations and consequences of their gambling. Other exercises in this module were designed to help motivate participants, clearly outline the benefits of changing their gambling and understand their goals. In **Module 2 – Taking Action to Gamble Less**, participants learnt to identify skills and strategies they already use, and learnt new skills, that would assist them in achieving their gambling goals. The strategies in this behavioural therapeutic module were designed to reduce and stabilise their gambling. Strategies included limiting access to gambling venues and money, budgeting, identifying alternative enjoyable activities, learning to relax, employing effective problem solving strategies, and seeking other help. **Module 3 – Thinking Differently to Gamble Less** addressed common gambling-related maladaptive cognitions. In this cognitive therapeutic module, participants learnt how gambling works and some of the methods that the gambling industry uses to keep people gambling. This module was designed to help participants make a more informed decision about their gambling. In doing so, participants would begin to understand which erroneous cognitions they are using and learn to modify them. Lastly, **Module 4 – Gambling Less for Good** helped increase participants awareness of the chain of events and behaviours leading up to a relapse, so that they would be more prepared to maintain their goals in the future. In this relapse prevention module, participants learnt how to adapt some existing skills and learnt some new skills to deal with high-risk situations and gambling urges so they would not relapse.

The development of the GAMBLINGLESS program commenced with the collation of a comprehensive range of CBT and self-directed treatment manuals for problem gambling. A consensus process by the Chief Investigators was conducted to identify the most relevant MI, cognitive and behavioural activities to develop a comprehensive and interactive protocol for the proposed intervention. Once the program content was finalised by the Chief Investigators, it was adapted for online delivery. The online GAMBLINGLESS program was then subjected to expert testing (a group of the Chief Investigators) and lay user testing (3 males and 1 female not involved in the development of the program). The expert and lay user testing involved working through the entire program, including the registration and consent process, the pre-intervention questionnaires, and all activities. Users were asked to provide feedback, using a structured feedback survey, on the content (e.g. errors, level of difficulty, appropriateness of content), usability (e.g. navigation, saving activities, rating each page) and likeability (e.g. level of interest and engagement) of the program. The feedback from the expert and lay user testing was collated and the online GAMBLINGLESS program was refined accordingly. These refinements included editing or reducing the amount of text, adding interactive activities (e.g., videos) and correcting minor technical issues.

The GAMBLINGLESS program leveraged the online delivery platform to engage participants through the use of interactive activities such as short videos, audio files, questionnaires and interactive animations. One of the unique features of the GAMBLINGLESS program was that at the end of each module participants could answer questions relating to their gambling spend, treatment goals and ability to resist gambling urges as a way of tracking their progress throughout the 8-week intervention. Another important feature of this program was the in-built rating item. At the end of each activity, participants were asked to rate its helpfulness, using a 5-star rating system. This enabled the collection of important acceptability and usability data, while participants were using the program.

Table 1. Overview of GAMBLINGLESS program

| Module | Activity | Module | Activity |
|--|--|---------------------------------|--|
| 1. Getting Ready to gamble less | 1. Assessing my gambling | 2. Taking action to gamble less | 1. My confidence to gamble less |
| | 2. Understanding my gambling | | 2. Knowing my strengths |
| | 3. My reasons for gambling | | 3. My previous attempts to gamble less |
| | 4. My gambling triggers | | 4. Limiting access to gambling venues |
| | 5. My negative gambling consequences | | 5. Guidelines to gamble safely |
| | 6. Money I spend gambling | | 6. Limiting my access to money |
| | 7. Keeping track of my gambling | | 7. My budget |
| | 8. Identifying the benefits of gambling less | | 8. My enjoyable activities |
| | 9. Knowing my values | | 9. Learning to relax I |
| | 10. My future self | | 10. Learning to relax II |
| | 11. My readiness to gamble less | | 11. Solving my problems I |
| | 12. Deciding to quit or cut back | | 12. Solving my problems II |
| | 13. Putting it all together | | 13. Seeking other help |
| 3. Thinking differently to gamble less | 1. How my thoughts affect my gambling | 4. Gambling less for good | 1. Recognising my gambling urges |
| | 2. Adjusting my gambling thoughts | | 2. Managing my urges I |
| | 3. The gamblers fallacy thinking trap | | 3. Managing my urges II |
| | 4. The illusion of control thinking trap | | 4. Managing my urges III |
| | 5. The prediction thinking trap | | 5. Managing my urges IV |
| | 6. The chasing thinking trap | | 6. Identifying my high risk situations |
| | 7. The positive expectancies thinking trap | | 7. Coping with my high risk situations |
| | 8. The near miss thinking trap | | 8. The willpower breakdown |
| | 9. The low self-confidence thinking trap | | 9. My seemingly irrelevant decisions |
| | 10. The explanation thinking trap | | 10. My decision consequences |
| | 11. The selective memory thinking trap | | 11. My reminder card |

| Module | Activity | Module | Activity |
|--------|--------------------------------|--------|-----------------------------|
| | 12. Changing my thoughts I | | 12. Coping with my lapses |
| | 13. Changing my thoughts II | | 13. My future |
| | 14. Putting it all together I | | 14. Putting it all together |
| | 15. Putting it all together II | | |

Phases 2 and 3: Trial design and acceptability and feasibility of the GAMBLINGLESS program

This study was a two-arm, parallel group, pragmatic randomised trial, with online follow-up evaluations conducted at two and three months from pre-intervention. There has been increasing recognition of a gap between the context in which research is carried out and the everyday practice settings in which we hope research findings are applied (Glasgow & Emmons, 2007). While RCTs have traditionally been viewed as the most scientifically rigorous study design for evaluating psychological treatments, most do not indicate the degree which interventions are effective in “real world” clinical practice. Researchers attempting to increase the external validity of treatment outcome studies therefore sometimes conduct observational studies that describe outcomes in clients treated in completely naturalistic settings without using randomisation. Unfortunately, the findings from non-randomised trials are inherently difficult to interpret due to selection bias. The alternative to conducting non-randomised observational studies, however, is to adapt the traditional RCT methodology to enhance the external validity of the trial but also to retain some of its key advantages. This is known as a pragmatic trial (Hotopf, 2002; Relton, Torgerson, O’Cathain, & Nicholl, 2010).

Pragmatic trials aim to inform healthcare decision making in practice. The design features of pragmatic trials include, but are not limited to conducting trials in “real-world” settings, representing the heterogeneity of clients in clinical practice, applying minimal exclusion criteria (such as other forms of help-seeking), including clients with a wide range of diagnoses, delivering the intervention flexibly, employing an active treatment as a comparison group, and employing outcome measures that reflect “real-world” concerns and functional outcomes. The study was designed to maximise the ability to translate the findings into clinical practice in the state of Victoria. While retaining a gold-standard level of evidence for the efficacy of self-directed interventions, it mimics real-life gambling care where clients mainly approach the institutions that they think can help them. This pragmatic trial maintains real-life application through collaboration with existing Victorian services and produce a protocol for an evidence-based CBT intervention that can be rolled out across a range of Victorian and other Australian services. This trial was registered with the Australian New Zealand Clinical Trials Registry (Trial ID: ACTRN12615000864527). This study has been approved by Deakin University Human Research Ethics Committee (Ethics ID: 2014-123) and Eastern Health Human Research Ethics Committee (Ethics ID: E07/2015).

Participant recruitment

Participants were recruited Australia-wide using numerous strategies. These included advertisements in public places and health services (e.g., general practitioner [GP] waiting rooms) and online advertisements through Facebook and Google (Google Adwords). Advertisements and links to the GAMBLINGLESS website were also placed on various university and gambling-related websites (e.g.

Gambling Help Online, Victorian Responsible Gambling Foundation). Lastly, participants were also recruited via counsellors from current gambling treatment services, including Victorian Gamblers Help Services. Counsellors from the participating agencies provided information about the GAMBLINGLESS program to their clients who expressed an interest in seeking additional help for their own gambling problems.

Individuals were eligible to participate if they: (1) resided in Australia; (2) expressed interest in seeking some type of help for their own gambling problems; (3) were 18 years of age or older; (4) had access to the Internet; (5) had adequate knowledge of the English language; and (6) were willing to take part in the 8 week program and complete brief assessment measures at 2-, and 3-months follow-up. Consistent with a typical pragmatic trial, the self-directed program was available to any interested individual, regardless of whether they were seeking other forms of assistance (Treweek & Zwarenstein, 2009).

Procedure

To register for the program, individuals were asked to provide an email address and password. At this stage, eligibility was assessed by asking participants to confirm that they were 18 years of age or older and that they lived in Australia. During this process, participants were required to provide informed consent online. In order to consent, an automatic window appeared with a detailed study explanatory statement. Participants were prompted to read this explanatory statement and asked to agree to the terms and conditions in order to continue. Upon providing consent, participants were immediately directed to the online pre-intervention questionnaire, after which they were automatically randomised to one of the two intervention conditions. Participants were asked to complete an online follow-up questionnaire 2 and 3 months after completing the pre-intervention questionnaire. See Figure 1 for the study flow chart.

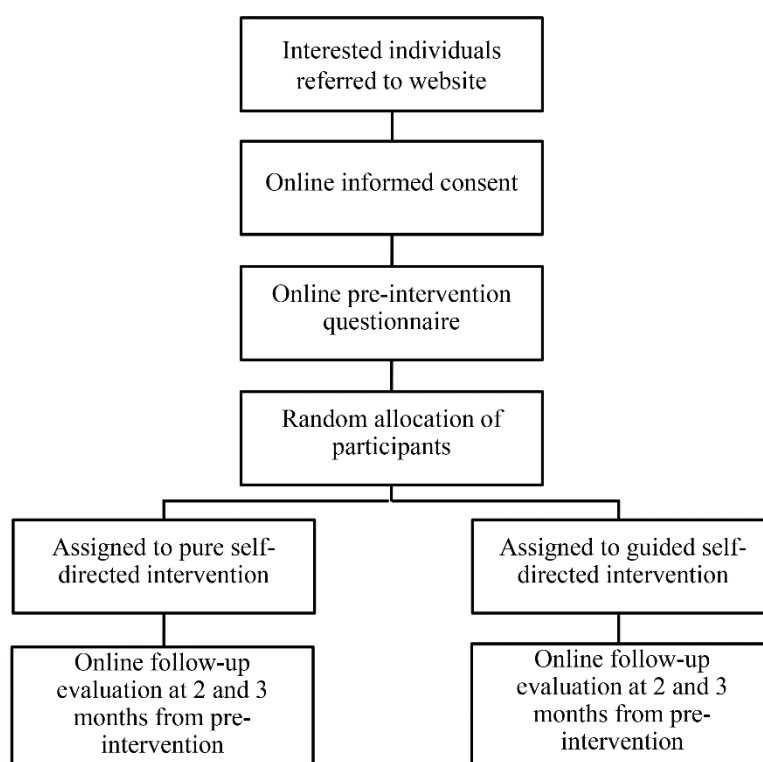


Figure 1. Participant flow chart

Interventions

Guided self-directed condition

Participants allocated to the GSD intervention were provided guidance throughout the 8-week program via email. Consistent with the definition adopted in a recent meta-analysis (Cuijpers et al., 2010), guidance consisted of a maximum of one contact per week (across the 8-week trial) with a maximum duration of 20 minutes per contact. Contacts were via appointment-based email. They were scheduled at the start of the intervention period, with guides initiating email contact once per week. Participants were informed that they could email their guide as often as they liked throughout the duration of the program, however, the guide would only respond at the scheduled appointment time.

Guides were responsible for providing assistance in a supportive and facilitative manner, with the aim of orienting the participant in the use of the GAMBLINGLESS program. The guides provided support, monitored progress, clarified information contained within the program, answered technical questions, and addressed other problems that arose. In these emails, participants were also reminded to complete modules to enhance retention. As there is evidence to suggest that a clear deadline provided for the duration of the treatment can foster compliance (Andersson et al., 2009; Andersson, Estling, Jakobsson, Cuijpers, & Carlbring, 2011), participants were informed that they would only have access to the self-directed materials for 14 weeks and access to their guide for 8 weeks. The 8-week guidance period coincided with the advice participants received to complete one module per fortnight. Participants who failed to attend their guidance appointments (i.e., did not respond to the weekly email from their guides) were not contacted by other means. Regardless of whether a participant responded, the guide was instructed to continue to send emails during the 8-week guidance period.

Pure self-directed condition

The PSD intervention served as an active control condition for this study. Participants in this group had access to the same GAMBLINGLESS program as participants in the GSD intervention, however, they did not receive weekly email support from a guide. Participants in the PSD intervention were also informed that they would only have access to the GAMBLINGLESS program for 14 weeks. An active control group was selected due to increasing awareness of the limitations of untreated control groups regarding ethical treatment and long-term follow-up of participants. Furthermore, given that GSD interventions are considered the gold standard in self-directed treatments for many disorders, with its efficacy and long-term effectiveness proven in a sufficient number of randomised controlled trials, its superiority over an untreated control group did not seem to need further confirmation (Wagner et al., 2013).

Guide selection and training

Eleven guides were recruited from current gambling treatment services in Australia, namely, Gambling Help Online (the Australian national online counselling service) and Victorian Gamblers Help services. The Gambling Help Online website provides a multi-layered response to the needs of site visitors and potential gambling treatment/help-seekers. This includes access to a range of gambling information and resources, online counselling (chat and email), assessment and referral interventions. Victoria's Gamblers Help services provide face-to-face counselling and financial counselling services throughout the metropolitan area and across regional Victoria. Agencies delivering the Gambler's Help program include community health services, and child and family welfare agencies, who provide face-to-face counselling (individual, couples and family counselling), group support, telephone counselling, email support and financial advice. Secure project-specific email addresses were provided to each guide. All emails exchanged between the guides and their participants were via these project-specific email addresses.

The GSD intervention was manualised and the Guides were required to complete a 3-hour training workshop. This workshop involved training the Guides in the use of the GAMBLINGLESS program, how to communicate via email and how to provide guidance via email. A group peer supervision session was conducted, with a member of the research team moderating this session. The supervision session included a discussion on the content of the e-mail correspondence, sharing of the experiences of providing guidance, and discussions about problems encountered. In addition, the guides were provided with ongoing assistance and support from members of the research team, as required.

Data collection

Table 2 provides an overview of the evaluation time-points at which each measure was administered to participants throughout the trial. As mentioned previously, participants were required to complete the pre-intervention questionnaire before gaining access to the GAMBLINGLESS program. Participants were also asked to complete follow-up evaluations 2 and 3 months following completion of the pre-intervention questionnaire. Participants were contacted via email to complete these follow-up evaluations and were compensated with an AUS\$30 gift voucher following the completion of each of the follow-up evaluations.

All questionnaires were completed online. Short and modified versions of validated measures were utilised to ensure that the online questionnaires were as brief as possible (approximately 15 minutes). Across the evaluations, data was collected about socio-demographic information (e.g. age, gender), gambling related variables (e.g. preferred gambling activity), psychosocial variables (e.g. alcohol use), process measures (e.g. gambling-related cognitions) and program evaluation measures (e.g. internet evaluation and utility questionnaire). At each evaluation time-point, data was collected on the primary outcome of gambling symptom severity, and secondary outcomes, including gambling behaviours, psychological distress, quality of life and additional help-seeking behaviour.

Participants who did not complete a follow-up evaluation received two reminder emails. Participants who failed to complete the follow-up evaluation after these two reminder emails were contacted by a research assistant via telephone as a final reminder. Although participants contacted over the telephone were given the option of completing the follow-up evaluation with the assistance of the research assistant, who were blind to the participant's treatment condition, only one participant completed their 2-month follow-up questionnaire over the telephone.

Primary outcome

Gambling symptom severity

The Gambling Symptom Assessment Scale (G-SAS) (Kim, Grant, Potenza, Blanco, & Hollander, 2009) was used to measure the severity of gambling symptoms. The G-SAS is a self-report scale that consists of 12 items designed to assess change in gambling symptom severity during treatment. The G-SAS uses a past week timeframe and each item is scored from 0 to 4, with varying response options for each item. Total scores on the G-SAS range from 0 to 48, with higher scores indicating greater gambling symptom severity. Scores on the G-SAS can be categorised as extreme (41-48), severe (31-40), moderate (21-30), or mild (8-20). The G-SAS has demonstrated high internal consistency ($\alpha = .87$) and good convergent validity with other measures of gambling symptom severity (Kim et al., 2009).

Secondary outcomes

Gambling urges

The gambling urge subscale of the G-SAS was used to assess changes in gambling-related urges (Kim et al., 2009). The gambling urge subscale consists of the first four items of the G-SAS, with total subscale scores ranging from 0 to 16.

Gambling behaviours

Past month gambling frequency was assessed using self-report items relating to the number of days gambled on six types of gambling activities. These activities include electronic gaming machines (EGMs), table games (e.g. blackjack), horse, harness or greyhound racing, sports and events betting, number games (e.g. lotteries and bingo), and informal private games (e.g. playing cards at home). Similarly, self-report items were used to assess past month gambling spend on these gambling activities. Participants were instructed to answer zero if they believed that they broke even or won money.

Psychological distress

Psychological distress was measured using the Kessler 6 Psychological Distress Scale (K6) (Kessler et al., 2002). The K6 measures current and nonspecific psychological distress in the past four weeks and comprises of six items relating to the experience of specific symptoms of psychological distress, such as nervousness, agitation, psychological fatigue, and depression. Using the scoring based on Australian norms, the response options for each item range from 1 (none of the time) to 5 (all of the time). Item scores are summed to obtain a total score between 6 and 30 and respondents can be classified as being at low (score of 6-13), moderate (score of 14-18), high (score of 19-24), or very high risk (score of 25-30). This measure has demonstrated high internal consistency and reliability ($\alpha = .89$) across major sociodemographic subsamples (Kessler et al., 2002).

Quality of life

The first item from the EUROHIS-QOL 8-item index was used to assess overall quality of life ('How would you rate your quality of life?') (Schmidt, Mühlen, & Power, 2006). The EUROHIS-QOL 8 is a short version of the WHOQOL-BREF, the first item of which is the same across both measures. The response options for this item range from 1 (very poor) to 5 (very good). This item has been shown to be highly correlated with overall EUROHIS-QOL 8-item scores (Power, 2003; Schmidt et al., 2006).

Additional help seeking behaviour

Participants were asked to indicate how many times, if any, they had accessed other support options for gambling during the previous 30 days. These items related to a range of support options, including high-intensity interventions (5 items: gambling counselling face-to-face, financial counselling, residential gambling facility, gambling support groups and psychologist/psychiatrist/general practitioner) and low-intensity interventions (3 items: gambling helpline, gambling counselling online via chat and gambling counselling via email) (Rodda, Lubman, & Dowling, 2017).

Diagnostic and descriptive measures

Socio-demographic characteristics

The following socio-demographic characteristics were collected: age, gender, postcode of current residence, country of birth, employment status and personal net income per year.

Problem gambling severity

The Problem Gambling Severity Index (PGSI) (Ferris & Wynne, 2001) was used as a past year measure of problem gambling severity for diagnostic and sample descriptive purposes. The PGSI consists of nine items rated on a 4-point Likert scale, ranging from 0 (never) to 3 (almost always). Scores range from 0 to 27, whereby higher scores indicate greater problem severity. Scores on the PGSI can be used to classify individuals as non-problem gamblers (score of 0), low risk gamblers (scores of 1 or 2), moderate risk gamblers (scores between 3 and 7), or problem gamblers (scores of 8 or higher). The PGSI has high internal consistency ($\alpha = .84$) and demonstrates good criterion validity with measures of gambling involvement and gambling severity (Ferris & Wynne, 2001; Holtgraves, 2009).

Treatment goals

Participants' current goal for treatment were examined, with the following response options provided: (i) quit (or stay quit) gambling altogether; (ii) quit (or stay quit) the gambling activities I think I have an issue with; or (iii) cut back (or stay cut back) the gambling activities I think I have an issue with.

Problematic gambling activity

As a measure of problematic gambling activity, participants were asked to indicate if they have an issue with a range of gambling activities, including EGMs, table games (e.g. blackjack), horse, harness or greyhound racing, sports and events betting, number games (e.g. lotteries and bingo), and informal private games (e.g. playing cards at home). Participants could indicate multiple problematic gambling activities.

Self-directed actions

Participants were asked to indicate how many times, if any, in the previous 30 days they had used self-directed actions (6 items). These self-directed actions included online gambling forums, reading information on the Gambling Help Online website, speaking to family or friends, trying self-help strategies, completing self-directed modules on Gambling Help Online website and self-exclusion (Rodda et al., 2017).

Internet use

Frequency of Internet use was assessed using a one-item self-report measure. Participants were asked to indicate, in a regular week, how many hours they would use the Internet for work/personal/education/recreation purposes.

Alcohol use

Alcohol use was measured using the Alcohol Use Disorders Identification Test-3 (AUDIT-3) (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). The AUDIT-3 uses the third item of the AUDIT, which measures the frequency of consumption of six or more drinks on one occasion. The response options range from 0 (never) to 4 (daily or almost daily). This item has shown to be an effective one-item screening measure for hazardous drinking with studies indicating adequate rates of sensitivity (.79-.89) and specificity (.65-.79), when using a cut-off score of 1 (i.e. more than never) (Bush et al., 1998; Gordon et al., 2001), against the 10-item AUDIT and measures of past-year heavy drinking.

Substance use

As a measure of substance use, participants were asked about the frequency of illegal drug use or use of prescription medications for non-medical purposes, in the previous 30 days (Smith, Schmidt, Allensworth-Davies, & Saitz, 2010). This single-item has shown good sensitivity (.85-1.00) and specificity (.74-.96) for detecting current drug problems or drug use disorders and self-report drug use,

against the Composite International Diagnostic Interview (CIDI) Substance Abuse Module (Smith et al., 2010).

Process measures

Gambling-related cognitions

Gambling-related cognitions were measured using a single item from each subscale of the Gambling-Related Cognitions Scale (GRCS) (Raylu & Oei, 2004). The items were selected as they best reflected the gambling-related cognitions addressed within the GAMBLINGLESS program. The GRCS consists of five subscales, of which the following items were employed: interpretative bias ('remembering how much money I won last time makes me continue gambling'), illusion of control ('I have specific rituals and behaviours that increase my chances of winning'), predictive control ('losses when gambling are bound to be followed by a series of wins'), gambling-related expectancies ('gambling makes things seem better'), and the perceived inability to stop gambling ('it is difficult to stop gambling as I am so out of control'). Response options for each item range from 1 (strongly disagree) to 7 (strongly agree), with higher scores reflecting a higher level of erroneous gambling cognitions.

Coping with gambling temptations

Selected items from the Alcohol Abuse Coping Response Inventory (AACRI) (Humke & Radnitz, 2005) were adapted for gambling as a measure of participants' ability to cope with gambling temptations. Four items from the behavioural factor of the AACRI were selected. These items relate to reducing stress, avoiding situations and/or places where one used to gamble or leaving tempting situations, focusing on techniques that they know about how to gamble less, and to do other things when tempted. The response options for each item range from 0 (never) to 2 (always). These items were selected as they were reflective of the activities within the GAMBLINGLESS program.

Importance, readiness, and confidence to change

Ready, Willing and Able (Rodda, Lubman, Iyer, Gao, & Dowling, 2015) uses three readiness rulers to assess the importance, readiness and confidence of participants to limit or stop their gambling. Participants were asked to indicate 'how important is it for you that you limit/stop your gambling' (importance), 'where does limiting/stopping gambling fit on your list of priorities' (readiness) and 'how confident are you that you could resist an urge to gamble' (confidence). Response options range from 1 to 10, where higher scores indicate greater importance, readiness or confidence. Similar rulers have demonstrated good psychometric properties in other addictions (Boudreaux et al., 2012; Hesse, 2006) and have been used in previous studies of treatment-seeking gamblers (Rodda et al., 2015).

Readiness to change

Selected items from the reduced drinking version of the University of Rhode Island Change Assessment (URICA), adapted for gambling, (Soderstrom et al., 2007) were used to measure participants readiness to change. This version of the URICA consists of 12 items, 3 items for each pre-contemplation, contemplation, action and maintenance stage of change subscales. The items are rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The following items from each subscale were selected as they best represented the content of the GAMBLINGLESS program: 'I guess I have faults, but there's nothing that I really need to change about my gambling' (pre-contemplation); 'I might want to change something about my gambling' (contemplation); 'I am really working hard to change my gambling' (action); and 'it is frustrating but I feel I might be having a recurrence of a gambling problem I thought I had resolved' (maintenance). A readiness score was calculated by adding the contemplation, action and maintenance scores and subtracting the pre-contemplation score (Pantalon & Swanson, 2003).

Gambling-related self-efficacy

The Brief Situational Confidence Questionnaire (BSCQ) (Breslin, Sobell, Sobell, & Agrawal, 2000) measures confidence in one's ability to resist drinking when faced with high-risk situations using a visual analogue scale where 0 equates to 'not at all confident' and 100 equates to 'totally confident'. These response options were converted to 0 to 10 in the current study. The original BSCQ consists of eight items relating to unpleasant emotions, physical discomfort, pleasant emotions, testing control over drinking, urges and temptations, conflict with others, social pressures to drink, and having pleasant times with others, and has demonstrated excellent internal consistency ($\alpha = .85$) (Breslin et al., 2000). The 8-item BSCQ was adapted for gambling with two further items added. These additional items relate to confidence in resisting the urge to gamble when faced with situations involving financial pressures and alcohol or drugs.

Program evaluation measures

Program evaluation

The Internet Evaluation and Utility Questionnaire (Ritterband et al., 2008; Thorndike et al., 2008) was used as a measure of participants' experience and perceptions of the GAMBLINGLESS program. This questionnaire consists of 15 items, with 13 of these items using a 5-point Likert scale ranging from 0 (not at all) to 4 (very). Higher scores on these items indicate good experiences and perceptions of the GAMBLINGLESS program. These items assess ease of use, convenience, engagement, enjoyment, layout, privacy satisfaction, acceptability, usefulness, comprehension, credibility, likelihood of returning and mode of delivery. This questionnaire also includes two open-ended items relating to the most and least helpful parts of the GAMBLINGLESS program. The Internet Evaluation and Utility Questionnaire has been shown to have adequate internal reliability ($\alpha = .69$) (Ritterband et al., 2008).

Therapeutic alliance

The Working Alliance Inventory-short form (WAI-S) (Tracey & Kokotovic, 1989) is a 12-item measure of therapeutic alliance. Response options range from 1 (never) to 7 (always). The WAI-S consists of three subscales: the goal, task and bond subscales (4 four items each). The goal subscale assesses the agreement between a client and therapist on treatment goals, the task subscale examines the agreement between the client and therapist on how to achieve the goals, and the bond subscale examines the development of a personal bond between the client and therapist (Tracey & Kokotovic, 1989). The WAI-S total scores range from 7-84 with higher scores indicative of a stronger therapeutic relationship, with subscale scores ranging from 4-28. The WAI-S has demonstrated excellent internal consistency ($\alpha = .95$) (Busseri & Tyler, 2003). For the purpose of this trial, only participants who were allocated to the GSD intervention will complete the WAI-S as a measure of the working alliance between the guide and the participant.

Additional requirements from treatment

Participants were asked to indicate additional issues that they may still want help with after taking part in the program. This questionnaire has been adapted from the What I Want For Treatment questionnaire (Miller & Brown, 1994). The adapted version employed in this study includes 21 statements, scored on a 10-point Likert scale ranging from 1 (definitely no) to 10 (definitely yes), and includes a variety of issues, such as moodiness or depression, anger, alcohol, tobacco or substance use, legal issues and financial issues.

Table 2. Overview of measures and evaluation period assessed

| Measure | Pre-intervention questionnaire | 2-month questionnaire | 3-month questionnaire |
|---|--------------------------------|-----------------------|-----------------------|
| Primary and secondary outcome measures | | | |
| G-SAS gambling symptom severity (incl. urge subscale) | x | x | x |
| Gambling frequency | x | x | x |
| Gambling expenditure | x | x | x |
| K6 psychological distress | x | x | x |
| EUROHIS quality of life | x | x | x |
| Additional help seeking behaviour | x | x | x |
| Diagnostic and descriptive measures | | | |
| Sociodemographic characteristics | x | | |
| PGSI problem gambling severity | x | | |
| Treatment goals | x | x | x |
| Problematic gambling activity | x | | |
| Self-directed actions | x | x | x |
| Internet use | x | | |
| AUDIT-3 alcohol use | x | x | x |
| Substance use | x | x | x |
| Process Measures | | | |
| GRCS gambling-related cognitions | x | x | x |
| AACRI coping with gambling temptations | x | x | x |
| Ready, Willing and Able | x | x | x |
| URICA readiness to change | x | x | x |
| BSCQ gambling-related self-efficacy | x | x | x |
| Program evaluation measures | | | |
| Internet Evaluation & Utility Questionnaire | | x | |
| WAI-S therapeutic alliance | | x | |
| Additional requirements from treatment | | x | |

Sample size

Effect sizes between GSD and PSD interventions range from 0.34 to 0.67 (Carter & Fairburn, 1998; Hirai & Clum, 2006; Loeb, Wilson, Gilbert, & Labouvie, 2000; Rapee, Abbott, Baillie, & Gaston, 2007; Titov, Andrews, Choi, Schwencke, & Mahoney, 2008). A total sample size of 100 participants at post-intervention was needed to detect an effect size of 0.55 (Cohen's d) for the primary outcome with statistical power of $(1 - \beta) = 0.80$ in a two-tailed test ($p < .05$). Follow-up attrition rates vary in RCTs of online interventions, with some studies indicating 3-month follow-up attrition rates as low as 8%, and others as high as 89% (Holländare et al., 2011; Murray et al., 2009). Taking into account a conservative drop-out rate of 50%, we aimed to recruit a sample of 200 participants.

Randomisation

Stratified block randomisation, using block sizes of 4, was utilised to randomly allocate participants. To ensure balance on potential confounders, randomisation was stratified based on gender, median age and problem gambling severity using the PGSI (8+). The randomisation schedule was applied via automated programming, which was built in to the program via the online resource developer. Therefore, participants who completed the pre-intervention questionnaire were immediately informed of their intervention allocation. Due to the automated nature of the randomisation process, a member

of the research team, monitored this process to ensure no technical issues ensued. This member of the research team was not able to influence the randomisation sequence.

Statistical analyses

Profile of GAMBLINGLESS users

Descriptive statistics were provided for baseline socio-demographic, gambling behaviour, psychological, and treatment-related characteristics. Participants who resided in Victoria were compared to participants who resided in other states and territories using a series of chi-square analyses and independent samples t-tests.

Effectiveness of the GAMBLINGLESS program

Due to the modest response rates at 2-month and 3-month follow-up assessments (38.8%), any analysis to assess the differential effectiveness of the PSD and GSD interventions that ignored the missing data would distort inferences about the population. Therefore, the outcome evaluation was based on participants who provided data on at least one follow-up occasion post-baseline. Statistical analyses were conducted using Stata 14 (StataCorp, 2015). A generalised mixed-effects model approach was used in the analysis of repeated measures for primary and secondary continuous and categorical outcomes. Mixed-effects models take into account the inter-individual differences in intra-individual change with repeated responses and use all the available data on each participant. Mixed models are also unaffected by randomly missing data and therefore do not require imputation methods (Gueorguieva & Krystal, 2004). Fixed effects in models were intervention group (GSD or PSD), time in categorical form, and interaction between intervention group and time. Random effects in the model were at study participant level, and represented an upward or downward shift in the outcome measure from an overall regression line and rate of change over time. Linear and non-linear combinations of regression coefficients from mixed models were tested for treatment group effect at follow-up time points and estimated between-group mean differences are presented along with confidence intervals. To interpret effect sizes and precision for ordinal and categorical outcomes, odds ratios and confidence intervals were calculated.

In mixed models, a distinct regression line for each individual is assigned for the random-effects, however, individual-specific intercepts and slopes are not estimated but are summarised by the variance-covariance components. These were predicted after estimation by obtaining best linear unbiased predictions (BLUPs) and estimated regression lines for each individual were then plotted. The intercept and slope was calculated using both fixed and random components. Normal Q-Q plots (quantiles of random intercept or slope against quantiles of normal distribution) were plotted to check the distributions of the predicted variables for any outliers. Also, standardised residuals (difference between observed and predicted values that take into account both fixed and random-effects multiplied by the inverse square root of the estimated error covariance matrix) were also calculated to identify any poorly fitting data or outliers.

For maximum likelihood estimation (MLE) models, assumptions relating to mechanisms of missing at random (MAR) and missing not at random (MNAR) are untestable but biases caused by data that are MNAR can be assessed using a sensitivity analysis (Sterne et al., 2009). Pattern mixture models (PMM) are one type of sensitivity analysis to represent MNAR behaviour for a range of differences between unobserved outcome data and observed outcome data. If therapy effects were relatively constant over the specified range then the findings are considered to be clinically plausible (National Research Council, 2010). The PMM method used in this project was based on the approach by White, Kalaitzaki, and Thompson (2011) and their user written program "rctmiss" for Stata. Sensitivity analyses were also performed via a pattern mixture approach with multiple imputation (MI). If data were missing not at MNAR, it was likely that the mean at follow-up (for participants for whom it was

missing) was higher (e.g. G-SAS) or lower (e.g. quality of life) than predicted under MAR. Based on mean differences between baseline and follow-up for observed data, we summarised the assumed difference between MNAR and MAR.

Effect sizes presented as Cohen's *d* were calculated for primary and secondary outcomes to provide an estimate of the magnitude of differences between groups and to allow comparisons with other published studies (Cohen, 1988). Clinically significant change, as outlined by Jacobson and Truax (1991), was also be measured for the G-SAS and K6. At the final follow-up, each participant's status was defined as "recovered" (final score fell into the functional range and corresponded to a reliable change), "improved" (final score corresponded to a reliable change, but fell into the dysfunctional range), "unchanged" (final score did not correspond to a reliable change), or "deteriorated" (final score corresponded to a reliable change in the negative direction). Participants were classified as "recovered" if their follow-up score fell in the mild range or below on the G-SAS (i.e., score of 20 or less). Based on the K6, participants were classified as "recovered" if their follow-up score fell in the low severity range (i.e., score of 13 or less).

Subgroups benefiting most from the GAMBLINGLESS program

Linear mixed models were performed to assess if individuals within the PSD and GSD intervention groups and across subtypes of patients had similar change in G-SAS gambling symptom severity scores and K6 psychological distress scores at 2-month and 3-month evaluations. The statistical models included interactions of three variables (gender, age, EGM use) to investigate the interaction between intervention group and time at different levels of participant subtype. A series of logistic regression models were performed to determine which factors predicted treatment outcome (i.e., unchanged/deteriorated cf. recovered/improved), treatment engagement (no engagement cf. any engagement), and follow-up attrition (non-completer of follow-up questionnaire cf. completer of follow-up questionnaire). Both univariate and multivariable models were calculated at 3-month follow-up, with 2-month follow-up data employed where 3-month follow-up data were not available. Variable selection for regression models commenced with univariate analyses and then selected for model advancement based on $p < 0.25$ or $p < 0.10$ where sample size was modest (Hosmer & Lemeshow, 2000). To interpret effect sizes, odds ratios were calculated to represent the probability of experiencing one outcome category (e.g. "recovered/improved") over the probability of experiencing the reference category (e.g. "unchanged/deteriorated").

Mechanisms or processes of change

A series of mixed linear models were performed to assess if individuals within the PSD and GSD intervention groups had similar change in the hypothesised process variables (GRCS gambling-related cognitions total score, AACRI behavioural coping with temptations total score, readiness rulers, URICA readiness to change total score, and BSCQ gambling-related self-efficacy total score).

For evaluating change process variables, it was originally proposed that either structural equation modelling (SEM) or a series of hierarchical regression analyses would be conducted to analyse mediation pathways. The standard criteria to support mediation include these two conditions: 1. participants in the intervention condition show significantly greater decreases on the outcome over time than controls, and 2. participants in the intervention condition show significantly greater decreases on the mediator over time than controls (MacKinnon, Fairchild, & Fritz, 2007). Based on the findings in Table 17 and Table 18, neither of these conditions was satisfied.

Nonetheless, an alternative approach to exploring the theoretical model of change can involve the likely pattern or trajectory of change for process variable and outcome variable and how each one of these variables is likely to induce change in another across treatment group. To do this, a cross-lagged panel design was used to provide information about presumed reciprocal causation between

G-SAS gambling symptom severity (primary outcome) and the hypothesised process variables from a temporal perspective and whether structural paths differed between GSD and PSD (Acock, 2013; Kline, 2011). Specifically, it simultaneously tested the influence of baseline gambling symptom severity on post-treatment gambling-related process variables and the reverse relationship (i.e., the influence of baseline process variables on post-treatment gambling symptoms when moderated by treatment group). The paths within each variable were also tested (e.g. baseline G-SAS gambling symptom severity scores to post-treatment G-SAS gambling symptom severity scores) to assess the stability of concepts across time (autoregressive effects) when adjusting for all other paths.

A covariance path was assumed between baseline (exogenous) variables. A correlated error term was specified for post-treatment variables to explain the shared variance that was not accounted for by the influence from baseline variables. In order to determine the best fitting model, structural path coefficients were initially set to vary across treatment group. Wald tests were then used to determine which parameters to either constrain or set free in final models. Participant baseline and 3-month follow-up data was used for panel models. If data was missing at 3-months follow-up, then 2-month data was used.

To evaluate how well measurement and cross-lagged models fitted the data, a range of post-estimation tests were conducted. Firstly, a likelihood-ratio (LR) test was used to compare each fitted model with degrees of freedom versus a saturated model with no degrees of freedom. A significant χ^2 statistic indicated that the model was not perfect at $p < 0.05$. Goodness-of-fit indices were also calculated to assess how well each model fitted the data (Kline, 2011). The confirmatory fit index (CFI) was used to determine how much better the fitted model did compared to a null model where all items were assumed to be independent of one another. A cut score of 0.90 indicated a reasonable relationship among item scores and 0.95 for a strong relationship. The root mean squared error of approximation (RMSEA) with 90% confidence intervals (CIs) was calculated for each model. It considered how much error there was for each degree of freedom. Smaller values indicated a better fitting model with an upper limit of 0.08.

In-depth interviews

Participant interviews

In-depth interviews were conducted with 8 participants from the pragmatic trial. The aim of these in-depth interviews was to explore participants' experiences with, and to evaluate the acceptability of, the GAMBLINGLESS program. Participants selected for inclusion were broadly representative of the RCT study sample, according to age, gender and gambling severity. Only participants who agreed in the 2-month follow-up evaluation to be contacted for a further in-depth telephone interview were approached.

These in-depth interviews were semi-structured and conducted by a clinically trained research fellow. The interview focussed on what participants saw as having changed over the course of therapy, their attributions of change, and their perceptions of helpful and unhelpful aspects of the program. Participants were asked how helpful each module was in reducing gambling, what was most and least helpful, what was difficult, and how each module may be improved. We aimed to interview eight participants (four from the PSD intervention and four from the GSD intervention). The interviews were conducted via telephone, after the 14-week access to the GAMBLINGLESS program was terminated, and the 2- and 3-month follow-up evaluations were conducted. The interviews were audio-recorded for transcription and data analysis purposes. The Data was analysed using thematic analysis, based on Braun and Clarke (2006) guidelines for an inductive approach to data-driven coding.

Guide interviews

In-depth interviews were also conducted with guides delivering the GSD intervention. The aim of these in-depth interviews was to explore how the program could be effectively integrated into clinical practice in existing gambling treatment services. All of the guides were approached to be involved in the in-depth interview. These interviews were semi-structured and conducted by a clinically trained research fellow. Guides were asked questions about the GAMBLINGLESS program, the client experience and clinical supervision. There was an emphasis on how this intervention would fit in with their current practice and their recommendations for integration of the program into the gambling treatment service sector. All interviews were audio-recorded and transcribed verbatim. Data was analysed using thematic analysis via Braun and Clarke (2006) guidelines for an inductive approach to data-driven coding.

Results

Participants

Participants were recruited from August 2015 until May 2016. Overall, 258 individuals provided informed consent online and commenced the pre-intervention questionnaire. Of these, 206 individuals completed the pre-intervention questionnaire and were randomly allocated in to the GSD (n=101) or PSD (n=106) intervention. A total of 55 participants commenced the 2-month follow-up questionnaire, with 46 completing it (GSD: n=25; PSD: n=21). At 3-months follow-up, a total of 55 participants commenced and completed the questionnaire (GSD: n=29; PSD: n=26). See Figure 2 below for CONSORT flow diagram.

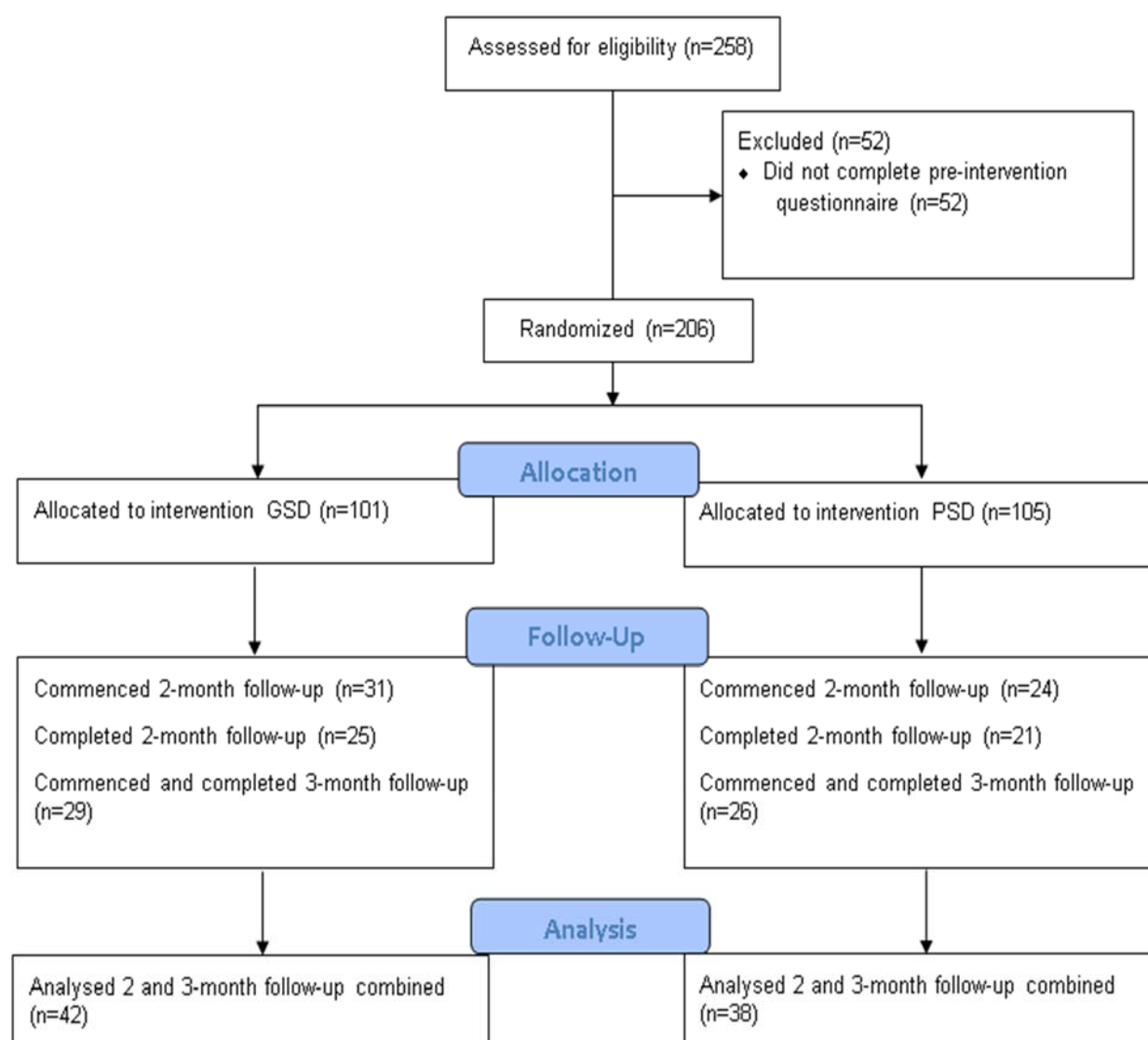


Figure 2. CONSORT flow diagram

Profile of GAMBLINGLESS users

State of residence

Approximately one-quarter ($n=48$, 23.3%) of participants resided in Victoria. The remaining participants resided in New South Wales ($n=75$, 36.4%), Queensland ($n=53$, 25.7%), Western Australia ($n=16$, 7.8%), South Australia ($n=8$, 3.9%), Tasmania ($n=3$, 1.5%), and the Northern Territory ($n=1$, 0.5%). There were few significant differences in socio-demographic, gambling behaviour, psychological, and treatment-related characteristics between participants residing in Victoria and other Australian states or territories. Significantly fewer Victorian participants earned \$130,000+ (0% vs 7.6%) and \$65,000–\$79,999 (8.3% vs 20.2%) per year ($p = 0.043$), and were also less likely to report problems with EGMs (60.4% vs 78.5%, $p = 0.012$) than participants from other states or territories. In addition, Victorian participants were significantly more likely to respond neutrally to the gambling-related erroneous cognitions item relating to interpretative bias (27.1% vs 8.9%, $p = 0.005$) than participants from other states or territories. Victorian participants also demonstrated a significantly higher average score on the readiness to limit or stop gambling ruler ($M=9.9$, $SD=0.4$) than participants from other states and territories ($M=9.4$, $SD=1.3$, $p < 0.001$). Lastly, participants also demonstrated a significantly higher average score on the importance of limiting or stopping their gambling ruler ($M=9.6$, $SD=0.8$) than participants from other states and territories ($M=9.1$, $SD=1.8$, $p = 0.003$).

Socio-demographic characteristics

Baseline socio-demographic characteristics for the 206 participants (broken down into the two intervention conditions) are presented in Table 3. Nearly two-thirds of participants were male (64.6%) and less than 40 years of age (63.6%). The majority of the sample was born in Australia (76.2%) and most were employed on a full-time (71.4%) or part-time/casual (17.0%) basis. Approximately one-third of the sample reported an annual personal net income of \$40,000 to \$64,999 (33.5%), with smaller proportions reporting incomes of \$65,000 to \$79,999 (17.5%), \$80,000 to \$129,000 (16.5%), and \$25,000 to \$39,999 (15.5%).

Table 3. Baseline socio-demographic sample characteristics

| Socio-demographic characteristic | Pure self-directed ($n = 105$) | Guided self-directed ($n = 101$) | Total ($n = 206$) |
|----------------------------------|-------------------------------------|---------------------------------------|------------------------|
| Sex (n , %) | | | |
| Female | 38 (36.2) | 35 (34.7) | 73 (35.4) |
| Male | 67 (63.8) | 66 (65.3) | 133 (64.6) |
| Age group in years (n , %) | | | |
| 18 – 24 | 17 (16.2) | 24 (23.8) | 41 (19.9) |
| 25 – 29 | 17 (16.2) | 20 (19.8) | 37 (18.0) |
| 30 – 34 | 15 (14.3) | 9 (8.9) | 24 (11.7) |
| 35 – 39 | 18 (17.1) | 11 (10.9) | 29 (14.1) |
| 40 – 44 | 11 (10.5) | 9 (8.9) | 20 (9.7) |
| 45 – 49 | 6 (5.7) | 10 (9.9) | 16 (7.8) |
| 50 – 54 | 10 (9.5) | 10 (9.9) | 20 (9.7) |
| 60+ | 11 (10.5) | 8 (7.9) | 19 (9.2) |
| Country of birth (n , %) | | | |
| Australia | 81 (77.1) | 76 (75.3) | 157 (76.2) |
| Other | 24 (22.9) | 25 (24.8) | 49 (23.8) |
| Employment (n , %) | | | |
| Work full-time | 77 (73.3) | 70 (69.3) | 147 (71.4) |

| Socio-demographic characteristic | Pure self-directed (n = 105) | Guided self-directed (n = 101) | Total (n = 206) |
|---|---|---|----------------------------|
| Work part-time/casual | 13 (12.4) | 22 (21.8) | 35 (17.0) |
| Unemployed | 3 (2.9) | 2 (2.0) | 5 (2.4) |
| Full time student | 2 (1.9) | 1 (1.0) | 3 (1.5) |
| Full-time home duties | 1 (1.0) | 1 (1.0) | 2 (1.0) |
| Retired | 3 (2.9) | 0 (0) | 3 (1.5) |
| Sick or disability pension | 2 (1.9) | 4 (4.0) | 6 (2.9) |
| Other | 4 (3.8) | 1 (1.0) | 5 (2.4) |
| Annual personal net income (n, %) | | | |
| < \$25,000 | 13 (12.4) | 10 (9.9) | 23 (11.2) |
| \$25,000 - \$39,999 | 18 (17.1) | 14 (13.9) | 32 (15.5) |
| \$40,000 - \$64,999 | 28 (26.7) | 41 (40.6) | 69 (33.5) |
| \$65,000 - \$79,999 | 19 (18.1) | 17 (16.8) | 36 (17.5) |
| \$80,000 - \$129,999 | 19 (18.1) | 15 (14.9) | 34 (16.5) |
| \$130,000+ | 8 (7.6) | 4 (4.0) | 12 (5.8) |

Gambling behaviour characteristics

Baseline gambling behaviour characteristics for the 206 participants (broken down into the two intervention conditions) are presented in

Table 4. EGMs (74.3%), followed by horse and greyhound racing (45.2%) and sports and events betting (27.2%), were the most commonly reported gambling activities with which participants had issues. Because participants could report having issues with multiple gambling activities, it was possible to examine the proportion of participants reporting issues with different combinations of gambling activities. The most common combination was EGMs only (41.8%); much smaller proportions of participants reported problems with horse, harness or greyhound racing/sports and events betting (9.7%), EGMs/horse, harness or greyhound racing (8.7%), and horse, harness or greyhound racing only (8.3%).

The mean PGSI problem gambling severity score for the sample was 17.8 (SD = 5.4), which is classified in the problem gambling category. Almost all participants reported PGSI scores that were classified in the problem gambling range (96.1%), with very small proportions of participants classified in the moderate risk (3.4%) and non-problem gambling (0.5%) categories; none of the participants were classified as low risk gamblers on the PGSI. The mean G-SAS gambling symptom severity score for the sample was 29.7 (SD = 7.7), which is classified at the very top of the moderate severity range. Half of the sample reported G-SAS scores that were classified within the moderate severity range (49.0%), with smaller proportions classified within the severe severity (35.0%), mild severity (7.8%), and extreme severity (6.8%) ranges. The mean G-SAS gambling urge scale score was 10.1 (SD = 2.8). There was a reasonably strong and positive association between baseline PGSI and G-SAS scores ($r = 0.51$, $p < 0.001$).

The mean total gambling frequency in the previous 30 days for the entire sample was 13.4 days (SD = 14.6), with the highest frequency reported for EGMs (6.0 days), followed by horse, harness or greyhound racing (3.9 days), sports and events betting (1.9 days), and number games (e.g., lotteries, keno, bingo) (1.6 days). The mean total gambling expenditure in the previous 30 days for the entire sample was \$1,640 (SD = 3,947), with the highest expenditure reported for EGMs (\$1,533), followed by horse, harness or greyhound racing (\$714) and sports and events betting (\$359).

Table 4. Baseline sample gambling behaviour characteristics

| Gambling behaviour characteristic | Pure self-directed (n = 105) | Guided self-directed (n = 101) | Total (n = 206) |
|--|------------------------------|--------------------------------|-----------------|
| Problematic gambling activities (n, %) ^a | | | |
| EGMs | 77 (73.3) | 76 (75.3) | 153 (74.3) |
| Casino table games (e.g., blackjack) | 15 (14.3) | 18 (17.8) | 33 (16.0) |
| Horse, harness or greyhound racing | 54 (51.4) | 39 (38.6) | 93 (45.2) |
| Sports and events betting | 33 (31.4) | 23 (22.8) | 56 (27.2) |
| Number games (e.g., lotteries, keno, bingo) | 12 (11.4) | 13 (12.9) | 25 (12.1) |
| Informal private games | 5 (4.8) | 4 (4.0) | 9 (4.4) |
| Problematic gambling activity combinations (n, %) | | | |
| EGMs only | 41 (39.1) | 45 (44.6) | 86 (41.8) |
| Horse, harness or greyhound racing + sports and events betting | 11 (10.5) | 9 (8.9) | 20 (9.7) |
| EGMs + horse, harness or greyhound racing | 12 (11.4) | 6 (5.9) | 18 (8.7) |
| Horse, harness or greyhound racing only | 8 (7.6) | 9 (8.9) | 17 (8.3) |
| EGMs + horse, harness or greyhound racing + sports and event betting | 8 (7.6) | 2 (2.0) | 10 (4.9) |
| Sports and event betting only | 1 (1.0) | 1 (1.0) | 2 (1.0) |
| Casino table games only | 0 (0) | 1 (1.0) | 1 (0.5) |
| Number games only | 0 (0) | 1 (1.0) | 1 (0.5) |
| Other combinations | 24 (22.9) | 27 (26.7) | 51 (24.8) |
| PGSI problem gambling severity (M, SD) | 18.2 (5.5) | 17.3 (5.3) | 17.8 (5.4) |
| PGSI problem gambling category (n, %) | | | |
| Problem gambling | 102 (97.1) | 96 (95.0) | 198 (96.1) |
| Moderate risk gambling | 2 (1.9) | 5 (5.0) | 7 (3.4) |
| Low risk gambling | 0 (0.0) | 0 (0.0) | 0 (0) |
| Non-problem gambling | 1 (1.0) | 0 (0.0) | 1 (0.5) |
| G-SAS gambling symptom severity (M, SD) | 30.5 (8.0) | 28.8 (7.4) | 29.7 (7.7) |
| G-SAS gambling symptom category (n, %) | | | |
| Extreme | 7 (6.7) | 7 (6.9) | 14 (6.8) |
| Severe | 44 (41.9) | 28 (27.7) | 72 (35.0) |
| Moderate | 45 (42.9) | 56 (55.5) | 101 (49.0) |
| Mild | 7 (6.7) | 9 (8.9) | 16 (7.8) |
| G-SAS gambling urge (M, SD) | 10.4 (2.9) | 9.7 (2.8) | 10.1 (2.8) |
| Gambling frequency (days) (M, SD) ^b | | | |
| EGMs | 5.3 (6.5) | 6.6 (7.3) | 6.0 (6.9) |
| Casino table games (e.g., blackjack) | 0.1 (0.7) | 0.4 (2.6) | 0.3 (1.9) |
| Horse, harness or greyhound racing | 4.4 (7.6) | 3.4 (7.1) | 3.9 (7.3) |
| Sports and events betting | 1.6 (4.9) | 2.3 (6.5) | 1.9 (5.8) |
| Number games (e.g., lotteries, keno, bingo) | 1.3 (3.9) | 2.0 (5.7) | 1.6 (4.9) |
| Informal private games | 0.0 (0.1) | 0.3 (2.6) | 0.2 (1.8) |
| Total gambling frequency | 12.2 (12.0) | 14.7 (16.9) | 13.4 (14.6) |
| Gambling expenditure (\$) (M, SD) ^b | | | |
| EGMs | 1518 (2295) | 1556 (2407) | 1533 (2319) |
| Casino table games (e.g., blackjack) | 46 (249) | 30 (151) | 38 (207) |
| Horse, harness or greyhound racing | 960 (3240) | 458 (1026) | 714 (2430) |
| Sports and events betting | 327 (2458) | 391 (2994) | 359 (2728) |
| Number games (e.g., lotteries, keno, bingo) | 56 (230) | 51 (230) | 54 (229) |
| Informal private games | 0 (0) | 14 (107) | 7 (75) |
| Total gambling expenditure | 1953(4359) | 1315 (3459) | 1640 (3947) |

^a Participants could endorse more than one option.^b Based on previous 30 days.

Psychological characteristics

Baseline psychological characteristics for the 206 participants (broken down into the two intervention conditions) are presented in Table 5. The mean K6 psychological distress score for the sample was 17.2 (SD = 5.6), which is classified within the moderate severity range. The distribution of scores for psychological distress as measured by K6 were 28.2% classified in the minimal to low risk range, 34.9% classified in the moderate risk range, 27.12% classified in the high risk range, and 9.7% classified in the very high risk range. There were reasonably strong and positive associations between baseline K6 psychological distress scores and PGSI problem gambling severity scores ($r = 0.44$) and G-SAS gambling symptom severity scores ($r = 0.43$) ($p < 0.001$). Half of the sample (50.0%) rated their quality of life as very poor, poor, or neither good nor poor. The mean AUDIT-3 hazardous drinking score for the sample was 1.7 (SD = 1.2), which is in excess of the positive screening cut-off score of 1 for hazardous drinking; 80.6% of participants screened positive for hazardous drinking using this measure. Participants reported using an illegal drug use or a prescription medication for non-medical reasons an average of 1.4 times in the past 30 days (SD = 4.8), which is in excess of the positive screening cut-off score of one time; 17.0% of participants screened positive for illegal drug use or a prescription medication for non-medical reasons using this item. Overall, 7.8% of the sample reported having a suicide plan and/or making a suicide attempt in the past 30 days.

Table 5. Baseline sample psychological characteristics

| Psychological characteristic | Pure self-directed (n = 105) | Guided self-directed (n = 101) | Total (n = 206) |
|--|---------------------------------|-----------------------------------|--------------------|
| K6 psychological distress (M, SD) | 17.1 (5.6) | 17.3 (5.7) | 17.2 (5.6) |
| K6 category (n, %) | | | |
| Very high risk | 8 (7.6) | 12 (11.9) | 20 (9.7) |
| High risk | 32 (30.5) | 24 (23.8) | 56 (27.2) |
| Moderate risk | 37 (35.2) | 35 (34.6) | 72 (34.9) |
| Minimal to low risk | 28 (26.7) | 30 (29.7) | 58 (28.2) |
| EUROHIS quality of life (n, %) ^a | | | |
| Very poor | 6 (5.7) | 6 (5.9) | 12 (5.8) |
| Poor | 17 (16.2) | 12 (11.9) | 29 (14.1) |
| Neither good nor poor | 30 (28.6) | 32 (31.7) | 62 (30.1) |
| Good | 37 (35.2) | 46 (45.5) | 83 (40.3) |
| Very good | 15 (14.3) | 5 (5.0) | 20 (9.7) |
| AUDIT-3 alcohol use (M, SD) | 1.7 (1.2) | 1.7 (1.2) | 1.7 (1.2) |
| AUDIT-3 hazardous drinking (n, %) | 87 (82.9) | 79 (78.2) | 166 (80.6) |
| Substance use frequency (M, SD) ^b | 1.3 (4.8) | 1.5 (4.8) | 1.4 (4.8) |
| Any substance use (n, %) ^b | 16 (15.2) | 19 (18.8) | 35 (17.0) |
| SBQ-R suicide ideation (n, %) ^{a,b} | | | |
| None | 73 (69.5) | 70 (69.3) | 143 (69.4) |
| Brief passing thought | 25 (23.8) | 22 (21.8) | 47 (22.8) |
| Plan but no attempt | 3 (2.9) | 7 (6.9) | 10 (4.9) |
| Plan and really wanted to die | 4 (3.8) | 0 (0.0) | 4 (1.9) |
| Attempt but did not want to die | 0 (0.0) | 1 (1.0) | 1 (0.5) |
| Attempt and really hoped to die | 0 (0.0) | 1 (1.0) | 1 (0.5) |

^a First item only.

^b Based on previous 30 days.

Treatment-related characteristics

Baseline treatment-related characteristics for the 206 participants (broken down into the two intervention conditions) are presented in

Table 6. Just under half of participants (48.5%) indicated that their goal was to quit gambling altogether, with an additional quarter of the sample indicating that their goal was to cut back on the gambling activities they thought they had an issue with (27.2%) or to quit the gambling activities they thought they had an issue with (24.3%), respectively. Over a third (34.5%) of participants showed a change in their treatment goal from baseline to 2-months follow-up, with this rate increasing to 43.6% at 3-months follow-up.

Overall, 15.5% of participants engaged in high intensity interventions, the most common of which were seeking financial counselling by phone or face-to-face (7.3%), talking to a psychologist, psychiatrist or GP about their gambling (7.3%), and talking to a gambling counsellor face-to-face (5.8%). A slightly smaller proportion of participants also engaged in low-intensity interventions (10.7%), the most common of which was phoning a gambling helpline (6.8%), and talking to a gambling help counsellor online (4.9%). Moreover, nearly half of participants (47.6%) engaged in at least one self-directed action in the previous 30 days. The most commonly employed self-directed actions were talking to family members or friends about their gambling (24.3%), trying a self-help strategy like budgeting to reduce the impact of their gambling (24.1%), reading information on Gambling Help Online website (22.3%), reading or posting in online gambling forums (10.7%), and signing up for exclusion from a land based or online gaming venue (7.8%).

Participants had relatively high rates of agreement on some of the GRCS gambling-related cognitions items, indicating greater erroneous thoughts. Specifically, participants had high rates of perceived inability to stop gambling (69.4%) and interpretative bias (65.5%). This was followed by lower rates of gambling expectancies (35.9%), predictive control (20.4%) and illusion of control (19.4%). On the AACRI behavioural coping with gambling temptations items, participants reported reducing stress (59.2%) and doing other things when tempted (59.2%) as the most frequently used behavioural coping strategy, followed by avoiding situations and/or places where previously tempted to gamble (58.3%) and focusing on techniques they know about how to gamble less (36.9%). The participants highly rated their readiness to limit or stop their gambling ($M = 9.5$, $SD = 1.1$) and the importance of limiting or stopping their gambling ($M = 9.2$, $SD = 1.6$), but reported much lower confidence in limiting or stopping their gambling ($M = 5.9$, $SD = 3.2$). URICA readiness to change scores indicated that participants endorsed the contemplation item most highly ($M = 4.6$, $SD = 0.8$), followed by the maintenance ($M = 3.7$, $SD = 1.2$) and action ($M = 3.4$, $SD = 1.2$) items; the pre-contemplation item, however, was not highly endorsed ($M = 1.4$, $SD = 0.9$). The average total URICA readiness to change score was 10.2 ($SD = 2.4$), with participants more likely to be classified into the contemplation stage of change (43.7%), followed by the action or maintenance stage of change (29.6%) and the pre-contemplation stage of change (26.7%). BSCQ gambling-related self-efficacy scores indicated that participants felt most confident that they would be able to resist the urge to gamble in situations involving physical discomfort ($M = 5.8$, $SD = 3.1$), pleasant emotions ($M = 5.7$, $SD = 3.1$), and having pleasant times with others ($M = 5.4$, $SD = 3.2$), and least confident in situations involving urges and temptations ($M = 3.6$, $SD = 2.6$), unpleasant emotions ($M = 4.1$, $SD = 3.3$), financial pressures ($M = 4.1$, $SD = 3.3$), social pressures to gamble ($M = 4.2$, $SD = 3.3$), testing control over gambling ($M = 4.2$, $SD = 2.9$), conflict with others ($M = 4.7$, $SD = 3.2$), and alcohol or drugs ($M = 4.9$, $SD = 3.8$).

Finally, the GAMBLINGLESS program was accessible only via the internet. Participants were therefore required to indicate for how many hours they used the internet for work, personal, education, or recreation reasons. The majority of participants indicated they would use internet between 1 and 21 hours a week (70.9%).

Table 6. Baseline sample treatment-related characteristics

| Treatment-related characteristic | Pure self-directed (n = 105) | Guided self-directed (n = 101) | Total (n = 206) |
|---|---|---|----------------------------|
| Treatment goal (n, %) | | | |
| Quit altogether | 51 (48.6) | 49 (48.5) | 100 (48.5) |
| Quit problem gambling activities | 25 (23.8) | 25 (24.8) | 50 (24.3) |
| Cut back problem gambling activities | 29 (27.6) | 27 (26.7) | 56 (27.2) |
| High-intensity interventions (n, %) ^a | | | |
| Gambling counsellor face-to-face | 8 (7.6) | 4 (4.0) | 12 (5.8) |
| Financial counselling | 3 (2.9) | 3 (3.0) | 15 (7.3) |
| Residential facility | 1 (1.0) | 2 (2.0) | 3 (1.5) |
| Gambling support group | 3 (2.9) | 6 (5.9) | 9 (4.4) |
| Psychologist/psychiatrist/GP | 8 (7.6) | 7 (6.9) | 15 (7.3) |
| Any high-intensity intervention | 15 (14.3) | 17 (16.8) | 32 (15.5) |
| Low-intensity interventions(n, %) ^a | | | |
| Gambling helpline | 8 (7.6) | 6 (5.9) | 14 (6.8) |
| Gambling counsellor online | 4 (3.8) | 6 (5.9) | 10 (4.9) |
| Gambling counsellor via email | 2 (1.9) | 1 (1.0) | 3 (1.5) |
| Any low-intensity intervention | 12 (11.4) | 10 (9.9) | 22 (10.7) |
| Self-directed actions (n, %) ^a | | | |
| Online gambling forums | 12 (11.4) | 10 (9.9) | 22 (10.7) |
| Family/friends | 32 (30.5) | 18 (17.8) | 50 (24.3) |
| Self-help | 20 (19.6) | 29 (28.7) | 49 (24.1) |
| Read information on Gambling Help Online website | 22 (21.0) | 24 (23.8) | 46 (22.3) |
| Completed self-help module on Gambling Help Online website | 2 (1.9) | 6 (5.9) | 8 (3.9) |
| Self-exclusion | 11 (10.5) | 5 (5.0) | 16 (7.8) |
| Any self-directed action | 53 (50.5) | 45 (44.5) | 98 (47.6) |
| GRCS gambling-related cognitions (n, %) ^{b,c,g} | | | |
| Gambling-related expectancies | | | |
| Agree | 36 (34.3) | 38 (37.6) | 74 (35.9) |
| Neither agree nor disagree | 17 (16.2) | 17 (16.8) | 34 (16.5) |
| Disagree | 52 (49.5) | 46 (45.5) | 98 (47.6) |
| Inability to stop | | | |
| Agree | 73 (69.5) | 70 (69.3) | 143 (69.4) |
| Neither agree nor disagree | 19 (18.1) | 8 (7.9) | 27 (13.1) |
| Disagree | 13 (12.4) | 23 (22.8) | 36 (17.5) |
| Interpretive bias | | | |
| Agree | 67 (63.8) | 68 (67.3) | 135 (65.5) |
| Neither agree nor disagree | 13 (12.4) | 14 (13.9) | 27 (13.1) |
| Disagree | 25 (23.8) | 19 (18.8) | 44 (21.4) |
| Illusion of control | | | |
| Agree | 20 (19.0) | 20 (19.8) | 40 (19.4) |
| Neither agree nor disagree | 16 (15.2) | 12 (11.9) | 28 (13.6) |
| Disagree | 69 (65.7) | 69 (68.3) | 138 (67.0) |
| Predictive control | | | |
| Agree | 22 (21.0) | 20 (19.8) | 42 (20.4) |
| Neither agree nor disagree | 16 (15.2) | 16 (15.8) | 32 (15.5) |
| Disagree | 67 (63.8) | 65 (64.4) | 132 (64.1) |
| AACRI behavioural coping with gambling temptations (n, %) ^{c,d} | | | |
| <i>Reduce stress</i> | | | |
| Never | 37 (35.2) | 47 (46.6) | 84 (40.8) |

| | | | |
|--|-----------|------------|------------|
| Sometimes | 53 (50.5) | 48 (47.5) | 101 (49.0) |
| Always | 15 (14.3) | 6 (5.9) | 21 (10.2) |
| <i>Avoid situations/places</i> | | | |
| Never | 41 (39.0) | 45 (44.6) | 86 (41.7) |
| Sometimes | 51 (48.6) | 48 (47.5) | 99 (48.1) |
| Always | 13 (12.4) | 8 (7.9) | 21 (10.2) |
| <i>Focus on techniques</i> | | | |
| Never | 67 (63.8) | 63 (62.4) | 130 (63.1) |
| Sometimes | 33 (31.4) | 33 (32.7) | 66 (32.0) |
| Always | 5 (4.8) | 5 (4.9) | 10 (4.9) |
| <i>Do other things when tempted</i> | | | |
| Never | 44 (41.9) | 40 (39.6) | 84 (40.8) |
| Sometimes | 56 (53.3) | 57 (56.4) | 113 (54.8) |
| Always | 5 (4.8) | 4 (4.0) | 9 (4.4) |
| Readiness rulers (M, SD) | | | |
| Importance | 9.1 (1.6) | 9.3 (1.69) | 9.2 (1.6) |
| Readiness | 9.5 (1.2) | 9.6 (1.14) | 9.5 (1.1) |
| Confidence | 5.9 (3.3) | 5.9 (3.08) | 5.9 (3.2) |
| URICA readiness to change (M, SD) ^c | | | |
| Pre-contemplation | 1.4 (0.8) | 1.5 (0.9) | 1.4 (0.9) |
| Contemplation | 4.5 (0.8) | 4.6 (0.8) | 4.6 (0.8) |
| Action | 3.2 (1.3) | 3.5 (1.1) | 3.4 (1.2) |
| Maintenance | 3.5 (1.3) | 3.8 (1.2) | 3.7 (1.2) |
| URICA readiness score (M, SD) ^c | 9.9 (2.4) | 10.5 (2.3) | 10.2 (2.4) |
| URICA readiness score categories (n, %) ^c | | | |
| Pre-contemplation | 34 (32.4) | 21 (20.8) | 55 (26.7) |
| Contemplation | 44 (41.9) | 46 (45.5) | 90 (43.7) |
| Action or maintenance | 27 (25.7) | 34 (33.7) | 61 (29.6) |
| BSCQ gambling-related self-efficacy (M, SD) | | | |
| Unpleasant emotions | 3.8 (2.8) | 4.4 (3.0) | 4.1 (2.9) |
| Physical discomfort | 5.4 (3.1) | 6.1 (3.0) | 5.8 (3.1) |
| Pleasant emotions | 5.6 (3.2) | 5.8 (3.0) | 5.7 (3.1) |
| Testing control over gambling | 3.8 (2.9) | 4.7 (3.0) | 4.2 (2.9) |
| Urges and temptations | 3.4 (2.5) | 3.9 (2.7) | 3.6 (2.6) |
| Conflict with others | 4.5 (3.2) | 4.9 (3.1) | 4.7 (3.2) |
| Social pressures to gamble | 4.4 (3.4) | 4.0 (3.1) | 4.2 (3.3) |
| Having pleasant times with others | 5.6 (3.1) | 5.3 (3.3) | 5.4 (3.2) |
| Financial pressures ^e | 4.0 (3.2) | 4.3 (3.4) | 4.1 (3.3) |
| Alcohol or drugs ^e | 4.6 (3.6) | 5.2 (3.9) | 4.9 (3.8) |
| Internet use (hours) (n, %) ^f | | | |
| Less than 1 | 6 (5.7) | 2 (2.0) | 8 (3.9) |
| 1 - 7 | 25 (23.8) | 19 (18.8) | 44 (21.4) |
| 8 - 14 | 28 (26.7) | 28 (27.7) | 56 (27.2) |
| 15 - 21 | 16 (15.2) | 22 (21.8) | 38 (18.5) |
| 22 - 28 | 7 (6.7) | 7 (6.9) | 14 (6.8) |
| 29 - 35 | 8 (7.6) | 6 (5.9) | 14 (6.8) |
| 36 - 42 | 3 (2.9) | 9 (8.9) | 12 (5.8) |
| More than 42 | 12 (11.4) | 8 (7.9) | 20 (9.7) |

^a Based on previous 30 days.

^b Endorsement of mildly, moderately, or strongly agree as response options.

^c Selected items.

^d Endorsement of sometimes or always as response options.

^e Additional items.

^f Based on average weekly use for work/personal/education/recreation.

^g Strongly/moderately/mildly categories combined to derive agree and disagree proportions

Effectiveness of the GAMBLINGLESS program

Baseline socio-demographic characteristics for participants completing a follow-up assessment are presented by intervention group in Table 7.

Table 7. Baseline socio-demographics for follow-up assessment completers

| Socio-demographic characteristic | Pure self-directed (n = 38) | Guided self-directed (n = 42) | p |
|-----------------------------------|--------------------------------|----------------------------------|-------|
| Sex (n, %) | | | |
| Female | 15 (39.5) | 17 (40.5) | |
| Male | 23 (60.5) | 25 (59.5) | 0.927 |
| Age group in years (n, %) | | | |
| 18 - 24 | 4 (10.5) | 6 (14.3) | 0.972 |
| 25 - 29 | 3 (7.9) | 4 (9.5) | |
| 30 - 34 | 6 (15.8) | 6 (14.3) | |
| 35 - 39 | 8 (21.1) | 10 (23.8) | |
| 40 - 44 | 4 (10.5) | 4 (9.5) | |
| 45 - 49 | 2 (5.3) | 4 (9.5) | |
| 50 - 54 | 5 (13.2) | 4 (9.5) | |
| 60+ | 6 (15.8) | 4 (9.5) | |
| Country of birth (n, %) | | | |
| Australia | 31 (81.6) | 32 (76.2) | 0.556 |
| Other | 7 (18.4) | 10 (23.8) | |
| Employment (n, %) | | | |
| Work full-time | 27 (71.1) | 30 (71.4) | 0.775 |
| Work part-time/casual | 6 (15.8) | 7 (16.7) | |
| Unemployed | 1 (2.6) | 1 (2.4) | |
| Full time student | 0 (0) | 1 (2.4) | |
| Full-time home duties | 0 (0) | 1 (2.4) | |
| Retired | 2 (5.3) | 0 (0) | |
| Sick or disability pension | 1 (2.6) | 1 (2.4) | |
| Other | 1 (2.6) | 1 (2.4) | |
| Annual personal net income (n, %) | | | |
| < \$25,000 | 6 (15.8) | 5 (11.9) | 0.975 |
| \$25,000 - \$39,999 | 5 (13.2) | 6 (14.3) | |
| \$40,000 - \$64,999 | 10 (26.3) | 13 (31.0) | |
| \$65,000 - \$79,999 | 6 (15.8) | 7 (16.7) | |
| \$80,000 - \$129,999 | 10 (26.3) | 9 (21.4) | |
| \$130,000+ | 1 (2.6) | 2 (4.8) | |

Primary outcome: G-SAS gambling symptom severity

The primary research question that was tested in this study was whether the GSD intervention was more effective in reducing G-SAS gambling severity symptoms over the 3-month study period (intervention and maintenance effects) compared with the PSD intervention. The first step to estimating treatment effects at the individual-level was to explore patterns in G-SAS gambling symptom severity scores.

Observed data

A plot of observed trajectories for G-SAS gambling symptom severity scores by intervention group suggested that trends were mostly non-linear (Figure 3). There was also considerable variation at the participant level in baseline G-SAS gambling symptom severity scores and rates of responses. Observed mean G-SAS gambling symptom severity scores by intervention group and time are shown in Figure 4 (descriptive stats for G-SAS gambling symptom severity scores are displayed in Appendix 1). Mean G-SAS gambling severity scores for the PSD intervention group improved from 30.6 at baseline (moderate) to 18.1 at the 2-month follow-up (mild), and were maintained at 19.9 at the 3-month follow-up (mild). Similarly, mean G-SAS gambling severity scores for the GSD intervention group improved from 28.8 at baseline (moderate) to 18.6 at the 2-month follow-up (mild), and were maintained at 15.8 at the 3-month follow-up (mild). The reduction (improvement) in mean G-SAS scores in both the PSD and GSD intervention groups showed a similar trend to the individual plots in Figure 3: an initial fast improvement from baseline (moderate symptom severity) to 2-month follow-up (mild symptom severity) and then a levelling-off effect at 3-month follow-up (mild symptom severity).

Patterns of missing data

The patterns of missing G-SAS data were explored (Appendix 2).

Linear mixed model

Using all available data, results from between-group comparisons for G-SAS symptom severity scores using linear mixed modelling are shown in Table 8. The model included both random intercept and random slope terms at the individual level (level two) and time (level one). The average number of outcome assessments per individual was 2.4 (Range = 2 - 3) and a total of 190 observations. A likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 31.26$, $df = 2$, $p < 0.001$). There was no significant difference between the two intervention groups in G-SAS gambling symptom severity scores at 2-month follow-up ($p = 0.381$) or 3-month follow-up ($p = 0.496$).

There was a significant reduction (improvement) in G-SAS gambling symptom severity scores within intervention groups at follow-up assessments compared to baseline scores ($p < 0.001$), as shown in Table 9. The estimated random intercept variance for G-SAS gambling symptom severity scores was 27.03 (95% CI: 13.84 - 52.79). This considerable variation between individuals as indicated from baseline scores in Figure 4.

Assessing model fit

The mixed model fit on the G-SAS gambling symptom severity data was assessed (Appendix 3).

Sensitivity analyses

The analysis of the G-SAS gambling symptom severity data involved MLE which is based on the assumption that missing data were missing at random (MAR). Sensitivity analyses were therefore conducted to assess for any departures in this MAR assumption (Appendix 4).

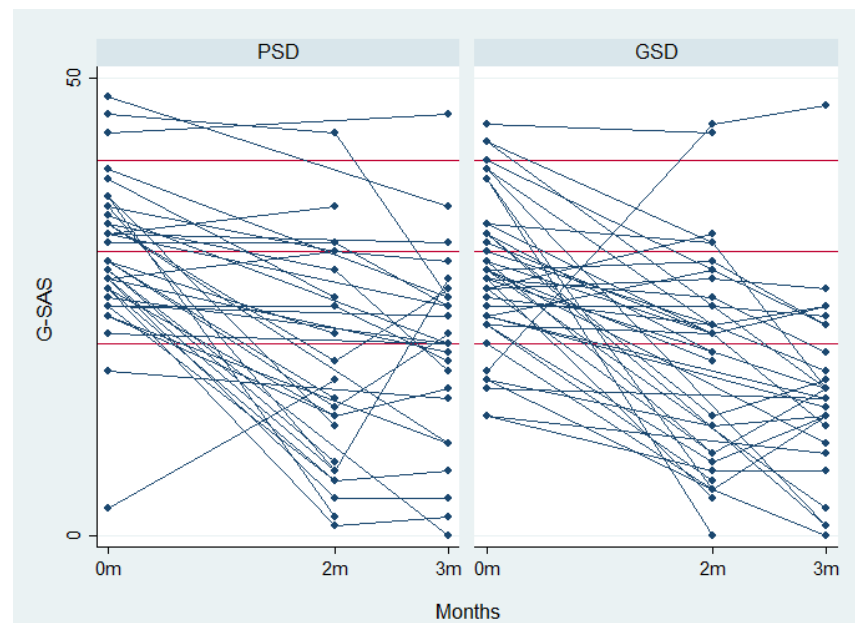


Figure 3. Individual response profiles for Gambling Symptom Assessment Scale (G-SAS) scores by treatment group and time ^a

^aLower scores indicate a reduction (improvement) in gambling symptom severity.

Note: Horizontal lines are G-SAS cut scores for range 21-30 (indicative of moderate symptom severity), 31-40 (indicative of severe symptom severity) 41+ (indicative of extreme symptom severity).

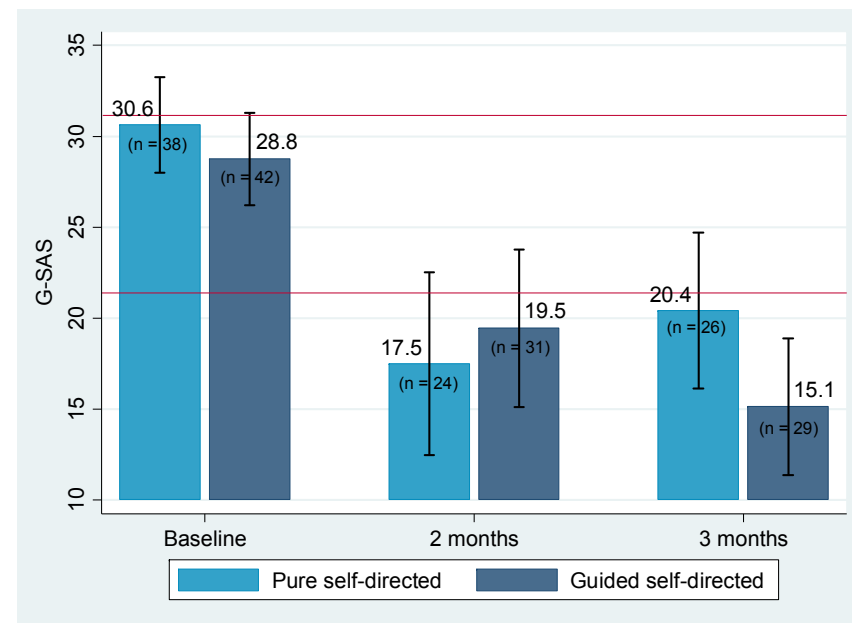


Figure 4. Observed mean G-SAS gambling symptom severity scores by time and treatment group

Lower scores indicate a reduction (improvement) in gambling symptom severity.

Note: a Horizontal lines are G-SAS cut scores for range 21-30 (indicative of moderate symptom severity) and 31-40 (indicative of severe severity).

Table 8. Change in primary outcome (between group differences on G-SAS gambling symptom severity)

| Outcome | Time-point | Unadjusted estimate (SE) | | Estimated between-group difference (95% CI) | <i>p</i> |
|---------|------------|--------------------------|--------------|---|----------|
| | | PSD | GSD | | |
| G-SAS | Baseline | 30.63 (1.42) | 28.76 (1.21) | -1.87 (-5.47 - 1.73) ^a | 0.309 |
| | 2-months | 18.14 (1.86) | 18.59 (1.70) | 2.32 (-2.87 - 7.51) ^a | 0.381 |
| | 3-month | 19.85 (2.01) | 15.82 (2.14) | -2.09 (-8.12 - 3.93) ^a | 0.496 |

^a Mean group difference (95% CI) from linear mixed model

Table 9. Change in primary outcome (within group differences on G-SAS gambling symptom severity)

| Outcome | Baseline | 2-months | | | 3-months | | |
|------------------|--------------------------|--------------------------|--|----------|--------------------------|--|----------|
| | Unadjusted estimate (SE) | Unadjusted estimate (SE) | Estimated within-group difference (95% CI) | <i>p</i> | Unadjusted estimate (SE) | Estimated within-group difference (95% CI) | <i>p</i> |
| PSD intervention | 30.63 (1.42) | 18.14 (1.86) | -12.49 (-16.28, -8.70) | <0.001 | 19.85 (2.01) | -10.78 (-14.86, -6.71) | <0.001 |
| GSD intervention | 28.76 (1.21) | 18.59 (1.70) | -10.17 (-13.65, -6.68) | <0.001 | 15.82 (2.14) | -12.94 (-17.25, -8.63) | <0.001 |

Secondary outcomes

The patterns of missing data for all secondary outcome measures were similar to those shown for G-SAS for both PSD and GSD participants (Appendix 2). Observed mean scores for all secondary outcome measures (G-SAS gambling urges, gambling frequency, gambling expenditure, K6 psychological distress, EUROHIS quality of life, and additional help seeking behaviour) by intervention group and time are displayed in Figures 5 to 11 (descriptive statistics at all time-points can be found in Appendix 1). Linear mixed modelling was employed to compare treatment groups for continuous measures (gambling urge, K6 psychological distress, EUROHIS quality of life, and help-seeking measures). Because data for gambling frequency and gambling expenditure was non-normally distributed, the scores were collapsed into four ordered categories and analysed using mixed effects ordered logistic regression. Between group differences are displayed in Table 10 and within group differences are displayed in Table 11 for all secondary outcomes.

Gambling urges

There was an initial fast reduction in mean G-SAS gambling urge subscale scores from baseline to 2-month follow-up and then a levelling-off effect at 3-month follow-up. The average number of outcome assessments per individual for G-SAS gambling urge scores was 2.4 (Range, 2 - 3) and there were a total of 190 observations. A likelihood-ratio test comparing the mixed model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 32.84$, $df = 2$, $p < 0.001$). There was no significant difference in G-SAS gambling urge scores between the PSD and GSD intervention groups at the 2-month follow-up evaluation ($p = 0.229$) or 3-month follow-up evaluation ($p = 0.548$). There was a significant reduction (improvement) in scores within treatment groups at both follow-up evaluations ($p < 0.001$).

Gambling frequency

There were two outliers at the 2-month follow-up evaluation which substantially influenced the mean score; these outliers were retained in the analyses. Otherwise, the average trajectory in gambling frequency across time had a similar shape to other outcome measures (i.e., an initial fast reduction in mean scores from baseline to 2-month follow-up and then a levelling-off effect at 3-month follow-up). The average number of outcome assessments per individual for gambling frequency was 2.3 (Range, 1 - 3) and a total of 185 observations. The reported likelihood-ratio test showed that there was enough variability between individuals to favour a mixed-effects ordered logistic regression over a standard ordered logistic regression ($\chi^2 = 8.36$, $df = 1$, $p = 0.002$). There was no significant difference between the two intervention groups at the 2-month follow-up ($p = 0.919$); but there was a statistically significant difference between groups at the 3-month follow-up ($p = 0.031$), with GSD participants reporting a greater decrease (improvement) in days gambled compared to the PSD group. There was a significant reduction (improvement) in gambling frequency within treatment groups at the 2-month follow-up evaluation ($p = 0.002$); and significant decreases were identified in both the GSD ($p < 0.001$) and PSD groups ($p = 0.038$) at the 3-month follow-up evaluation.

Gambling expenditure

The average trajectories in gambling expenditure across time indicated an initial improvement from baseline to the 2-month follow-up evaluation, followed by a further small improvement for the GSD intervention and a small deterioration for the PSD intervention at the 3-month follow-up. The average number of outcome assessments per individual for gambling expenditure was 2.3 (Range, 1 - 3) and a total of 185 observations. There was enough variability between individuals to favour a mixed-effects ordered logistic regression ($\chi^2 = 4.87$, $df = 1$, $p = 0.014$). There was no significant difference between the two intervention groups at the 2-month follow-up evaluation ($p = 0.257$) or 3-month follow-up evaluation ($p = 0.338$). There was a significant reduction (improvement) in gambling expenditure

within treatment groups at the 2-month follow-up evaluation ($p = 0.023$), but not at the 3-month follow-up evaluation ($p = 0.630$).

Psychological distress

There was an initial fast reduction in mean K6 psychological distress scores from baseline (moderate risk) to 2-month follow-up (low risk) and then a levelling-off effect at 3-month follow-up (low risk). The average number of outcome assessments per individual for the K6 measure was 2.3 (Range, 1 - 3) and a total of 185 observations. A likelihood-ratio test comparing the mixed model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 54.60$, $df = 3$, $p < 0.001$). There was no significant difference between the two intervention groups at the 2-month follow-up evaluation ($p = 0.803$) or 3-month follow-up evaluation ($p = 0.164$). There was a significant reduction (improvement) in scores within treatment groups at both the 2-month ($p < 0.001$) and 3-month follow-up evaluations ($p = 0.007$).

Quality of life

There was an initial improvement in mean EUROHIS quality of life item scores from baseline to 2-month follow-up and then a further small improvement for the GSD intervention and a small deterioration for the PSD intervention at 3-month follow-up. The average number of outcome assessments per individual for quality of life was 2.3 (Range, 1 - 3) and a total of 185 observations. A likelihood-ratio test comparing the mixed model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 41.70$, $df = 2$, $p < 0.001$). There was no significant difference between the two intervention groups at the 2-month follow-up ($p = 0.536$) or 3-month follow-up ($p = 0.294$). There was a significant increase (improvement) in scores within treatment groups at the 2-month follow-up evaluation ($p = 0.030$), but not at the 3-month follow-up evaluation ($p = 0.582$).

Additional help seeking behaviour

High-intensity interventions. There was an initial small improvement in high intensity help-seeking behaviour mean scores from baseline to 2-month follow-up for both interventions and then a further small improvement for the GSD intervention and a larger improvement for the PSD intervention at 3-month follow-up. The average number of assessments for high-intensity interventions per individual was 2.3 (Range, 1 - 3) and a total of 184 observations across the study period. A likelihood-ratio test comparing mixed-effects models with one-level (fixed effects) ordinary linear regression was significant ($\chi^2 = 22.01$, $df = 2$, $p < 0.001$) and indicated that there was adequate individual variability across intervention period to warrant random effects components. There was no significant difference between the two groups at 2-month follow-up ($p = 0.830$) or 3-month follow-up ($p = 0.254$). There was no significant difference in high-intensity intervention help-seeking within treatment groups at the 2-month follow-up evaluation ($p = 0.588$), but there was a significant increase (improvement) within treatment groups at the 3-month follow-up ($p = 0.026$).

Low-intensity interventions. There was an initial small improvement in low intensity intervention help-seeking behaviour from baseline to the 2-month follow-up for the PSD intervention and a further small improvement at the 3-month follow-up. In contrast, there was a larger initial improvement in the GSD intervention from baseline to the 2-month follow-up with a small decrease at 3-month follow-up. The average number of assessments for help-seeking per individual was 2.3 (Range, 1 - 3) and a total of 184 observations across the study period. A likelihood-ratio test comparing mixed-effects models with one-level (fixed effects) ordinary linear regression was not significant ($\chi^2 = 1.87$, $df = 2$, $p = 0.085$), indicating a random effects component was not warranted. There was no significant difference between the two groups at 2-month follow-up ($p = 0.367$) or 3-month follow-up ($p = 0.978$). There was no significant difference in low-intensity intervention help-seeking within treatment groups at the 2-month follow-up ($p = 0.892$) or 3-month follow-up ($p = 0.557$) evaluations.

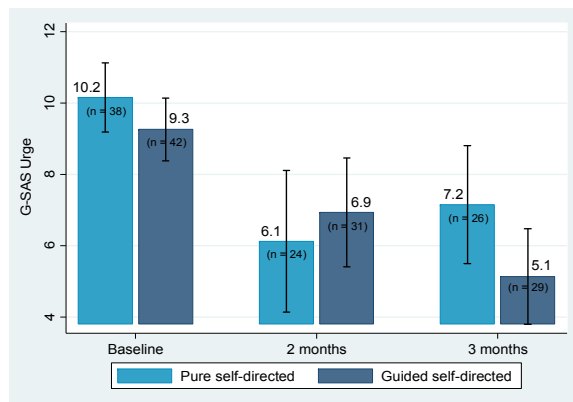


Figure 5. Observed G-SAS gambling urge subscale scores by time and treatment group

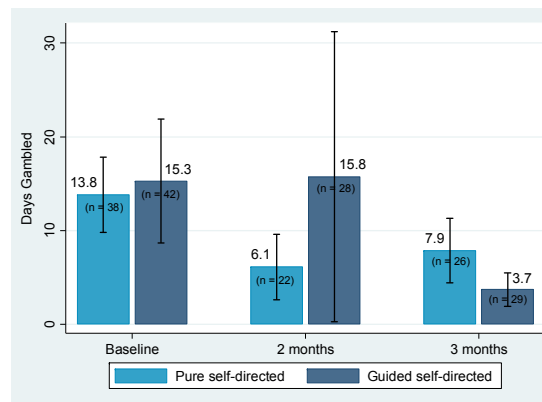


Figure 6. Observed mean gambling frequency by time and treatment group

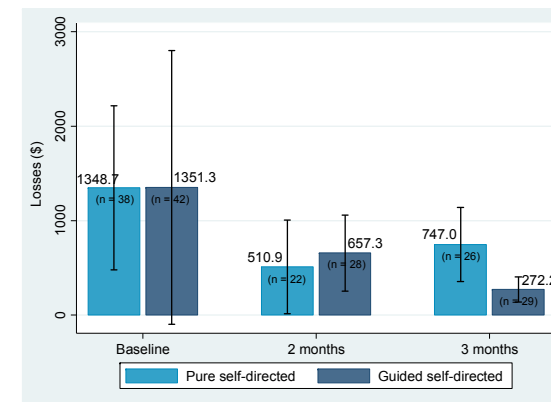


Figure 7. Observed mean gambling expenditure by time and treatment group.

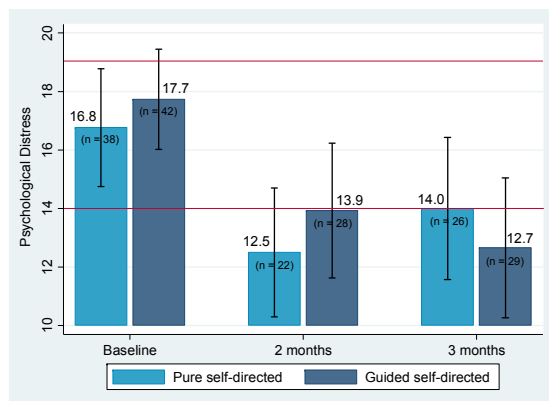


Figure 8. Observed mean K6 psychological distress scores by time and treatment group

Note: Lower scores indicate a reduction (improvement) in psychological distress.

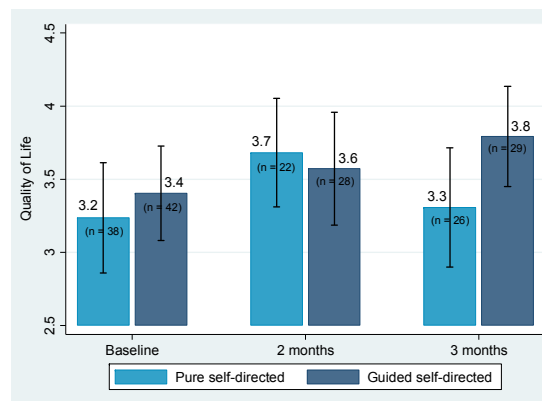


Figure 9. Observed mean EUROHIS quality of life item scores by time and treatment group.

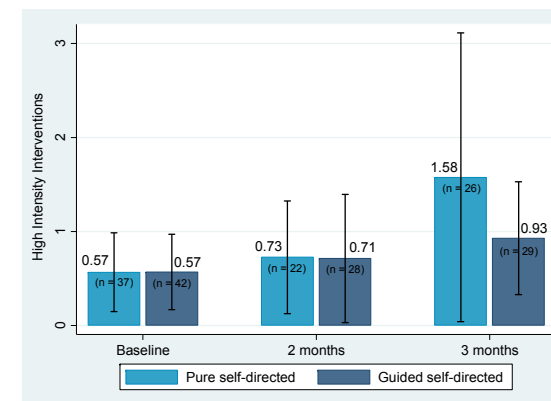


Figure 10. Observed mean high intensity help-seeking behaviour by time and treatment group.

Red lines indicate cut-offs for low to moderate risk, and moderate risk to high risk K6 psychological distress scores.

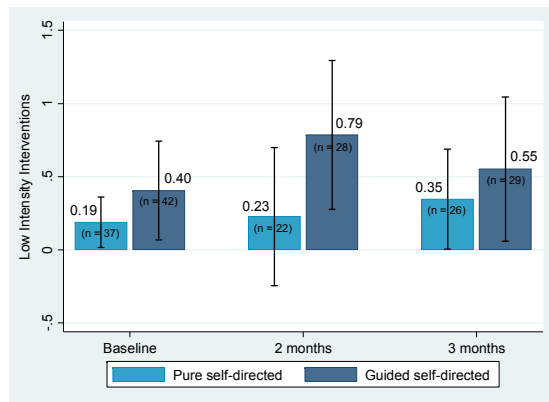


Figure 11. Observed mean low intensity help-seeking behaviour by time and treatment group.

Table 10. Change in secondary outcomes (between group differences)

| Outcome | Time-point | Unadjusted estimate (SE) | | Estimated between-group difference (95% CI) | p |
|---|------------|--------------------------|--------------|---|--------------|
| | | PSD | GSD | | |
| G-SAS gambling urge ^a | Baseline | 10.16 (0.54) | 9.26 (0.43) | -0.90 (-2.23 - 0.44) | 0.188 |
| | 2-months | 6.39 (0.71) | 6.65 (0.59) | 1.17 (-0.74 - 3.07) | 0.229 |
| | 3-month | 7.02 (0.78) | 5.47 (0.73) | -0.67 (-2.86 - 1.52) | 0.548 |
| Gambling frequency ^b | Baseline | - | - | -0.15 (-1.15, 0.85) | 0.768 |
| | 2-months | - | - | 0.06 (-1.15, 1.27) | 0.919 |
| | 3-months | - | - | -1.30 (-2.48, -0.12) | 0.031 |
| Gambling expenditure ^b | Baseline | - | - | -0.64 (-1.60, 0.33) | 0.198 |
| | 2-months | - | - | 0.68 (-0.49, 1.84) | 0.257 |
| | 3-months | - | - | -0.53 (-1.61, 0.55) | 0.338 |
| K6 psychological distress ^a | Baseline | 16.76 (0.86) | 17.74 (0.82) | 0.97 (-1.35 - 3.30) | 0.412 |
| | 2-months | 12.67 (1.09) | 13.32 (1.00) | -0.33 (-2.88 - 2.23) | 0.803 |
| | 3-months | 13.93 (1.17) | 12.88 (1.11) | -2.02 (-4.86 - 0.83) | 0.164 |
| EUROHIS quality of life ^a | Baseline | 3.24 (0.17) | 3.40 (0.15) | 0.17 (-0.27 - 0.60) | 0.449 |
| | 2-months | 3.64 (0.20) | 3.65 (0.17) | -0.16 (-0.66 - 0.34) | 0.536 |
| | 3-months | 3.34 (0.19) | 3.75 (0.18) | 0.26 (-0.22 - 0.73) | 0.294 |
| High Intensity Interventions ^a | Baseline | 0.57 (0.21) | 0.57 (0.21) | 0.00 (-0.84, 0.85) | 0.997 |
| | 2-months | 1.10 (0.40) | 0.67 (0.26) | -0.12 (-1.22, 0.98) | 0.830 |
| | 3-months | 1.05 (0.55) | 0.80 (0.28) | -0.61 (-1.66, 0.44) | 0.253 |
| Low Intensity Interventions ^a | Baseline | 0.19 (0.13) | 0.40 (0.19) | 0.22 (-0.25, 0.68) | 0.360 |
| | 2-months | 0.23 (0.17) | 0.79 (0.23) | 0.34 (-0.40, 1.09) | 0.367 |
| | 3-months | 0.35 (0.16) | 0.55 (0.23) | -0.01 (-0.73, 0.71) | 0.978 |

^a Mixed effects ordered logistic regression model^b Linear Regression

Table 11. Change in secondary outcomes (within group differences)

| Outcome | Baseline | 2-months | | | 3-months | | |
|---|--------------------------|--------------------------|--|------------------|--------------------------|--|------------------|
| | Unadjusted estimate (SE) | Unadjusted estimate (SE) | Estimated within-group difference (95% CI) | p | Unadjusted estimate (SE) | Estimated within-group difference (95% CI) | p |
| PSD intervention | | | | | | | |
| G-SAS gambling urge ^a | 10.16 (0.54) | 6.39 (0.71) | -3.77 (-5.21, -2.33) | <0.001 | 7.02 (0.78) | -3.14 (-4.70, -1.57) | <0.001 |
| Gambling frequency ^b | - | - | -1.59 (-2.70, -0.47) | 0.005 | - | -1.10 (-2.14, -0.06) | 0.038 |
| Gambling expenditure ^b | - | - | -1.30 (-2.51, -0.09) | 0.035 | - | -0.30 (-1.47, 0.87) | 0.613 |
| K6 psychological distress ^a | 16.76 (0.92) | 12.53 (1.06) | -4.23 (-5.96, -2.51) | <0.001 | 14.13 (1.01) | -2.63 (-4.25, -1.02) | 0.001 |
| EUROHIS quality of life ^a | 3.24 (0.17) | 3.64 (0.20) | 0.41 (0.05, 0.77) | 0.026 | 3.34 (0.19) | 0.10 (-0.24, 0.44) | 0.562 |
| High-intensity interventions ^a | 0.57 (0.21) | 1.65 (0.88) | 1.08 (-0.60, 2.77) | 0.209 | 1.84 (1.30) | 1.27 (-1.25, 3.79) | 0.323 |
| Low-intensity interventions ^a | 0.19 (0.13) | 0.23 (0.17) | 0.04 (-0.39, 0.46) | 0.859 | 0.35 (0.16) | 0.16 (-0.25, 0.56) | 0.441 |
| GSD intervention | | | | | | | |
| G-SAS gambling urge ^a | 9.26 (0.43) | 6.65 (0.59) | -2.61 (-3.86, -1.36) | <0.001 | 5.47 (0.73) | -3.79 (-2.30, -2.29) | <0.001 |
| Gambling frequency ^b | - | - | -1.82 (-3.08, -0.55) | 0.005 | - | -2.80 (-4.36, -1.24) | <0.001 |
| Gambling expenditure ^b | - | - | 0.11 (-0.80, 1.03) | 0.809 | - | -0.14 (-1.02, 0.75) | 0.809 |
| K6 psychological distress ^a | 17.74 (0.77) | 13.19 (1.05) | -4.55 (-6.34, -2.75) | <0.001 | 13.12 (1.27) | -4.62 (-6.90, -2.35) | <0.001 |
| EUROHIS quality of life ^a | 3.40 (0.14) | 3.65 (0.17) | 0.25 (-0.08, 0.58) | 0.143 | 3.75 (0.18) | 0.35 (0.00, 0.69) | 0.048 |
| High-intensity interventions ^a | 0.57 (0.21) | 0.67 (0.26) | 0.10 (-0.43, 0.62) | 0.719 | 0.80 (0.28) | 0.23 (0.15, 0.99) | 0.427 |
| Low-intensity interventions ^a | 0.40 (0.19) | 0.79 (0.23) | 0.38 (-0.21, 0.97) | 0.202 | 0.55 (0.23) | 0.15 (-0.44, 0.73) | 0.618 |

^a Mixed effects ordered logistic regression model^b Linear Regression

Clinically significant change

For secondary analyses, effect sizes presented as Cohen's *d* were calculated for primary and secondary outcomes (G-SAS gambling symptom severity, G-SAS gambling urges, K6 psychological distress, EUROHIS-QOL quality of life item) to provide an estimate of the magnitude of differences between treatment groups and to allow comparisons with other published studies (Cohen, 1988). Because Cohen's *d* effect sizes are based on the assumption of normality for continuous data, they were not calculated for gambling frequency or expenditure due to the skewed nature of the data. Clinically significant change, as outlined by (Jacobson & Truax, 1991) was also measured for the G-SAS gambling symptom severity and K6 psychological distress scores as these measures provide functional score ranges. At the follow-up evaluations, each participant's status was defined as "recovered" (final score fell into the functional range and corresponded to a reliable change), "improved" (final score corresponded to a reliable change, but fell into the dysfunctional range), "unchanged" (final score did not correspond to a reliable change), or "deteriorated" (final score corresponded to a reliable change in the negative direction).

Gambling symptom severity

Both treatment groups showed a clinically meaningful reduction (improvement) in mean G-SAS gambling symptom severity scores from baseline to the 2-month follow-up, with large effect sizes (PSD: $d = 1.26$, GSD: $d = 0.92$) ($p < 0.001$). From baseline to the 3-month follow-up, there was also a clinically significant reduction in mean G-SAS gambling symptom severity scores in both intervention groups (PSD: $d = 1.16$, GSD: $d = 1.36$) ($p < 0.001$). For clinically significant change calculated from G-SAS gambling symptom severity data from baseline to the 2-month follow-up (see Table 12 below), 58.3% of PSD participants recovered, 8.3% improved, 29.2% showed no real change, and 4.2% deteriorated. For GSD participants, 38.7% recovered, 19.4% improved, 38.7% showed no real change, and 3.2% deteriorated. There was no statistically significant difference between groups in clinically significant change from baseline to the 2-month follow-up ($p = 0.454$). For baseline to the 3-month follow-up, 34.6% of PSD participants recovered, 23.1% improved and 42.3% experienced no real change. For GSD participants, 62.1% recovered, 3.4% improved, 31.0% showed no real change, and 3.4% deteriorated. There was no statistically significant difference between groups in clinically significant change from baseline to the 3-month follow-up ($p = 0.054$). When the 2-month and 3-month follow-up data were combined, 50.0% recovered, 13.8% improved, 33.8% showed no real change, and 2.5% deteriorated.

Table 12. Clinically significant change based on G-SAS gambling symptom severity

| 2-months | PSD (n= 24) | GSD (n=31) | Total (n=55) |
|-----------------------|--------------------|-------------------|---------------------|
| Recovered | 14 (58.3) | 12 (38.7) | 26 (47.3) |
| Improved | 2 (8.3) | 6 (19.4) | 8 (14.5) |
| Unchanged | 7 (29.2) | 12 (38.7) | 19 (34.5) |
| Deteriorated | 1 (4.2) | 1 (3.2) | 2 (3.6) |
| 3-months | PSD (n= 26) | GSD (n=29) | Total (n=55) |
| Recovered | 9 (34.6) | 18 (62.1) | 27 (49.1) |
| Improved | 6 (23.1) | 1 (3.4) | 7 (12.7) |
| Unchanged | 11 (42.3) | 9 (31.0) | 20 (36.4) |
| Deteriorated | 0 (0.0) | 1 (3.4) | 1 (3.4) |
| 2- or 3-months | PSD (n= 38) | GSD (n=42) | Total (n=80) |
| Recovered | 16 (42.1) | 24 (57.1) | 40 (50.0) |

| | | | |
|--------------|-----------|-----------|-----------|
| Improved | 8 (21.1) | 3 (7.1) | 11 (13.8) |
| Unchanged | 13 (34.2) | 14 (33.3) | 27 (33.8) |
| Deteriorated | 1 (2.6) | 1 (2.4) | 2 (2.5) |

Gambling urges

Both groups also showed a clinically meaningful reduction (improvement) in mean G-SAS urge subscale scores from baseline to the 2-month follow-up (PSD: $d = 1.08$, $p < 0.001$; GSD: $d = 0.67$, $p = 0.005$), and baseline to the 3-month follow-up (PSD: $d = 0.87$, $p < 0.001$; GSD: $d = 1.31$, $p < 0.001$).

Psychological distress

Both treatment groups showed a clinically meaningful reduction (improvement) in mean K6 psychological distress scores from baseline to the 2-month follow-up (PSD: $d = 0.86$, $p = 0.001$; GSD: $d = 0.71$, $p = 0.002$), and baseline to the 3-month follow-up (PSD: $d = 0.36$, $p = 0.009$; GSD: $d = 0.92$, $p < 0.001$). For clinically significant change calculated from K6 psychological distress data (see Table 13 below), 31.8% of PSD participants recovered at the 2-month follow-up, 13.6% improved, 50.0% experienced no real change, and 4.5% deteriorated. For GSD participants, 39.3% of participants recovered, 10.7% improved, 39.3% showed no real change and 10.7% deteriorated. There was no statistically significant difference between PSD and GSD in clinically significant change at the 2-month follow-up ($p = 0.756$). For clinically significant change from baseline to the 3-month follow-up, 19.2% of PSD participants recovered, 11.5% improved, 65.4% experienced no real change, and 3.8% deteriorated. For GSD participants, 41.4% recovered, 17.2% improved, 34.5% showed no real change, and 6.9% deteriorated. There was no statistically significant difference between groups in clinically significant change at the 3-month follow-up ($p = 0.146$). When the 2-month and 3-month follow-up data were combined, 31.6% recovered, 14.5% improved, 44.7% showed no real change, and 9.2% deteriorated.

Table 13. Clinically significant change based on K6 psychological distress

| 2-months | PSD (n= 22) | GSD (n=28) | Total (n=50) |
|-----------------------|--------------------|-------------------|---------------------|
| Recovered | 7 (31.8) | 11 (39.3) | 18 (36.0) |
| Improved | 3 (13.6) | 3 (10.7) | 6 (12.0) |
| Unchanged | 11 (50.0) | 11 (39.3) | 22 (44.0) |
| Deteriorated | 1 (4.5) | 3 (10.7) | 4 (4.0) |
| 3-months | PSD (n= 26) | GSD (n=29) | Total (n=55) |
| Recovered | 5 (19.2) | 12 (41.4) | 17 (30.9) |
| Improved | 3 (11.5) | 5 (17.2) | 8 (14.5) |
| Unchanged | 17 (65.4) | 10 (34.5) | 27 (49.1) |
| Deteriorated | 1 (3.8) | 2 (6.9) | 3 (5.5) |
| 2- or 3-months | PSD (n= 36) | GSD (n=40) | Total (n=76) |
| Recovered | 9 (25.0) | 15 (37.5) | 24 (31.6) |
| Improved | 5 (13.9) | 6 (15.0) | 11 (14.5) |
| Unchanged | 20 (55.6) | 14 (35.0) | 34 (44.7) |
| Deteriorated | 2 (5.6) | 5 (12.5) | 7 (9.2) |

Quality of life

For both treatment groups, there was no clinically significant change on the EUROHIS quality of life item from baseline to the 2-month follow-up (PSD: $d = 0.42$, $p = 0.104$; GSD: $d = 0.16$, $p = 0.057$) or baseline to the 3-month follow-up (PSD: $d = 0.06$, $p = 0.664$; GSD: $d = 0.40$, $p = 0.086$).

Additional help-seeking behaviour

For both treatment groups, there was no clinically significant change on high intensity intervention help-seeking behaviour from baseline to the 2-month follow-up (PSD: $d = 0.09$, $p = 0.715$; GSD: $d = 0.15$, $p = .475$) or baseline to the 3-month follow-up (PSD: $d = 0.00$, $p = 1.00$; GSD: $d = 0.19$, $p = 0.463$). Similarly, there were no clinically significant changes between treatment groups on low intensity help-seeking behaviours from baseline to the 2-month follow-up (PSD: $d = 0.04$, $p = 0.863$; GSD: $d = 0.17$, $p = .381$), and baseline to the 3-month follow-up (PSD: $d = 0.11$, $p = 0.600$; GSD: $d = 0.10$, $p = 0.609$).

Subgroups benefiting most from the GAMBLINGLESS program

In this study, a secondary aim was to identify subgroups of gamblers who can most benefit from the GAMBLINGLESS program by identifying possible moderators of treatment outcome, as well as predictors of treatment outcomes, treatment engagement, and follow-up completion.

Treatment outcomes

Moderators of treatment outcomes

Gambling symptom severity

To investigate for any difference between males and females in treatment effects on G-SAS gambling symptom severity scores across time, a categorical (gender) by categorical (intervention group) by categorical (time) interaction was specified. A likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 31.93$, $df = 2$, $p < 0.001$). There was no significant difference between males and females in treatment effects at the 2-month follow-up ($p = 0.268$) or 3-month follow-up ($p = 0.651$).

To examine how the slope of age differs as a function of treatment effects on G-SAS gambling symptom severity scores across time, a continuous (age) by categorical (intervention group) by categorical (time) interaction was specified. A likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 31.95$, $df = 2$, $p < 0.001$). There was no significant age effect on treatment at the 2-month follow-up ($p = 0.950$) or 3-month follow-up ($p = 0.575$).

To study for any difference between participants with issues on EGMs and those with issues on EGMs plus other forms (e.g. horse/dog betting) on G-SAS gambling symptom severity scores across time, a categorical (EGM) by categorical (intervention group) by categorical (time) interaction was specified. A likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 30.90$, $df = 2$, $p < 0.001$). There was no significant difference between EGM only and EGM/other gambling activities in treatment effects at the 2-month follow-up ($p = 0.809$) or 3-month follow-up ($p = 0.859$).

The graphs illustrating each of the three-way interactions can be found in Appendix 5.

Psychological distress

For K6 psychological distress data, patient subtypes (gender, age and EGM use) were also investigated across intervention group and follow-up evaluations. For males versus females, a likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant ($\chi^2 = 55.62$, $df = 2$, $p < 0.001$). There was no significant difference between males and females in treatment effects at the 2-month follow-up ($p = 0.432$) or 3-month follow-up ($p = 0.513$).

To examine how the slope of age differs as a function of treatment effects on K6 psychological distress scores across time, a continuous (age) by categorical (intervention group) by categorical (time) interaction was specified. A likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 56.01$, $df = 2$, $p < 0.001$). There was no significant treatment effect for age across treatment group and time at 2-months ($p = 0.129$) or 3-months ($p = 0.817$).

To study for any difference between participants with issues on EGMs and those with issues on EGMs plus other forms (e.g. horse/dog betting) on K6 psychological distress scores across time, a categorical (EGM) by categorical (intervention group) by categorical (time) interaction was specified. A likelihood-ratio test comparing the model with one-level (fixed effects) ordinary linear regression was highly significant for these data ($\chi^2 = 48.63$, $df = 2$, $p < 0.001$). There was no significant difference between EGM only and EGM/other gambling activities in treatment effects at the 2-month follow-up ($p = 0.831$) or 3-month follow-up ($p = 0.578$).

The graphs illustrating each of the three-way interactions can be found in Appendix 5.

Predictors of treatment outcomes

As previously indicated (Table 12), 63.8% of participants recovered/improved based on clinically significant change from baseline to the final follow-up evaluation, on G-SAS gambling symptom severity. Binary logistic regression was employed to investigate the prediction of clinically significant change by intervention group (PSD, GSD), baseline socio-demographic characteristics (sex, age group, country of birth, employment, annual personal net income), outcome measures (gambling frequency and expenditure, K6 psychological distress, EUROHIS quality of life, additional help-seeking behaviour), diagnostic and descriptive measures (PGSI problem gambling severity, treatment goal, problematic gambling activities, internet use, AUDIT-3 alcohol use, substance use frequency), and readiness to change (readiness rulers, URICA readiness to change). The referent category was participants who were unchanged or deteriorated according to their G-SAS gambling symptom severity clinically significant change indices.

Results from the regression analyses are provided in Table 14. For a one unit increase in baseline K6 psychological distress scores, the odds of recovery or improvement increased by a factor of 1.16 ($p = 0.003$). For a one unit increase in baseline readiness ruler scores, the odds of recovery or improvement increased by a factor of 2.00 ($p = 0.030$). In the multivariable model, the odds of recovery or improvement increased by a factor of 1.16 ($p = 0.004$) and 2.59 ($p = 0.048$), for a one unit increase in baseline K6 psychological distress and readiness ruler scores, respectively, when holding all other variables constant. The intervention group (PSD or GSD) did not significantly predict treatment outcomes.

Table 14. Univariable and multivariable binary logistic regression models of factors associated with clinically significant change on G-SAS gambling symptom severity

| Variable | Univariable model | | | Multivariable model ^a | | |
|--|-------------------|--------------------|--------------|----------------------------------|--------------------|--------------|
| | OR | 95% CI | p | OR | 95% CI | p |
| Intervention group | | | | | | |
| PSD (referent) | 1.00 | - | - | | | |
| GSD | 1.05 | 0.42 – 2.62 | 0.917 | | | |
| Sex | | | | | | |
| Female (referent) | 1.00 | - | - | | | |
| Male | 0.70 | 0.27 – 1.79 | 0.448 | | | |
| Age group ^b | 1.05 | 0.85 – 1.29 | 0.656 | | | |
| Country of birth | | | | | | |
| Australia (referent) | 1.00 | - | - | | | |
| Other | 1.05 | 0.34 – 3.23 | 0.926 | | | |
| Employment | | | | | | |
| Part-time/student/ unemployed (referent) | 1.00 | - | - | | | |
| Full-time | 0.52 | 0.18 – 1.52 | 0.234 | | | |
| Annual personal net income | | | | | | |
| <\$40,000 (referent) | 1.00 | - | - | | | |
| \$40,000-\$79,999 | 0.37 | 0.11 – 1.21 | 0.101 | | | |
| \$80,000+ | 0.51 | 0.14 – 1.93 | 0.325 | | | |
| Gambling frequency (days) ^c | 1.00 | 0.97 - 1.02 | 0.852 | | | |
| Gambling expenditure (\$) ^c | | | | | | |
| 0 (referent) | 1.00 | - | - | | | |
| 1 - 200 | 0.59 | 0.14 – 2.42 | 0.464 | | | |
| 201 - 800 | 1.05 | 0.25 – 4.37 | 0.944 | | | |
| 801 + | 0.53 | 0.17 – 1.61 | 0.262 | | | |
| K6 psychological distress | 1.16 | 1.05 – 1.27 | 0.003 | 1.16 | 1.05 - 1.29 | 0.004 |
| EUROHIS-QOL ^d | 1.02 | 0.67 – 1.55 | 0.927 | | | |
| Additional help-seeking behaviour ^{c,e} | | | | | | |
| No (referent) | 1.00 | - | - | | | |
| Yes | 0.76 | 0.29 – 2.00 | 0.575 | | | |
| PGSI problem gambling severity | 1.03 | 0.94 – 1.12 | 0.532 | | | |
| Treatment goal | | | | | | |
| Quit altogether (referent) | 1.00 | - | - | | | |
| Quit problem gambling activities | 0.48 | 0.17 – 1.40 | 0.179 | | | |
| Cut back problem gambling activities | 0.64 | 0.20 – 2.08 | 0.458 | | | |

| | | | | | | |
|--|-------------|--------------------|--------------|-------------|--------------------|--------------|
| Problematic gambling activities | | | | | | |
| EGMs+others (referent) | 1.00 | - | - | 1.00 | - | - |
| EGMs only | 2.31 | 0.89 – 6.03 | 0.087 | 2.36 | 0.80 – 6.96 | 0.119 |
| Internet use (hours) ^f | 0.83 | 0.67 – 1.04 | 0.109 | | | |
| AUDIT-3 alcohol use | 1.24 | 0.87 – 1.79 | 0.232 | | | |
| Substance use frequency ^c | 1.39 | 0.74 – 2.60 | 0.303 | | | |
| Readiness rulers | | | | | | |
| Importance | 1.44 | 0.96 – 2.16 | 0.080 | 0.72 | 0.34 – 1.51 | 0.386 |
| Readiness | 2.00 | 1.07 – 3.74 | 0.030 | 2.59 | 1.01 – 6.68 | 0.048 |
| Confidence | 1.04 | 0.90 – 1.21 | 0.572 | | | |
| URICA readiness to change ^g | | | | | | |
| Pre-contemplation | 0.91 | 0.56 – 1.46 | 0.694 | | | |
| Contemplation | 0.61 | 0.28 – 1.34 | 0.218 | | | |
| Action | 1.08 | 0.75 – 1.55 | 0.671 | | | |
| Maintenance | 0.95 | 0.66 – 1.36 | 0.770 | | | |

^a Variable selection based on $p < 0.10$ from univariable analyses and interaction terms (due to sample size).

^b Age groups in continuous form.

^c Based on previous 30 days.

^d First item only.

^e Includes high-intensity interventions, low-intensity interventions, and self-directed actions.

^f Based on average weekly use for work/personal/education/recreation.

^g Selected items.

Treatment engagement

Overall, 33.0% of participants completed an activity within the GAMBLINGLESS program. Binary logistic regression was employed to investigate the prediction of module activity completion by the same baseline characteristics as those employed for the prediction of treatment outcome completion. Unlike the treatment completion analyses, however, G-SAS gambling symptom severity scores were included in the analyses as the G-SAS was not employed to calculate module activity completion. Moreover, because of the larger sample sizes in these analyses, an interaction term between gender and age has been included in these analyses. The classification as a “module activity completer” was established on a participant completing at least one module activity. The referent category was participants who had not completed any module activity.

Results from regression analyses are provided in Table 15. In the univariable models, age group, past-month gambling expenditure in excess of \$800, past-month additional help-seeking, and average weekly internet use were statistically significant. For a one unit increase in age group, the odds of completing a module activity increased by a factor of 1.24 ($p = 0.001$). For participants who had sought help in the previous 30 days (including high-intensity interventions, low-intensity interventions, and self-directed actions), the odds of completing at least one module increased by a factor of 2.40 ($p = 0.005$). For a one-unit increase in hours of internet use in a regular week, the odds of module activity completion increased by a factor of 1.20 ($p = 0.014$). In contrast, participants who spent in excess of \$800 in the past month were less likely than participants who spent no money to complete a module activity by a factor of 0.39 ($p = 0.009$). In the multivariable model, all of these variables, with the exception of gambling expenditure, were statistically significant. With each one unit increase in age group, the odds of completing a module activity increased by a factor of 1.25 when holding all other variables constant ($p = 0.006$). For participants who had sought help in the previous 30 days, the odds of completing at least one module activity increased by a factor of 2.52 ($p = 0.007$). With each one unit increase in hours of internet use in a regular week, the odds of completing a module activity increased by a factor of 1.29 when holding all other variables constant ($p = 0.003$). The intervention group (PSD or GSD) did not significantly predict treatment engagement.

Table 15. Univariable and multivariable binary logistic regression models of factors associated with module activity completion

| Variable | Univariable model | | | Multivariable model ^a | | |
|--|-------------------|--------------------|--------------|----------------------------------|--------------------|--------------|
| | OR | 95% CI | p | OR | 95% CI | p |
| Intervention group | | | | | | |
| PSD (referent) | 1.00 | - | - | | | |
| GSD | 1.16 | 0.65 - 2.07 | 0.623 | | | |
| Sex | | | | | | |
| Female (referent) | 1.00 | - | - | 1.00 | - | - |
| Male | 0.63 | 0.35 - 1.15 | 0.130 | 1.37 | 0.55 - 3.41 | 0.497 |
| Age group ^b | 1.24 | 1.09 - 1.41 | 0.001 | 1.25 | 1.07 - 1.46 | 0.006 |
| Country of birth | | | | | | |
| Australia (referent) | 1.00 | - | - | | | |
| Other | 0.76 | 0.38 - 1.54 | 0.450 | | | |
| Employment | | | | | | |
| Part-time/student/ unemployed (referent) | 1.00 | - | - | | | |
| Full-time | 0.77 | 0.41 - 1.44 | 0.409 | | | |
| Annual personal net income | | | | | | |
| <\$40,000 (referent) | 1.00 | - | - | | | |
| \$40,000-\$79,999 | 1.22 | 0.61 - 2.44 | 0.583 | | | |
| \$80,000+ | 0.98 | 0.42 - 2.29 | 0.959 | | | |
| G-SAS gambling symptom severity | 0.99 | 0.95 - 1.03 | 0.536 | | | |
| Gambling frequency (days) ^c | 0.99 | 0.97 - 1.01 | 0.376 | | | |
| Gambling expenditure (\$) ^c | | | | | | |
| 0 (referent) | 1.00 | - | - | 1.00 | - | - |
| 1 - 200 | 1.29 | 0.53 - 3.10 | 0.576 | 1.18 | 0.45 - 3.06 | 0.737 |
| 201 - 800 | 0.89 | 0.34 - 2.30 | 0.810 | 0.86 | 0.26 - 2.90 | 0.810 |
| 801 + | 0.39 | 0.19 - 0.79 | 0.009 | 0.43 | 0.18 - 1.06 | 0.067 |
| K6 psychological distress | 0.97 | 0.93 - 1.03 | 0.341 | | | |
| EUROHIS-QOL ^d | 1.21 | 0.90 - 1.62 | 0.200 | 1.14 | 0.81 - 1.62 | 0.444 |
| Additional help-seeking behaviour ^{c,e} | | | | | | |
| No (referent) | 1.00 | - | - | 1.00 | - | - |
| Yes | 2.40 | 1.31 - 4.39 | 0.005 | 2.52 | 1.28 - 4.96 | 0.007 |
| PGSI problem gambling severity | 0.97 | 0.91 - 1.02 | 0.155 | 0.96 | 0.91 - 1.03 | 0.332 |
| Treatment goal | | | | | | |
| Quit altogether (referent) | 1.00 | - | - | | | |
| Quit problem gambling activities | 1.67 | 0.83 - 3.36 | 0.151 | | | |
| Cut back problem gambling activities | 0.71 | 0.34 - 1.48 | 0.359 | | | |

| | | | | | | |
|--|-------------|--------------------|--------------|-------------|--------------------|--------------|
| Problematic gambling activities | | | | | | |
| EGMs+others (referent) | 1.00 | - | - | 1.00 | - | - |
| EGMs only | 1.65 | 0.92 – 2.97 | 0.093 | 0.96 | 0.40 - 2.32 | 0.926 |
| Internet use (hours) ^f | 1.20 | 1.04 - 1.39 | 0.014 | 1.29 | 1.09 - 1.53 | 0.003 |
| AUDIT-3 alcohol use | 0.83 | 0.65 - 1.06 | 0.145 | 0.93 | 0.69 - 1.25 | 0.631 |
| Substance use frequency ^c | 0.92 | 0.84 - 1.02 | 0.130 | 0.93 | 0.84 - 1.04 | 0.233 |
| Readiness rulers | | | | | | |
| Importance | 1.05 | 0.87 - 1.26 | 0.622 | | | |
| Readiness | 0.96 | 0.75 - 1.22 | 0.737 | | | |
| Confidence | 0.95 | 0.87 - 1.05 | 0.310 | | | |
| URICA readiness to change ^g | | | | | | |
| Pre-contemplation | 0.78 | 0.52 - 1.15 | 0.201 | 0.80 | 0.52 - 1.23 | 0.308 |
| Contemplation | 1.24 | 0.83 - 1.85 | 0.297 | | | |
| Action | 1.10 | 0.87 - 1.40 | 0.409 | | | |
| Maintenance | 0.96 | 0.76 - 1.21 | 0.729 | | | |
| Interaction term | | | | | | |
| Sex X Age group | 1.07 | 0.80 – 1.42 | 0.649 | | | |

^a Variable selection based on $p < 0.25$ from univariable analyses and interaction terms.

^b Age groups in continuous form.

^c Based on previous 30 days.

^d First item only.

^e Includes high-intensity interventions, low-intensity interventions, and self-directed actions.

^f Based on average weekly use for work/personal/education/recreation.

^g Selected items.

Follow-up completion

Over one-third of participants (38.8%) completed a 2 or 3-month follow-up). Binary logistic regression was employed to investigate the prediction of follow-up assessment completion by the same baseline socio-demographic characteristics as employed in the treatment engagement prediction analyses. Classification as a “follow-up assessment completer” was based on a participant completing at least one set of follow-up assessments (i.e., completing the 2- or 3-month follow-up assessment). The referent category was participants who had completed baseline assessments only.

Results from univariable regression analyses are provided in Table 16. For each one unit increase in age group, on average, participants were significantly more likely to complete at least one follow-up assessment by a factor of 1.18 ($p = 0.007$). The interaction between sex and age group was statistically significant ($p = 0.009$) and indicated that older males were more likely to complete at least one follow-up assessment relative to other sub-groups. For participants who had sought help in the previous 30 days (including high-intensity interventions, low-intensity interventions, and self-directed actions), the odds of completing at least one study follow-up assessment increased by a factor of 2.40 ($p = 0.003$). For a one unit increase in average weekly internet use, the odds of follow-up assessment completion increased by a factor of 1.16 ($p = 0.045$). For the multivariable model in Table 16, there was no overall effect of sex or age group (i.e. main effects), but there were statistically significant crossover interactions for sex X age group ($p = 0.024$). Figure 12, which displays the crossover interaction between sex and age group, indicates that the effect of gender on follow-up completion status is opposite, depending on the value of age. Participants who sought additional help were more likely to complete follow-up measures in the multivariable model when holding all other variables constant ($OR = 2.27$, $p = 0.009$), as was increased weekly internet use ($OR = 1.19$, $p = 0.030$). The intervention group (PSD or GSD) did not significantly predict follow-up assessment completion.

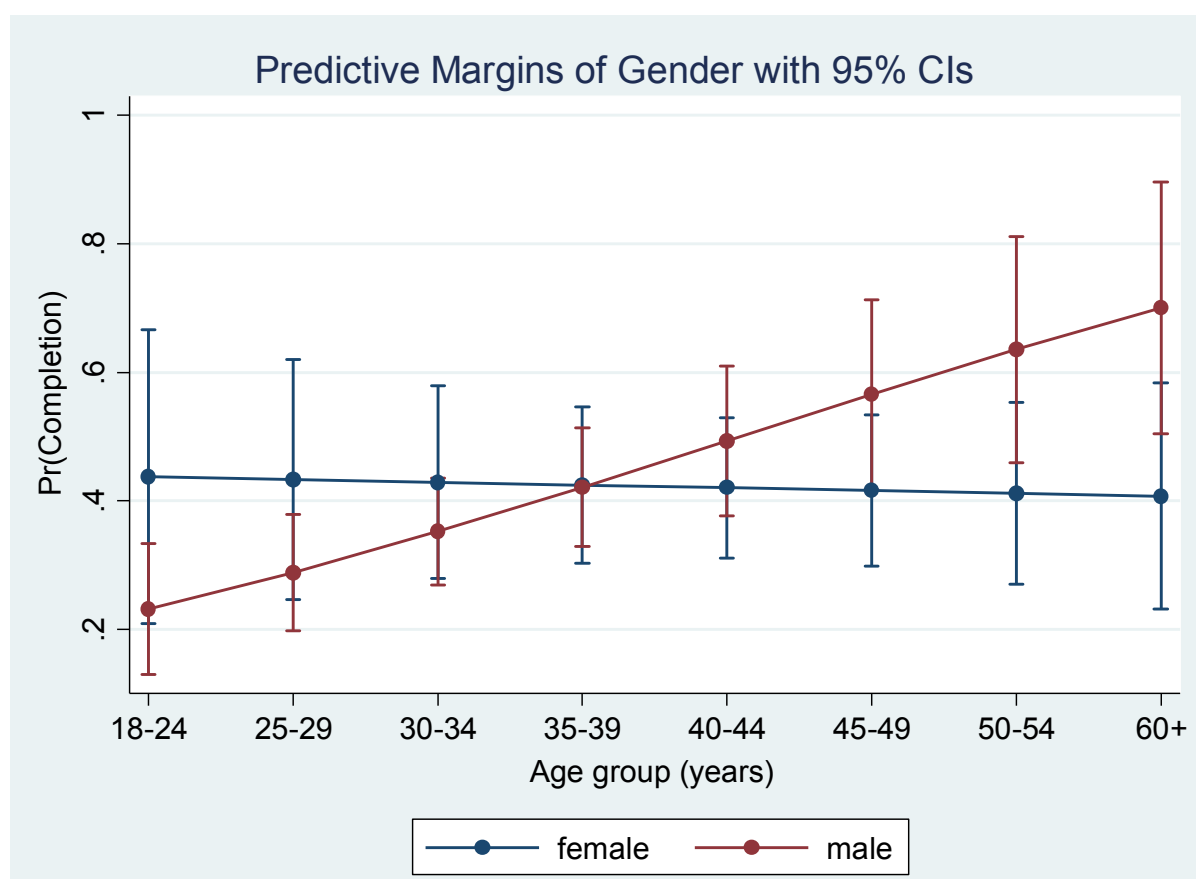


Figure 12. Predictive probabilities of follow-up assessment completion by gender and age

Table 16. Univariable and multivariable binary logistic regression models of factors associated with follow-up assessment completion.

| Variable | Univariable model | | | Multivariable model ^a | | |
|--|-------------------|--------------------|--------------|----------------------------------|--------------------|--------------|
| | OR | 95% CI | p | OR | 95% CI | p |
| Intervention group | | | | | | |
| PSD (referent) | 1.00 | - | - | | | |
| GSD | 1.26 | 0.72 - 2.20 | 0.427 | | | |
| Sex | | | | | | |
| Female (referent) | 1.00 | - | - | 1.00 | - | - |
| Male | 0.72 | 0.40 - 1.30 | 0.276 | 0.26 | 0.06 - 1.08 | 0.064 |
| Age group ^b | 1.18 | 1.05 - 1.34 | 0.007 | 0.98 | 0.79 - 1.21 | 0.832 |
| Country of birth | | | | | | |
| Australia (referent) | 1.00 | - | - | | | |
| Other | 0.79 | 0.41 - 1.55 | 0.496 | | | |
| Employment | | | | | | |
| Part-time/student/ unemployed (referent) | 1.00 | - | - | | | |
| Full-time | 0.99 | 0.53 - 1.84 | 0.978 | | | |
| Annual personal net income | | | | | | |
| <\$40,000 (referent) | 1.00 | - | - | | | |
| \$40,000-\$79,999 | 0.78 | 0.40 - 1.53 | 0.476 | | | |
| \$80,000+ | 1.38 | 0.62 - 3.03 | 0.430 | | | |
| G-SAS gambling symptom severity | 1.00 | 0.96 - 1.04 | 0.965 | | | |
| Gambling frequency (days) ^c | 1.01 | 0.99 - 1.03 | 0.381 | | | |
| Gambling expenditure (\$) ^c | | | | | | |
| 0 (referent) | 1.00 | - | - | | | |
| 1 - 200 | 1.25 | 0.51 - 3.04 | 0.622 | | | |
| 201 - 800 | 2.33 | 0.91 - 5.98 | 0.078 | | | |
| 801 + | 0.82 | 0.42 - 1.59 | 0.553 | | | |
| K6 psychological distress | 1.00 | 0.96 - 1.06 | 0.869 | | | |
| EUROHIS-QOL ^d | 0.98 | 0.74 - 1.28 | 0.869 | | | |
| Additional help-seeking behaviour ^{c,e} | | | | | | |
| No (referent) | 1.00 | - | - | 1.00 | - | - |
| Yes | 2.40 | 1.34 - 4.28 | 0.003 | 2.27 | 1.22 - 4.22 | 0.009 |
| PGSI problem gambling severity | 1.00 | 0.95 - 1.06 | 0.890 | | | |
| Treatment goal | | | | | | |
| Quit altogether (referent) | 1.00 | - | - | | | |
| Quit problem gambling activities | 1.51 | 0.76 - 2.99 | 0.242 | | | |
| Cut back problem gambling activities | 0.77 | 0.465 - 0.39 | 0.465 | | | |

| | | | | | | |
|--|-------------|--------------------|--------------|-------------|--------------------|--------------|
| Problematic gambling activities | | | | | | |
| EGMs+others (referent) | 1.00 | - | - | | | |
| EGMs only | 1.14 | 0.65 - 2.02 | 0.642 | | | |
| Internet use (hours) ^f | 1.16 | 1.00 - 1.33 | 0.045 | 1.19 | 1.02 - 1.40 | 0.030 |
| AUDIT-3 alcohol use | 0.88 | 0.69 - 1.11 | 0.278 | | | |
| Substance use frequency ^c | 0.95 | 0.88 - 1.03 | 0.206 | 0.96 | 0.89 - 1.04 | 0.291 |
| Readiness rulers | | | | | | |
| Importance | 1.14 | 0.94 - 1.38 | 0.191 | 1.10 | 0.89 - 1.36 | 0.359 |
| Readiness | 1.14 | 0.88 - 1.48 | 0.322 | | | |
| Confidence | 0.99 | 0.90 - 1.08 | 0.748 | | | |
| URICA readiness to change ^g | | | | | | |
| Pre-contemplation | 1.07 | 0.77 - 1.49 | 0.680 | | | |
| Contemplation | 1.14 | 0.79 - 1.64 | 0.483 | | | |
| Action | 1.23 | 0.98 - 1.56 | 0.075 | 1.13 | 0.88 - 1.46 | 0.329 |
| Maintenance | 0.95 | 0.76 - 1.19 | 0.674 | | | |
| Interaction term | | | | | | |
| Sex X Age group | 1.44 | 1.09 - 1.90 | 0.009 | 1.40 | 1.04 - 1.87 | 0.024 |

^a Variable selection based on $p < 0.25$ from univariable analyses and interaction terms.

^b Age groups in continuous form.

^c Based on previous 30 days.

^d First item only.

^e Includes high-intensity interventions, low-intensity interventions, and self-directed actions.

^f Based on average weekly use for work/personal/education/recreation.

^g Selected items.

Mechanisms or processes of change

A secondary aim of this study was to identify the processes or mechanisms that are responsible for changes in gambling outcomes following the GAMBLINGLESS program. Hypothesised process of change measures included GRCS gambling-related cognitions, AACRI behavioural coping with gambling temptations, readiness rulers (importance, readiness, confidence), URICA readiness to change, and BSCQ gambling-related self-efficacy. In this study, we explored the degree to which these measures changed over the course of treatment and the presumed reciprocal causation between G-SAS gambling symptom severity (primary outcome) and these measures from a temporal perspective using cross-lagged panel models.

Change in process measures

The descriptive statistics for all process measures at all time-points can be found in Appendix 1. For the process measures, the average number of outcome assessments per individual was 2.3 (Range, 1 - 3) and a total of 185 observations. The results from linear mixed models are shown in Table 17 (between group differences) and Table 18 (within group differences).

No significant between groups differences were identified for any of the process measures at 2-month or 3-month follow-up, with the exception of the confidence ruler scores at the 3-month follow-up. A statistically significant difference was identified between the two groups on this measure, whereby GSD participants experienced a greater increase (improvement) compared to PSD participants ($p = 0.027$). An exploration of this effect separately between the intervention groups revealed that the GSD group, but not the PSD group, demonstrated a significant increase from baseline to the 3-month follow-up ($p = 0.002$).

In addition, analysis of within intervention group effects revealed that the GRCS gambling-related cognitions total score decreased (improved) from baseline to the 2-month follow-up ($p < 0.001$) and from baseline to the 3-month follow-up ($p = 0.001$); the AACRI behavioural coping with gambling temptations total score increased (improved) from baseline to the 2-month follow-up ($p = 0.004$) and from baseline to the 3-month follow-up ($p = 0.001$); and the the BSCQ self-efficacy total scores increased (improved) from baseline to the 2-month follow-up ($p < 0.001$) and from baseline to the 3-month follow-up ($p < 0.001$). In contrast, the readiness ruler scores decreased (deteriorated) from baseline to the 2-month follow-up ($p = 0.010$).

Table 17. Change in process measures (between group differences)

| Outcome | Time-point | Unadjusted estimate (SE) | | Estimated between-group difference (95% CI) | p |
|--|------------|--------------------------|--------------|---|--------------|
| | | PSD | GSD | | |
| GRCS gambling-related cognitions total | Baseline | 18.76 (0.94) | 19.02 (1.10) | 0.26 (-2.59, 3.11) | 0.858 |
| | 2-months | 12.01 (1.09) | 14.05 (1.34) | 1.76 (-1.69, 5.22) | 0.316 |
| | 3-months | 14.28 (1.07) | 14.84 (1.35) | 0.36 (-3.11, 3.83) | 0.837 |
| AACRI coping with gambling temptations | Baseline | 5.68 (0.47) | 6.26 (0.33) | 0.58 (-0.54 - 1.70) | 0.311 |
| | 2-months | 7.46 (0.62) | 8.33 (0.41) | 0.21 (-1.45 - 1.88) | 0.800 |
| | 3-months | 7.78 (0.56) | 8.44 (0.41) | 0.14 (-1.46 - 1.73) | 0.867 |
| Importance rule | Baseline | 9.13 (0.23) | 9.60 (0.16) | 0.46 (-0.07 - 1.00) | 0.091 |
| | 2-months | 8.75 (0.33) | 8.49 (0.32) | -0.80 (-1.78 - 0.19) | 0.113 |
| | 3-months | 9.09 (0.34) | 8.49 (0.43) | -0.83 (-2.0 - 0.33) | 0.160 |
| Readiness ruler | Baseline | 9.50 (0.17) | 9.71 (0.13) | 0.21 (-0.20 - 0.63) | 0.316 |
| | 2-months | 8.69 (0.33) | 8.72 (0.29) | -0.15 (-1.01 - 0.71) | 0.733 |
| | 3-months | 8.66 (0.45) | 8.73 (0.40) | -0.22 (-1.36 - 0.93) | 0.711 |
| Confidence ruler | Baseline | 5.95 (0.52) | 5.62 (0.38) | -0.33 (-1.58 - 0.92) | 0.606 |
| | 2-months | 6.77 (0.66) | 6.26 (0.48) | -0.18 (-1.95 - 1.59) | 0.839 |
| | 3-months | 5.71 (0.61) | 7.39 (0.49) | 1.95 (0.22 - 3.68) | 0.027 |
| URICA readiness to change | Baseline | 9.92 (0.40) | 10.67 (0.33) | 0.75 (-0.26, 1.75) | 0.146 |
| | 2-months | 8.79 (0.54) | 9.87 (0.42) | 0.33 (-1.21, 1.88) | 0.671 |
| | 3-months | 9.35 (0.53) | 10.43 (0.44) | 0.32 (-1.23, 1.88) | 0.684 |
| BSCQ gambling-related self-efficacy | Baseline | 46.13 (3.84) | 49.40 (2.77) | 3.27 (-5.75 - 12.29) | 0.477 |
| | 2-months | 64.09 (4.80) | 64.96 (3.58) | -2.44 (-13.53 - 8.65) | 0.667 |
| | 3-months | 61.30 (4.71) | 67.19 (4.05) | 2.46 (-9.29 - 14.21) | 0.682 |

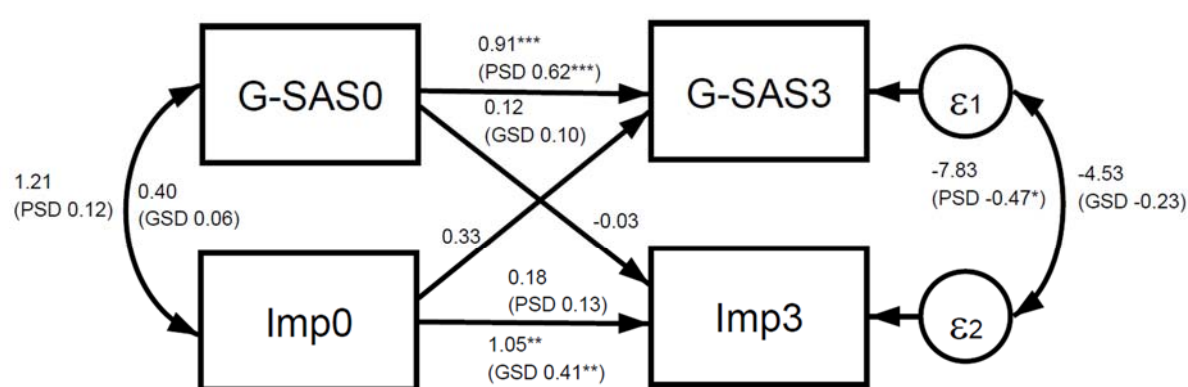
Table 18. Change in process measures (within group differences)

| Outcome | Baseline | 2-months | | | 3-months | | |
|--|--------------------------|--------------------------|--|------------------|--------------------------|--|------------------|
| | Unadjusted estimate (SE) | Unadjusted estimate (SE) | Estimated within-group difference (95% CI) | p | Unadjusted estimate (SE) | Estimated within-group difference (95% CI) | p |
| PSD intervention | | | | | | | |
| GRCS gambling-related cognitions | 18.76 (0.94) | 12.01 (1.09) | -6.75 (-8.64, -4.86) | <0.001 | 14.28 (1.07) | -4.48 (-6.32, -2.65) | <0.001 |
| AACRI coping with gambling temptations | 5.68 (0.47) | 7.46 (0.62) | 1.78 (0.40, 3.15) | 0.011 | 7.78 (0.56) | 2.10 (0.82, 3.38) | 0.001 |
| Importance ruler | 9.13 (0.23) | 8.75 (0.33) | -0.38 (-1.11, 0.34) | 0.295 | 9.09 (0.34) | -0.04 (-0.79, 0.70) | 0.907 |
| Readiness ruler | 9.50 (0.17) | 8.69 (0.33) | -0.81 (-1.43, -0.18) | 0.011 | 8.66 (0.45) | -0.84 (-1.70, 0.01) | 0.054 |
| Confidence ruler | 5.95 (0.52) | 6.77 (0.66) | 0.83 (-0.57, 2.22) | 0.245 | 5.71 (0.61) | -0.24 (-1.55, 1.07) | 0.719 |
| URICA readiness to change | 9.92 (0.40) | 8.79 (0.54) | -1.13 (-2.34, 0.08) | 0.067 | 9.35 (0.53) | -0.57 (-1.75, 0.61) | 0.343 |
| BSCQ gambling-related self-efficacy | 46.13 (3.84) | 64.09 (4.80) | 17.96 (9.24, 26.68) | <0.001 | 61.30 (4.71) | 15.17 (6.64, 23.70) | <0.001 |
| GSD intervention | | | | | | | |
| GRCS gambling-related cognitions | 19.02 (1.10) | 14.05 (1.34) | -4.97 (-7.72, -2.22) | <0.001 | 14.84 (1.35) | -4.18 (-6.97, -1.40) | 0.003 |
| AACRI coping with gambling temptations | 6.26 (0.33) | 8.33 (0.41) | 2.07 (1.08, 3.10) | <0.001 | 8.45 (0.41) | 2.18 (1.20, 3.17) | <0.001 |
| Importance ruler | 9.60 (0.16) | 8.49 (0.32) | -1.10 (-1.81, -0.40) | 0.002 | 8.49 (0.43) | -1.10 (-2.01, -0.20) | 0.017 |
| Readiness ruler | 9.71 (0.13) | 8.72 (0.29) | -0.99 (-1.58, -0.40) | 0.001 | 8.73 (0.40) | -0.98 (-1.78, -0.18) | 0.017 |
| Confidence ruler | 5.62 (0.38) | 6.26 (0.48) | 0.64 (-0.47, 1.76) | 0.258 | 7.39 (0.49) | 1.78 (0.64, 2.91) | 0.002 |
| URICA readiness to change | 10.67 (0.33) | 9.87 (0.42) | -0.79 (-1.78, 0.19) | 0.115 | 10.43 (0.44) | -0.24 (-1.26, 0.78) | 0.647 |
| BSCQ gambling-related self-efficacy | 49.40 (2.77) | 64.96 (3.58) | 15.56 (8.58, 22.53) | <0.001 | 67.19 (4.05) | 17.79 (9.90, 25.67) | <0.001 |

Cross-lagged panel models

A cross-lagged panel design was used to provide information about presumed reciprocal causation between G-SAS gambling symptom severity (primary outcome) and the hypothesised process variables. All of the separate cross-lagged models showed acceptable fit. For all models, there were no statistically significant cross-lagged paths. Baseline gambling symptom severity did not have a statistically significant effect on 3-month follow-up process measures; and baseline process measures did not have a statistically significant effect on 3-month follow-up gambling symptom severity. The path coefficients indicated that gambling symptom severity was more stable for PSD than GSD at a statistically significant level for all models, with the exception of that for BSCQ gambling-related self-efficacy: importance ruler ($p < 0.001$, readiness ruler ($p = 0.008$), confidence ruler ($p = 0.012$), GRCS gambling-related cognitions ($p = 0.002$, AACRI behavioural coping with gambling temptations ($p = 0.013$) and URICA readiness to change ($p = 0.007$).

Two of the models (importance ruler and GRCS gambling-related cognitions) are provided for illustrative purposes. The intervention group-moderated cross-lagged paths model for G-SAS gambling symptom severity scores and importance ruler scores showed acceptable fit as indicated by fit indices (Figure 13). Based on post-estimation tests for invariance across group, all structural parameter estimates were set to be equal except for the effect of baseline G-SAS scores on 3-month follow-up G-SAS gambling severity scores and baseline importance ruler scores on the 3-month follow-up importance ruler scores. No equality constraints were placed on the variances or covariance. The constrained model fitted as well as the saturated model (no constraints and no degrees of freedom) as indicated by the non-significant χ^2 statistic. The path coefficients indicated that gambling symptom severity was more stable for the PSD intervention than the GSD intervention at a statistically significant level. For GSD participants, the small autoregressive coefficient means that there has been a substantial rearrangement of individual positions on the G-SAS construct over time. For GSD participants, the construct relating to the importance ruler was more stable from baseline to the 3-month follow-up than PSD participants at a statistically significant level. Results for cross-lagged paths indicated that baseline G-SAS symptom severity scores did not have a statistically significant effect on 3-month follow-up importance ruler scores and the reverse path was also non-significant (i.e., 3-month follow-up G-SAS scores were not a consequence of baseline importance ruler scores).

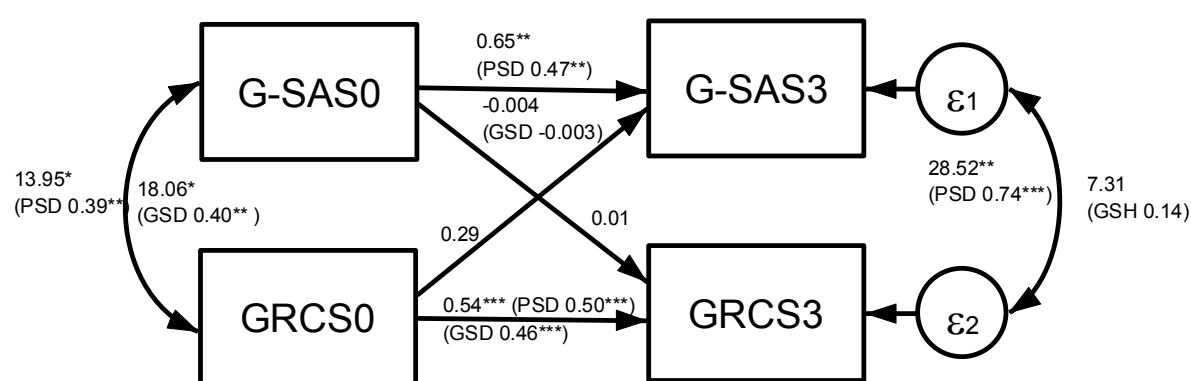


Fit statistics: $\chi^2(2) = 0.18$ ($p = 0.914$), RMSEA = 0.000, CFI = 1.00, N(PSD)=38, N(GSD)=42, Standardized estimates in parentheses.

Figure 13. Estimated model for cross-lagged panel relating G-SAS gambling symptom severity and the importance ruler by intervention group

Note: Time points: Baseline (0), 3-month follow-up (3).
 (***) $p < 0.001$ *** $p < 0.01$

The cross-lagged paths model for G-SAS gambling symptom severity scores and GRCS gambling-related cognitions showed acceptable fit as indicated by fit indices (Figure 14). Based on post-estimation tests for invariance across intervention group, all structural parameter estimates were set to be equal except for the effect of baseline G-SAS gambling symptom severity scores on 3-month follow-up G-SAS gambling symptom severity scores. No equality constraints were placed on the variances or covariance. The constrained model fitted as well as the saturated model (no constraints and no degrees of freedom) as indicated by the non-significant χ^2 statistic. The path coefficients indicated that gambling symptom severity was more stable for the PSD intervention than the GSD intervention at a statistically significant level. For GRCS gambling-related cognition scores, the path coefficients indicated that gambling-related cognitions were stable for both the PSD and GSD interventions at a statistically significant level. Results for cross-lagged paths indicated that baseline G-SAS gambling symptom severity scores did not have a statistically significant effect on 3-month follow-up GRCS gambling-related cognitions total scores and the reverse path was also not significant (i.e., 3-month follow-up G-SAS gambling symptom severity scores were not a result of baseline GRCS gambling-related cognitions total scores). The correlated errors for the PSD intervention were statistically significant, which indicated that some variance in post-treatment G-SAS gambling symptom severity scores was not accounted for by baseline G-SAS gambling symptom severity scores; and GRCS gambling-related cognitions total scores were correlated with some variance in post-treatment GRCS gambling-related cognitions total scores that was not accounted for by baseline G-SAS gambling symptom severity and GRCS gambling-related cognitions total scores. The cross-sectional association between baseline G-SAS gambling symptom severity and GRCS gambling-related cognitions total scores were significantly correlated for the PSD and GSD interventions.



Fit statistics: $\chi^2(3) = 2.87$ ($p = 0.413$), RMSEA = 0.000, CFI = 1.00, N(PSH)=38, N(GSH)=42, Standardized estimates in parentheses.

Figure 14. Estimated model for cross-lagged panel relating G-SAS gambling symptom severity and GRCS gambling-related cognitions by intervention group

Note: Time points: Baseline (0), 3-month follow-up (3).
 (***) $p < 0.001$ *** $p < 0.01$ * $p < 0.05$

Acceptability and feasibility of the GAMBLINGLESS program

Program evaluation

Completion and helpfulness of activities

Built within the GAMBLINGLESS program was a rating system designed to examine the degree to which activity was completed and the helpfulness of each activity. Participants were asked to rate, using a 5-star rating scale, the degree of helpfulness of each completed activity. The proportion of participants who completed each activity in the GAMBLINGLESS program was calculated using these star ratings. Overall, 33.0% of participants completed an activity within the GAMBLINGLESS program. This rate of completion was similar across both the PSD (31.4%) and GSD (34.6%) intervention groups.

Presented in Table 19 below is the proportion of participants who completed and rated each activity, and the average helpfulness of each of these activities. Despite each module being accessible, participants appeared to move through the GAMBLINGLESS program in a linear fashion, with a greater proportion of participants completing any activity in module one (31.6%), followed by module two (11.7%), module three (7.8%) and module four (5.3%).

The following activities were rated as most helpful:

1. Module 4 Activity 12 - Coping with my lapses (M=4.5, SD=0.7);
2. Module 1 Activity 8 - Identifying the benefits of gambling less (M=4.3, SD=1.0);
3. Module 4 Activity 14 - Putting it all together (M=4.3, SD=1.0);
4. Module 1 Activity 12 - Deciding to quit or cut back (M=4.2, SD=1.1); and
5. Module 1 Activity 6 - Money I spend gambling (M=4.1, SD=1.2).

In contrast, the least helpful activities across the entire program were:

1. Module 4 Activity 13 - My future (M=1.7, SD=0.6);
2. Module 4 Activity 5 - Managing my urges IV (M=2.0, SD=2.0);
3. Module 4 Activity 4 - Managing my urges III (M=2.6, SD=1.5);
4. Module 2 Activity 13 - Seeking other help (M=2.7, SD=1.6); Module 2 Activity 12 - Solving my problems II (M=2.7, SD=1.4); Module 2 Activity 10 - Learning to relax II (M=2.7, SD=1.5); and
5. Module 1 Activity 13 - Putting it all together (M=2.8, SD=0.8)

Table 19. Completion and helpfulness

| Activity | Completed n (%) | Helpfulness M (SD) |
|--|------------------------|---------------------------|
| <i>Module 1 – Getting Ready to Gamble Less (any)</i> | 65 (31.6) | |
| Activity 1 - Assessing my gambling | 38 (18.5) | 3.6 (1.2) |
| Activity 2 - Understanding my gambling | 43 (20.9) | 3.3 (1.2) |
| Activity 3 - My reasons for gambling | 43 (20.9) | 4.0 (1.0) |
| Activity 4 - My gambling triggers | 39 (18.9) | 3.9 (1.0) |
| Activity 5 - My negative gambling consequences | 23 (11.2) | 3.6 (1.4) |
| Activity 6 - Money I spend gambling | 34 (16.5) | 4.1 (1.2) |
| Activity 7 - Keeping track of my gambling | 30 (14.6) | 3.4 (1.6) |
| Activity 8 - Identifying the benefits of gambling less | 27 (13.1) | 4.3 (1.0) |
| Activity 9 - Knowing my values | 21 (10.2) | 3.9 (1.1) |
| Activity 10 - My future self | 18 (8.7) | 3.8 (1.2) |
| Activity 11 - My readiness to gamble less | 22 (10.7) | 3.9 (1.0) |
| Activity 12 - Deciding to quit or cut back | 28 (13.6) | 4.2 (1.1) |
| Activity 13 - Putting it all together | 27 (13.1) | 2.8 (0.8) |
| <i>Module 2 – Taking Action to Gamble Less (any)</i> | 24 (11.7) | |
| Activity 1 - My confidence to gamble less | 17 (8.3) | 3.7 (1.2) |
| Activity 2 - Knowing my strengths | 16 (7.8) | 3.1 (1.3) |
| Activity 3 - My previous attempts to gamble less | 13 (6.3) | 3.1 (1.3) |
| Activity 4 - Limiting access to gambling venues | 20 (9.7) | 3.4 (1.4) |
| Activity 5 - Guidelines to gamble safely | 19 (9.2) | 3.8 (1.0) |
| Activity 6 - Limiting my access to money | 19 (9.2) | 3.7 (1.1) |
| Activity 7 - My budget | 19 (9.2) | 3.0 (1.7) |
| Activity 8 - My enjoyable activities | 17 (8.3) | 3.5 (1.0) |
| Activity 9 - Learning to relax I | 16 (7.8) | 3.1 (1.6) |
| Activity 10 - Learning to relax II | 15 (7.3) | 2.7 (1.5) |
| Activity 11 - Solving my problems I | 16 (7.8) | 2.9 (1.5) |
| Activity 12 - Solving my problems II | 15 (7.3) | 2.7 (1.4) |
| Activity 13 - Seeking other help | 15 (7.3) | 2.7 (1.6) |
| <i>Module 3 – Thinking Differently to Gamble Less (any)</i> | 16 (7.8) | |
| Activity 1 - How my thoughts affect my gambling | 14 (6.8) | 3.4 (1.6) |
| Activity 2 - Adjusting my gambling thoughts | 15 (7.3) | 3.7 (1.2) |
| Activity 3 - The gamblers fallacy thinking trap | 13 (6.3) | 3.7 (1.3) |
| Activity 4 - The illusion of control thinking trap | 14 (6.8) | 3.4 (1.2) |
| Activity 5 - The prediction thinking trap | 14 (6.8) | 3.5 (1.4) |
| Activity 6 - The chasing thinking trap | 14 (6.8) | 3.7 (1.2) |

| | | |
|--|-----------------|-----------|
| Activity 7 - The positive expectancies thinking trap | 12 (5.8) | 4.1 (1.1) |
| Activity 8 - The near miss thinking trap | 11 (5.3) | 3.5 (1.4) |
| Activity 9 - The low self-confidence thinking trap | 12 (5.8) | 3.7 (1.1) |
| Activity 10 - The explanation thinking trap | 12 (5.8) | 3.3 (1.1) |
| Activity 11 - The selective memory thinking trap | 12 (5.8) | 3.8 (1.2) |
| Activity 12 - Changing my thoughts I | 11 (5.3) | 3.6 (1.2) |
| Activity 13 - Changing my thoughts II | 12 (5.8) | 3.5 (1.3) |
| Activity 14 - Putting it all together I | 10 (4.9) | 3.7 (1.0) |
| Activity 15 - Putting it all together II | 12 (5.8) | 3.7 (1.0) |
| Module 4 – Gambling Less for Good (any) | 11 (5.3) | |
| Activity 1 - Recognising my gambling urges | 8 (3.9) | 3.5 (0.9) |
| Activity 2 - Managing my urges I | 5 (2.4) | 3.2 (1.6) |
| Activity 3 - Managing my urges II | 8 (3.9) | 3.6 (0.9) |
| Activity 4 - Managing my urges III | 5 (2.4) | 2.6 (1.5) |
| Activity 5 - Managing my urges IV | 3 (1.5) | 2.0 (2.0) |
| Activity 6 - Identifying my high risk situations | 4 (1.9) | 3.8 (1.3) |
| Activity 7 - Coping with my high risk situations | 0 (0.0) | NA |
| Activity 8 - The willpower breakdown | 3 (1.5) | 3.0 (2.0) |
| Activity 9 - My seemingly irrelevant decisions | 3 (1.5) | 3.7 (1.5) |
| Activity 10 - My decision consequences | 3 (1.5) | 3.3 (1.5) |
| Activity 11 - My reminder card | 3 (1.5) | 3.3 (1.5) |
| Activity 12 - Coping with my lapses | 2 (1.0) | 4.5 (0.7) |
| Activity 13 - My future | 3 (1.5) | 1.7 (0.6) |
| Activity 14 - Putting it all together | 4 (1.9) | 4.3 (1.0) |

Therapeutic alliance with guide

In the two-month follow-up assessment, participants were asked to complete the short form of the Working Alliance Inventory (WAI-S). For participants in the PSD intervention, a response of 'not applicable' was provided as these items directly assessed the therapeutic relationship between participants allocated to the GSD intervention and their allocated Guide.

The average score on the total WAI-S was 61.4 (SD=11.9), where the possible maximum score is 84. Examination of the WAI-S subscales (maximum score of 28 each) indicated that the Bond scale had highest average score (M=22.2, SD=4.5), followed by the Task subscale (M=19.9, SD=6.0) and the Goal subscale (M=19.4, SD=4.0). These results suggest participants felt that they had developed a fairly strong personal bond with their Guide, and rated that the level of agreement between their Guide and themselves in relation to their treatment goals and how to achieve said goals was not as strong.

Perception of the GAMBLINGLESS program

The Internet Evaluation and Utility Questionnaire was used to measure participants' perceptions and experience of the GAMBLINGLESS program. Overall, 47 participants completed this questionnaire,

however, several participants indicated that some of the items did not apply to them as they did not complete any or most of the GAMBLINGLESS program. As such, the percentages provided below are based on the number of participants who indicated that these items were applicable to them and could provide responses relating to their perception of the program.

- **Ease of use:** When asked how easy the program was to use, 32 participants (76.2%) indicated that it was mostly or very easy to use.
- **Convenience:** Similarly, 30 participants (71.4%) thought the program was mostly or very convenient to use.
- **Engagement:** Just over half of the participants (n=24, 58.5%) indicated that the GAMBLINGLESS program mostly or very much kept their interest and attention.
- **Layout:** Most participants (n=26, 65.0%) indicated that they mostly or very much liked the look of the program.
- **Enjoyment:** Over-two thirds (n=29, 69.1%) of participants indicated that they mostly or very much liked the program.
- **Privacy:** Few participants (n=6, 14.6%) indicated that they were mostly or very concerned about their privacy when using the GAMBLINGLESS program.
- **Satisfaction:** Over two-thirds (n=27, 67.5%) indicated that they were mostly or very satisfied with it the GAMBLINGLESS program.
- **Acceptability:** Just over half of the participants (n=23, 57.5%) responded that they mostly or very much thought the GAMBLINGLESS program was a good fit for them.
- **Usefulness of information:** Most participants (n=28, 70.0%) indicated that the information provided in the program was mostly or very much useful.
- **Comprehension of information:** The majority of participants (n=32, 82.1%) reported that the information in the program was mostly or very easy to understand.
- **Credibility:** In addition, 75.6% of participants (n=31) indicated that they could mostly or very much trust the information in the GAMBLINGLESS program.
- **Likelihood of returning or re-use:** Most participants (n=31, 73.8%) stated they were mostly or very likely to return to use the program.
- **Mode of delivery:** The majority of participants (n=31, 77.5%) stated that the internet was mostly or very much a good mode of delivery.
- **Helpfulness of program:** Participants were asked two open-ended questions to determine the most and least helpful parts of the program. Seven participants (14.9%) stated that these items were not applicable to them as they had not completed any or enough of the program.

In response to the open-ended questions in the Internet Evaluation and Utility Questionnaire, several participants (n=8, 17.0%) stated that the most helpful part of the program was the guides and the emails they received. In addition, several participants (n=6, 12.8%) noted that the fact that the program was online and convenient to use was most helpful to them. Moreover, participants (n=6, 12.8%) stated that helpful parts of the GAMBLINGLESS program were the activities that aided in their

understanding of their gambling, including, why they gamble, how much they actually gamble, and their feelings when they gamble. Some participants stated that the most helpful parts of the program were: the information provided in (n=3, 6.4%), knowing that there is help available (n=3, 6.4%), and that the program was so easy to use and follow (n=3, 6.4%). Several participants also noted that the GAMBLINGLESS program helped them take that first step to change (n=3, 6.4%). Lastly, other factors that were identified as helpful by a single participant were: the videos, the goal setting activity, the managing urges activities, the privacy, and the stories within the activities.

When asked about the least helpful parts of the program, several participants (n=14, 29.8%) indicated that there was no part of the no program they did not find helpful. Several participants noted that they did not like parts of the look of the program, including the graphics and the colours. The least helpful aspect for two participants (4.3%) were the technical issues they faced (e.g., lack of compatibility with Android). In addition, two participants in the PSD intervention (4.3%) noted that the lack of interaction was not helpful for them. Similarly, one participant allocated to the GSD intervention stated that there was not enough guidance. Two participants (4.3%) also noted that they would have liked more time to complete the program. While only mentioned by one participant, other factors that were not helpful included: the winning strategies and beliefs sections, keeping a diary, lack of engagement (i.e., lost interest), the program was too long, and the information was too basic.

Additional needs from treatment

Participants were asked to rate on a scale from 1 (definitely no) to 10 (definitely yes), with a mid-point of 5.5, further needs from treatment after participating in the GAMBLINGLESS program. These responses were also dichotomised into: (1) not an additional need from treatment based on ratings of 5 or less; and (2) an additional need from treatment based on ratings of 6 or more.

The average rating for each additional treatment need statement and proportions are provided in Table 20 below. The most commonly reported additional needs were learning how to relax better (n=33, 71.7%), improving physical health (n=32, 69.6%), learning skills to keep from returning to gambling (n=31, 67.4%), helping to overcome boredom (n=29, 63.0%), and finding enjoyable ways to spend free time (n=28, 60.9%).

In contrast, the least reported additional needs were help with legal problems (n=8, 17.4%), help to stop or decrease use of alcohol, tobacco or other drugs (n=13, 28.3%), talking about personal problems (n=16, 34.8%), advice about financial problems (n=18, 39.1%), and help with sleep problems (n=18, 39.1%).

Table 20. Additional needs from treatment

| Statements | M (SD) | n (%) |
|--|-----------|-----------|
| I want to learn some skills to keep from returning to gambling | 6.8 (3.4) | 31 (67.4) |
| I would like to talk about some personal problems | 4.5 (3.4) | 16 (34.8) |
| I want help to decrease my stress and tension | 5.6 (3.2) | 25 (54.3) |
| I want help with depression or moodiness | 5.1 (3.5) | 20 (43.5) |
| I want to work on my spiritual growth | 4.8 (3.4) | 19 (41.3) |
| I want to learn how to solve problems in my life | 5.4 (3.3) | 25 (54.3) |
| I want help with angry feelings and how I express them | 5.0 (3.4) | 23 (50.0) |
| I want to have healthier relationships | 5.8 (3.3) | 26 (56.5) |
| I want to learn how to express my feelings in a more healthy way | 5.1 (3.4) | 23 (50.0) |

| | | |
|---|-----------|-----------|
| I want to learn how to relax better | 6.2 (3.3) | 33 (71.7) |
| I want help in overcoming boredom | 5.9 (3.4) | 29 (63.0) |
| I want help with feelings of loneliness | 5.2 (3.4) | 25 (54.3) |
| I want help to stop or decrease my use of alcohol, tobacco or other drugs | 3.7 (3.4) | 13 (28.3) |
| I want advice about financial problems | 4.5 (3.3) | 18 (39.1) |
| I want help in setting goals and priorities in my life | 5.0 (3.2) | 22 (47.8) |
| I would like to learn how to manage my time better | 5.1 (3.4) | 22 (47.8) |
| I want to find enjoyable ways to spend my free time | 6.0 (3.5) | 28 (60.9) |
| I need help in getting motivated to change | 5.3 (3.5) | 24 (52.2) |
| I would like to improve my physical health | 6.5 (3.2) | 32 (69.6) |
| I want help with sleep problems | 4.6 (3.3) | 18 (39.1) |
| I want help with legal problems | 2.9 (3.0) | 8 (17.4) |

In-depth interviews

Two sets of semi-structured, in-depth interviews were undertaken to further explore the experiences of gamblers, as well as the guides, who engaged with the GAMBLINGLESS program. The interview schedules included 24 questions related to the GAMBLINGLESS program. In addition, gamblers in the guided self-help were offered an additional four questions investigating that experience. Guides were offered an additional 10 questions related to the experience of being a guide on the GAMBLINGLESS program.

Participant (gamblers) and guide responses were analysed using thematic content analysis (Braun & Clarke, 2006). This included reading and then rereading transcripts, generating a list of initial codes and collating data relevant to each code and then collating initial codes into potential themes. Each theme was then presented under each of the questions asked of participants.

This section first describes the characteristics and experiences of eight gamblers accessing the GAMBLINGLESS program (four from each intervention group). It then describes the characteristics and experiences of seven guides providing guidance and support to gamblers accessing the GAMBLINGLESS program.

Participant interviews

Interviews were conducted with eight participants from the pragmatic RCT. These interviews were conducted from August 2016 to October 2016. This coincided with completion of the 2- and 3-month follow-up data collection, and termination of access to the 14-week GAMBLINGLESS program for all study participants.

Descriptive statistics of participants (gamblers) can be found in Table 21. Four participants received guidance and four accessed GAMBLINGLESS as pure self-directed. The majority of participants (n=7, 87.5%) started the program and completed at least one activity, with three participants completing all of the activities. One participant was unaware of how to access the program content and therefore never moved beyond the pre-intervention questionnaire.

Table 21. Characteristics of participants (gamblers)

| Participant ID | Intervention | Gender | Age group | State of residence |
|----------------|--------------|--------|-----------|--------------------|
| GSD01 | GSD | Female | 60+ | TAS |
| GSD02 | GSD | Male | 35-39 | VIC |
| PSD03 | PSD | Female | 60+ | SA |
| GSD04 | GSD | Female | 45-49 | VIC |
| PSD05 | PSD | Female | 50-54 | WA |
| PSD06 | PSD | Female | 50-54 | WA |
| PSD07 | PSD | Male | 35-39 | VIC |
| GSD08 | GSD | Male | 35-39 | WA |

Opinions of GAMBLINGLESS program

Participants were asked to report aspects of the GAMBLINGLESS program that were helpful. Participants also reported their overall opinion of the program and specific factors that were helpful, unhelpful or perceived as missing from the program.

Overall helpfulness

Participants reported the overall helpfulness of the GAMBLINGLESS program. The majority of participants (n=5) reported the program was helpful in terms of changing their gambling. However, two participants indicated the program was not helpful. For one participant, this was because of difficulties in being able to access to program.

Yes, I did... It was instrumental because it made me stop and think about what I was actually doing and what I needed to do to stop. (PSD03)

...think I did all the modules that was required but I found some of them really helpful and others maybe not as much... (PSD06)

No. [the program did not work for me]... I know finishing the program wouldn't have changed anything. What has to change is me. (GSD08)

Overall impressions of the program

Participants were asked to report what they liked and disliked about the program. There was variability in participants' experience and impressions of the program. One of the key issues that arose was related to the length of the program and the amount of information and text within it. For example, some participants stated that the program was too long and had too much information. For others, the program was too intensive. However, some participants thought the program was comprehensive and had the right amount of information.

I thought it was pretty comprehensive... to hold my interest, there must have been just the right amount because if there was too much text in there I wouldn't have been bothered with it, too much rambling I wouldn't have been bothered with it. (PSD03)

Several participants stated that, at times, the content of the program was confronting. Interestingly, some participants reported this as a negative aspect of the program. Others, however, found the

intensity of content to be a difficult but helpful component that encouraged deeper thought about patterns of gambling.

It just got too intense to the point where you just didn't want to do it. (GSD01)

It made you think a lot... found them at times challenging, challenged me, but overall it was good. (PSD03)

...but you still have to face what's happened. A lot of the stuff I've done, I don't really want to remember because there's been marriage break-ups and nearly prison terms over some of the things I've done, so I'm not really... It is hard for me to have to face it. (PSD05)

Helpfulness of specific activities and techniques

Participants were asked to recall specific techniques or activities that they found helpful or unhelpful. Several participants (n=3) could not recall specific techniques due to the length of time between completing the program and the interviews.

That's really hard because it was such a long time ago but I remember – I'm just trying to think because it was a while ago. (PSD03)

As I said there's nothing that I can remember like oh that part or that thing changed my life (GSD08)

Those participants who could recall some of the activities noted that the introductory videos were helpful. This was because it made the program feel more personable and encouraging.

And I liked the videos that were in it, just the welcome videos and the fact that you made it personable and you weren't just faceless people in a university. It made it more personal. (PSD05)

I liked the videos. I thought they were quite encouraging. It sort of gave that human element to it. (PSD07)

Other activities that participants recalled as being helpful included finance-based activities, activities that encouraged openness and honesty with people in order to assist with limiting access to money for gambling, and alternate enjoyable activities.

There are times when they ask you to do things like print a budget... I did print that up and it works. (GSD01)

...being open with people, not having basically dodgy bank account - I think I read that in there somewhere - and just being open and transparent with people... looking at my reasons for and the rationale and the strategies bit I really liked... what I got out of it and looking at danger sort of - and motivations and when I did and danger periods for me. So I know there's certain activities - I shouldn't go to sort of gaming venues by myself. I don't do that anymore. (PSD07)

...when you had the thought in your head that you were going to gamble like what you could do to distract yourself. Like to sort of change the way that you're thinking about the gambling. Because of course when you lose and then you go back next time you forget how much you lost, how much time you spent, all that sort of stuff so I think just changing my way of thinking before I actually went. So going back through things in my head that I might have read on those modules. I found that helpful. For me anyway. (PSD06)

When asked to report activities that were unhelpful, the majority of participants stated that the unhelpful activities were the ones that did not necessarily apply to them. However, they understood why they were in the program as they may apply to others.

Well, some of them were – I think they asked you did you gamble to be sociable because I'm not sure – I think in the eastern states maybe – well, for me it's like poker machines and I live in WA so I can only go one place to play them which is probably lucky but I think over in the eastern states it's more a social thing. I think maybe people go out for dinner and those poker machines are everywhere. Like in all clubs and whatever. Maybe that. I didn't really see it as a sociable thing. (PSD06)

For me - and I get what you guys were getting at - you're looking at sort of other life stressors which is contributing to gambling. For me, that didn't apply and my mood hadn't changed and I wasn't depressed and all that sort of stuff but I understand why that was in there. (PSD07)

Specific activities that were identified as unhelpful were due to the confronting nature of the activity.

When I got into the personality part, describing yourself and that sort of thing, strengths and weaknesses etc.... I think there was too much in it. (GSD01)

This is how serious I was about doing it, but I couldn't answer all those questions, emotional, financial, family, social, leisure, work, study, health and legal problems, because I've had them all and I've had them really bad... (PSD05)

Changes in gambling and other areas of life

Participants were asked to report changes that occurred over the course of participating in the GAMBLINGLESS program. Participants reported a range of changes including changes in gambling, relationships and finances, as well as personal change (i.e., change in oneself).

Over half of the participants (n=5) reported some change in their gambling behaviour across the course of the program that related to their treatment goal. Treatment goals varied, including stopping or reducing gambling, maintenance of abstinence, gaining insight in to their gambling problems and using the program as an outlet.

I didn't gamble at the time I was doing it. (PSD03)

Look I certainly did [see changes in my gambling]. I thought it was wonderful. Some insight and there's some good strategies I thought for me was looking at when I gambled excessively and not putting myself in positions where I would do that in the future. So that was for me the really good thing. (PSD07)

However, at the time of the interviews, some participants (n=2) had returned to problematic gambling behaviours and others reported their gambling had never changed (n=3).

I think I ended up just burning myself out. Then I returned to gambling. (PSD05)

I stopped because I guess you start to think that you're better and you're over it... there are times that I have gone back and probably overindulged in certain things a little bit too much. (GSD02)

To be honest, I'd say none [changes in gambling]. (GSD04)

Participants were asked about any changes they may have noticed in their finances since participating in the GAMBLINGLESS program. The majority of the participants (63%) reported changes in their

finances, including now being able to pay bills on time and a noticeable change in their available money.

Instead of spending money I didn't have, I was more economical. I'd pay all my bills and save a certain amount, but I'd just spend the rest. (GSD01)

...and then I had money in the bank, and all my bills were under control and I had money in the bank. (PSD05)

I still have debts associated with my gambling and I guess I will for a long time but I've noticed that I've got more money to spend. (PSD03)

I'm not so stressed about how can I pay this? What can I pay first? (PSD06)

Personal changes were also reported in these interviews. For most participants, changes in overall quality of life such as better sleep or mental health were not noticed (n=5). However, two participants reported changes in gambling behaviour were associated with improved quality of life. This included, greater self-esteem, less guilt, reduced depression and anxiety, better sleeping and eating, and general improvement in well-being.

Apart from the fact I've given up gambling, it has given me more self-esteem. It has made me feel better about myself. It has made me feel like I can be honest with people again. And I just feel like I'm living a proper life. That's what it has given me. (PSD03)

Yeah, not so anxious. Just sleeping better. Eating better. Just feeling better in myself. Big changes, yeah. (PSD06)

While few relationship changes were identified throughout these interviews (n=3), a common theme did arise, whereby relationships improved due to increased openness and honesty where gambling was previously hidden.

I think I've been able to maintain friendships easier because while I was gambling I didn't want to have friendships in case people realised what I was doing behind closed doors but now I can feel – the friend that I've sort of kept at arm's length, I can now bring out and be real friends with and be open with them and be able to go out and do things with these people that I've always held at arm length. (PSD03)

I don't have any guilt anymore, and that's a combination of doing the GAMBLINGLESS and the Gambling Help Online. I don't carry that guilt because I think well there are so many people who are out there that have done this, that are still struggling with it exactly the same way I am, and you just seem to single yourself out. And because I sort of dropped that guilt and just started behaving a lot more normally, my relationships got better with people. (PSD05)

Lastly, participants were also asked to report any changes for the worse they may have experienced during the GAMBLINGLESS program. Only one participant stated that while she stopped gambling and has been able to maintain abstinence, she replaced her gambling behaviours with overeating.

Well, that's a tricky one to answer because I think because I – I don't know if you lose something you've had in your life for a long time you try – some people might be able to just lose that and not replace it with anything else but I've replaced it with overeating. And I have. Because trying to fulfil – trying to replace with I've lost I eat. That's my reward. (PSD03)

Other help-seeking

One of the key themes that arose from these interviews was that participants in the GAMBLINGLESS program had sought other forms of help, prior to, during, and/or after their participation in the program. The majority of participants (n=7) had sought at least one other form of help for their gambling and other issues, with four of these participants seeking multiple forms help (e.g., face-to-face counselling, Gamblers Anonymous, self-exclusion, blogs, 100 day challenge).

Some participants sought help after participating in the GAMBLINGLESS program. This included calling the Gamblers Helpline or starting a program with a counsellor. However, most participants sought other help before or during the GAMBLINGLESS program.

Attribution of change

Participants were asked to think about how the aforementioned changes came about. They were asked to think about whether the changes in their gambling, finances, personal lives and relationships were due to their involvement in the GAMBLINGLESS program or whether there were other factors that contributed to change.

Some participants viewed the GAMBLINGLESS program as the main reason for the change that occurred in their gambling and other areas of their lives.

I think it was probably unlikely [achieving change in gambling without participating in the program]. (PSD03)

However, where change occurred, the majority of participants (n=4) attributed change to a combination of help-seeking activities, which included the GAMBLINGLESS program.

that's a combination of doing the GAMBLINGLESS and the Gambling Help Online (PSD05)

...but I wasn't really good at the face to face meetings and stuff so I think the online thing [GAMBLINGLESS and 100 day challenge] for me was better. (PSD06)

Several participants reported that making the decision to change was an important factor that contributed to changes in their gambling behaviour and other areas of their life.

I guess the fact is when you get to that point that you've made the decision to start something, you're sort of going to take that on as it should be a scenario that should improve. I guess a lot of it's your mindset at the time... (GSD02)

I think the program gave me, I guess, the impetus, the starting point and some insight and then there was probably the support of my wife that certainly helped in the process and it was probably about me wanting to change myself a little bit as well so a combination of all that. (PSD07)

Look and feel of the program

Understanding and trustworthiness of information

Participants were asked to report how easy the information in the program was to understand and whether they trusted the information provided. Overall, most of the participants thought the information in the program was easy to understand.

Yes, but I think it was fairly standard. Anybody could understand it. (GSD01)

I think its simplicity. It was easy to follow... (PSD03)

Some struggled with some of the text being too academic and educational at times, which led to a loss of interest in the program.

But my problem was, I think it became too academic towards the end. (GSD01)

I have no issue with reading but it's just purely the fact that I get bored quite easily... I looked at it and thought it's full-on or a bit - a lot of educational stuff.... again I don't have a problem with that but it's just purely that it wasn't for what I was looking for. (GSD02)

All participants trusted the information provided in the program, with some participants specifying that the Deakin University affiliation and referral source contributed to that trust.

I went to Deakin so that made me feel comfortable I think. (PSD07)

...well, the other lady sort of gave me that website and stuff so I trusted her... (PSD06)

Navigation and ease of use

When asked about the ease of use and navigation of the program, the majority of participants (n=6) stated that it was an easy program to navigate and use.

...it was easy enough to navigate around, easy enough to find, easy enough to pick up where you left off. (PSD03)

That was reasonable with the menu and the little modules... (GSD01)

Yeah, I didn't think I had any issue with that. I don't think there was ever a problem with the whole getting out of it and how easy it was to get into. (GSD02)

However, one participant found that the program was difficult to use when the entire activity did not fit on one page (i.e., had to scroll down to see entire activity).

...it was easier sometimes to do it on Word and then copy into there... It's too hard, it's fiddly. You just can't see it all. (PSD05)

Privacy and convenience

Overall, participants did not have any concerns about their privacy when using the GAMBLINGLESS program. Only one participant indicated some hesitation at the start of the program.

To start with, I did, but then I figured it's not going to be on here and who can access it anyway so it didn't bother me after a while. (PSD03)

When prompted further, only one participant expanded on the reason why they had no concerns with privacy and attributed, in part, to the limited personal information collected through the program.

Not really because ... I just think you're not really putting any – too much personal information in there. (PSD06)

In addition, when prompted, further several participants revealed that the privacy and anonymity that comes along with the use of an online program was the reason they signed up, which was advantageous as many of the participants indicated that they were hiding their gambling problem from family or friends.

At the start, again, I was looking for something where I could - I didn't want to tell anyone that I was having issues so I could get online and get away from it so that was fine. (GSD02)

Well, yeah, I think it's really important because when I started doing it no one was aware that I was doing it and I did it on a Monday night and my wife has a girls' night that night. She goes out to dinner and stuff and they watch Pretty Little Liars and all sorts of horrible things and it was good because that was my time. I logged in and I know I could do it just on the computer and no one knew about it and that was important. That's why I probably looked for something online as opposed to maybe calling someone and that was brilliant. (PSD07)

Some participants also indicated that the appeal of this type of online program was avoiding the stigma and judgement that comes along with being a gambler.

I've been reading blogs, talked to people a little bit. It's something very personal. You don't really want to talk too much about it because then everybody's like oh he's a gambler.... you have the privacy between you and a program instead of you and the public. (GSD08)

This theme also arose when participants were asked to think about the convenience of the program. Some participants reported the program was convenient because they could do it from the privacy of their own home and at their own time and pace.

It was okay, being that I live on my own and didn't really have to worry about it being on the computer. (GSD01)

And plus the fact you can do it in your own time. I have rheumatoid arthritis so sometimes I don't want to go out, I just want to stay home, and I prefer to do everything online. (PSD05)

Future use of program

Participants were asked to think about whether they would ever use the GAMBLINGLESS program again. The majority of participants (n=5) stated that they would use it again, with one of these participants stipulating that they would only if there was no time restriction to access to the program.

Absolutely [would return to use the program if available in the future]. (PSD03)

In addition, the majority of participants indicated that they would recommend the GAMBLINGLESS program to others (n=6).

Yeah, I would recommend it to other people if I knew they had a problem or they just need that little bit of extra help. I think it did help me stop gambling definitely. (PSD06)

Yes, I would recommend it, especially the fact that I got emails from somebody. That was one of the biggest helps. (GSD08)

In fact, one participant had already recommended the GAMBLINGLESS program on Gambling Help Online.

...I actually did recommend the program on Gamblers Help Online. (PSD05)

Only one participant indicated that he would not recommend the GAMBLINGLESS program to others because he felt that it was not suited to the type of people he knows.

Probably not.... I guess the experience I've had is that the people that I know that I would say have an issue with gambling aren't educational based people. They're more tradies or more

warehouse staff and if I told them to try and help themselves with this they should go through an online program and try to study a way to help I just don't think that they would be interested at all. (GSD02)

Guidance

Helpfulness of guidance

Participants in the GSD intervention reported the helpfulness of email guidance received throughout the trial. In addition, participants in the PSD intervention were advised that some participants received emails throughout the trial and were asked if that type of support would have been helpful.

Of the four participants allocated to the GSD intervention, only one found the guidance they received to be helpful.

They were a real person. A real person who tried to help me and then helped me to give me the strength to try to move forward. (GSD08)

When prompted further, this participant stated the guidance he received was helpful in stopping gambling but was not helpful in increasing his use of the program.

... more about don't do it. (GSD08)

In contrast, the remaining three GSD participants did not find the guidance helpful as they did not feel like the person providing the guidance was real. They felt like the emails were automated and did not feel a connection between themselves and the guide.

I just felt with the emails that I was getting a form email back, that they weren't reading mine. It was like an automated response. You're saying it wasn't, but that is what it felt like... I didn't feel connected to anybody. (GSD01)

... But again impersonal emails at times... (GSD02)

Other issues noted by some participants, in relation to the email guidance they received, was response time for the weekly email was lengthy, and that the emails themselves were too long.

...the emails seemed to take a bit of time to respond. (GSD01)

...but there was also trouble with the emails were clearer. I think that they would be better if they were a bit shorter... (GSD04)

When asked whether this type of support would have been helpful, half of the PSD participants (n=2) indicated that it would have been helpful for them.

Yes... Well it would have kept me on track... (PSD05)

Furthermore, one of the PSD participants found it hard to respond whether she would have found email guidance helpful as she was already receiving that kind of support from a fellow participant, who recommended the program to her.

I can't really say because I had that other lady that was helping and we're still in contact now. We've sort of made a friendship out of this but I just found her helpful. I might have needed help if I didn't have her help. (PSD06)

Overall, all of the participants, whether they received guidance or not, stated that some kind of support and encouragement is important and should be included in future versions of this program. Most participants noted that having any support or encouragement would be helpful.

Just some encouragement or something like that. (GSD01)

...you virtually do it on your own because you don't want people to know and so any support you get, any support you get, is encouraging... and if you know someone is out there behind you it is very important so yeah, you need to keep that up for sure. (PSD03)

In addition, participants stated that having someone check in on them and reinforcing what they are doing in the program would make them feel accountable and help keep them on track.

If we've got someone to be accountable for us, that helps us. I'm going to show her I can do it... we gain a lot of support out of that because we won't want to let you down. (GSD04)

That somebody was trying to help me. So you feel committed to try yourself too. (GSD08)

If you haven't got someone that sort of reinforces what you're doing that you're doing the right thing. (GSD02)

... kept me on track, like how are you going, what are you up to, what are you having problems with? Instead of me having to initiate that. (PSD05)

Guidance mode of delivery

Participants from both intervention groups were asked to think about their preferred method for receiving guidance. The majority of the participants (n=6) stated that their preference would be to receive guidance via email due to convenience and fewer privacy concerns, with some participants concerned about privacy if receiving text messages.

No, emails is good. You can do it in your own privacy. You can read it when you're able to. (GSD08)

For me email and that's for a multitude of reasons. Text message - my phone personally is on - I work in an open office and I wouldn't want that sort of content being flashed up on my phone. I don't think anyone would see it but I think privacy wise it would be an issue. (PSD07)

I think email, yeah. Because if you really want to commit and do something then you will check your email, you know what I mean, and you might not want to get SMS to your phone and stuff like that. I think email for me. (PSD06)

Three of these participants indicated that in addition to emails, guidance could include some text messages or occasional, but scheduled, telephone calls.

Well, I guess that's a personal thing. I like emails. I like to be able to read the email but then sometimes text messages too. I personally prefer emails. (PSD03)

Yeah, I think to start off obviously with a gambler like myself, an email, you talk to the same person "this is Jenny", so you feel like that person cares about you and maybe you could work out with them they can call you once a week just for two minutes "have you gambled this week". (GSD04)

Maybe email most part, but maybe every fourth contact being a phone call. Because phone calls will be a bit too much all the time... (PSD05)

Some participants, however, expressed concerns around receiving guidance via telephone. These concerns related to privacy and feeling uncomfortable with this method of delivery.

With me it depended on how I was feeling. Sometimes I didn't really want to talk to anyone anyway so a message at least I knew I was still getting that support and still having contact with someone without actually having to speak to anyone. (PSD03)

Now I'm having this conversation with you, I have to be away, I have to walk away as I don't want anybody to listen to this. Even talking too long I just feel uncomfortable. (GSD08)

Lastly, one participant stated that their preferred mode of guidance was via online chat (i.e., instant messaging) through the program.

I think you can do it without email... I don't know if the program can allow you to have an online chat, just a response as you were going through it... Either that or just when you go back into the program, somebody has had a look at what you've done and left a note for you. (GSD01)

Participants were also asked to think about who they would prefer to receive guidance by (e.g., a professional gambling counsellor, a peer, and automated emails). Half of the participants did not have a preference between a professional or lay person.

I guess it depends on your level. If you were just a lay person, a lay person wouldn't matter, but if you're a professional, you probably need something a bit stronger. (GSD01)

... I don't care if it's a professional or a lay person. (PSD03)

No, it won't make any difference [who delivered the guidance] (GSD08)

Some participants (n=3) preferred a peer, with only one participant preferring a professional.

Definitely a lay person. Definitely... So it is another – it is a fellow gambler that understands a gambler. (PSD05)

I'd like to think for me personally from a professional just because for me I think I'd respond better to that... (PSD07)

Overall, the majority of the participants highlighted that it was important that whoever provides guidance is a real person and that it is not automated. Participants stated that automated guidance emails would not be an effective method of delivering guidance for them.

Yeah, an automated thing doesn't do a lot for me. (PSD07)

...if they're just automated then you're not going to do anything... (PSD05)

Recommendations for improvement

Throughout the interviews, participants highlighted several areas that they thought would help improve the program. This varied across participants, indicating that treatment and program requirements may vary depending on the individual.

Improvements in the content and program delivery

One of the recurring suggestions related to financial strategies. Three participants indicated that they would have preferred additional money-related strategies or that these strategies should be placed upfront.

I think some strategies, how to hang on to it, what to do with it, what to do with money when you get. Just how to manage it really. (PSD03)

...From the start of the program you should tell people to - what I did and it helped a little bit was you cancel the accounts so they're self-excluding. That helps... (GSD08)

Another common suggestion related to accessing the program and relevant information. Two participants noted that accessing the modules, and more importantly the information and techniques that they wanted should be easy and immediate (i.e., not having to wade through irrelevant information before accessing information relevant to them). Suggestions to improve this varied with one participant suggesting that a visual aid that directs people to relevant information would be useful.

I definitely think that there needs to be something to try and help you get in there when you're in there. When you first start it there needs to be some type of I think visual aid to keep you going rather than going straight into the documents or words or something like that. (GSD02)

In contrast, another participant suggested that they would prefer a link to the program that gives them immediate access with as little reading as possible.

...but just a pretty basic click on the link and follow the thing. A brief description obviously if you are in the initial one but after that, pretty much for me, will just be click the link to go into your thing. (GSD04)

Other suggestions for improving the content or delivery of the program were: (1) adding comment boxes or not applicable response options; and (2) adding post-care sessions to the program to help with maintaining change.

If you had a box where you can make a comment, it would have been better or even if it said 'If you don't want to answer this, go the next one'. (GSD01)

I'd probably like to see a shortened maintenance aspect added to it and look I don't know if you guys are thinking about that but if down the track there was even a one session or a two session or a check-in I'd really like that and I'd probably get onto that straight away. (PSD07)

Improvements in guidance

Suggestions for improving guidance varied across the participants. A common theme that did emerge related to the content of the guidance emails. Three participants indicated that the content of emails was important in terms of feeling supported. This suggested emails needed to be tailored to the individual and include specific knowledge of where they are up to in the program.

It'd be nice to say "oh, we see that you're up to module 2 and you've got up to question such and such, how are you feeling" or whatever. Just a little bit more, you know. (PSD05)

Yes, more tailored. (GSD08)

In addition, one participant suggested that guidance emails, especially towards the end of the program, need to be more specifically tailored around future plans and dealing with triggers to assist with maintenance of change.

One at the end around probably what we're talking about now. Future plans, directions, maintenance sort of stuff, creating plans around danger periods and all that sort of stuff just to sort of cement what you've already been working on so as a bit of a sort of conclusion at the end. During it just checking in and seeing how you're going. (PSD07)

Relatedly, two participants indicated that a personal relationship and bond with the guide is important. In order to improve this, it was suggested that the guides should be peers and matched with participants based on various factors, such as, age, gender and preferred gambling activity as they are more likely to gamble in similar ways and develop a bond.

Yeah, I think even someone that has just been through it and has got similar experiences. Because it's sort of like a common bond with someone... like all the different ages deal with gambling differently. Like a younger person – I mean because they're more probably on their phones and whatever gambling, computers gambling, you know what I mean? So I just think you're always going to have a bond with someone similar to your age group... Or men – you know, because some people like gambling on the horses. So if I met someone and they were gambling on horses I might not even understand their gambling addiction because I don't have that one... (PSD06)

Other suggestions for improving guidance were: (1) a live online chat option that is available 24/7; (2) immediate responses by guides; and (3) support embedded within the program (e.g., pop-up affirmations).

While you were going through it, you could chat to somebody and say "What does this mean" and "What are you really looking for?" and "Can I skip this", because if you don't have an online chat, you're stopping and starting because then you email someone and say "I don't get this"... If you don't have online chat, maybe some little pop up affirmations or something... (GSD01)

Guide interviews

Interviews were conducted with seven guides providing support for the pragmatic RCT. These interviews were conducted in August 2016 and had an average duration of 44 minutes (range 26 to 86 minutes). This coincided with completion of being a guide for the GAMBLINGLESS program for all guides. Descriptive statistics of the participating guides can be found in Table 22 below.

Table 22. Characteristics of guides

| Guide ID | Gender | Location | Service type |
|----------|--------|--------------|--------------|
| Guide 1 | Male | Regional Vic | Face-to-face |
| Guide 2 | Female | Metro Vic | Face-to-face |
| Guide 3 | Female | Metro Vic | Face-to-face |
| Guide 4 | Female | Regional Vic | Face-to-face |
| Guide 5 | Male | Metro Vic | Face-to-face |
| Guide 6 | Female | Regional Vic | Face-to-face |
| Guide 7 | Female | Metro Vic | Online |

Opinions of GAMBLINGLESS program

Guides were asked to report in an overall sense the helpfulness of the GAMBLINGLESS program. Responses were broadly aligned with overall program helpfulness, helpfulness of guidance, helpfulness of specific activities.

In terms of overall helpfulness, there was a perception by most guides that the program was professional and well presented. Guides stated that the program had a good structure, was straight forward, nicely packaged and made sense. Another guide noted the whole program including training and supervision was professional and well organised.

They were very nicely packaged for them, so I didn't have to package it up, put it in order. That helped, so I didn't have to go shuffling around to find the relaxation page, it was just all there. (Guide 4)

Well, I think the easiest thing was that I felt the whole arrangement around it was well organised. It was professional. Everything. The training we went to was professional, and it was also very positive working with Stephanie and the others. Everything about it I found to have a really constructive feeling to it, and for me that's really important on a personal level, so everything about that reassured me. (Guide 5)

Guides also noted that the program was good for gamblers who were not always able to attend face-to-face treatment. Another noted that program was a good resource that could be used when needed with clients. This guide reported that it would be good to be able to refer clients back to the program when needed.

There was limited information provided on specific elements of the program that were helpful. As previously suggested, this was due to limited exchange with participants.

Not that I think it was not working, it's more that I don't have much impact information. I didn't get much feedback. People did not make contact. I think I might have spoken to one person on the phone, but only ever heard one voice, and a few email exchanges with a few people, so I have nothing to base that on. (Guide 5)

One guide was also sceptical that the program impacted any change. One guide stated that this was because of the lack of face-to-face interaction. They stated that they would need to see evidence that it worked before being confident in the effectiveness of online treatments (including this program).

I have no evidence to be confident that that format is going to be helpful for clients at the moment based on my experience. I'm a little bit sceptical at one level about whether that format would be therapeutic for people because I'm a face to face counsellor and I think a lot happens when you sit with a person that doesn't happen when a person sits in front of a screen and does something like that. I need to see it work before I'd be confident that it would work. (Guide 1)

Guides did, however, note that they thought specific parts of the program were helpful. These included:

A very structured way of thinking and problem solving. (Guide 1)

Good depth in terms of talking about the emotional aspects of gambling. (Guide 2)

Urges and being able to recognise what their triggers were. (Guide 4)

I really liked all the self-care, I think that just humanises things. I think it's quite a human and caring sort of approach. I found it optimistic in a way. (Guide 4)

Guides also expressed views on the overall helpfulness of guidance. They stated that it was potentially positive and potentially a value-added service. This was because it was easy to ask questions and it appeared that, for at least some participants, support was appreciated. Some guides suggested that just knowing there was someone available for support could make a difference, especially to those that might lack social support.

I know from previous experience that just because they're not accessing that support person, doesn't mean they're not grateful for them to be there. It is a tricky one, I guess, being a guide and not getting any email exchanges to think that they really care all that much. But I do know from personal experience with working on services that clients can still be really grateful for knowing that somebody is there in case they really need them. (Guide 3)

Guides were asked whether they would recommend the program to other clients. The overall majority of guides said that they would recommend the program to clients as well as to other counsellors. However, this was typically in the context of offering it as an adjunct to other treatment, incorporating it into treatment sessions or encouraging clients to undertake the program as homework between sessions.

I felt that I would really like to be able to offer it again to more people. I felt that I could offer it to more people from having had this experience. (Guide 4)

Observed changes in gambling and other areas of life

Guides were asked to report changes that they observed occurring in participants over the course of participating in the GAMBLINGLESS program.

Overall, guides were reticent in reporting change to participant gambling symptoms over the course of the trial. The main reason for this was a lack of communication, information from participant emails, and from the overall GAMBLINGLESS program. In terms of communication, three guides stated that they could not comment on observed changes in gambling because there was no contact established for the majority of their allocated participants. Where initial contact had been established, guides noted that again that there was very limited interaction or contact for the majority of participants.

I couldn't really answer that question because with most of them, there wasn't really anything to go on. A couple of them, although I didn't have exchanges with, appeared, to continue to use the program because they still answered those few questions that were at the end of the module, so I could see whether the gambling had increased or decreased based on those questions. But for the majority, I had no information to go on, so I simply wasn't able to know. (Guide 3)

Guides also reported multiple participants were gambling during the trial. This was based on emails that described what had happened and the up and down journey of attempting to change. For example, one guide noted that some participants expressed disappointment that they had gambled and they had discussed the experience. This guide recounted the participant's account of winning and losing and their regret at not having walked away with winnings. While there was information on the change process recounted in the email, it was challenging for the guide to comment on whether change was being made.

Where information had been provided in the modules or via email, there was some doubt from the guides as to the reliability of this evidence. For example, one guide noted that they had very little information and had to rely on the gamblers accounts of whether they were improving:

There wasn't a real lot to go on, so all I could base it on was whether they were telling me that their gambling was improving or not. (Guide 3)

This guide went on to explain that they noticed inconsistency in how the module questions were completed. For example, some participants completed the modules in a short period of time (less than a week). At the end of each module was a self-assessment of urges and money spent gambling to help participants track their progress. The guide noted that there was change to the self-assessment that did not seem possible in the short time period.

One guide reported two participants had contacted them to say that the program had not worked for them. The first stated that the program did not really give them the strategies that they were looking for and the second reported that they were going well but had returned to gambling. Another guide suggested the reasons for no change was because the participants allocated to them did not complete the components of the program.

I don't think mine benefited from the program. Whether a lot of them didn't really do it properly or didn't do it, that's another question. Because I remember looking – you can look into their profiles and see how much progress they made, and a lot of them hadn't done any progress at all. So overall, as a general sense, I don't think my people got help out of it. (Guide 7)

Attribution of change

Guides were asked to reflect on the attribution of change to gambling that was reported by participants. For the most part, the guides said it was difficult to attribute change directly to the program. This was because of the apparent lack of engagement of the participants with the program (as indicated by self-assessment information) and also because of the lack of engagement with the guide.

Where there was change reported this was attributed to disclosure to family and friends and also access to other treatment and support options. One guide noted that their participant reported improved symptoms and they attributed this to both the program as well as attending 12-step meetings.

That was just the positive changes in his life I think he was talking about, that he hadn't been tempted to gamble, and he hadn't actually gambled since February, and he was emailing me in May to say that he was gambling free without temptation, and then talking about the extra support he's also gained, so it wasn't just the program, he also was attending GA meetings as well. (Guide 6)

User suitability

Guides described a range of possible user characteristics that could mean GAMBLINGLESS would be a good fit. The most frequent comments were that users needed to have access to a computer or mobile device and that they had sufficient technical expertise that they could navigate and use the program. Multiple guides also commented that the program would be most suitable to those who were able to communicate in writing and in English language. Guides described this type of suitability as well educated, able to articulate ideas and thoughts verbally, and with an adequate literacy level.

Related to this, guides suggested demographics that may impact suitability included age (younger rather than older) and geographic location (regional or remote versus metropolitan). Guides did not

think gender would influence the suitability of the user for the program. Guides did, however, think feelings of shame or stigma or anxiety might make the program especially suitable for some gamblers. This was because of the relative anonymity of the program, as well as not having to physically meet with a counsellor.

Multiple guides suggested the program would be most beneficial to those who were highly motivated. Guides reported the program appeared to be targeted towards those who had already made the decision to change. One guide suggested that a combination of high self-awareness, literacy and motivation were necessary requirements:

A reasonably high level of self-awareness, somebody with a reasonably high literacy level, and somebody with a reasonably high level of motivation to want to make the change because even though there are aspects of the program that encourage motivation, I think the person has got to come at it with that. (Guide 3)

Conversely, guides listed a range of different gamblers for whom the GAMBLINGLESS program may not be beneficial. This included those with severe or complex problems (versus moderate problems) or serious vulnerability, mental health or legal problems. One guide suggested one reason why the program may not be suitable to people with complex problems was because of them being in a state of crisis or distress. This was because it may be difficult for distressed gamblers to sit and work through a CBT program without professional oversight.

So probably not people who are in a lot of chaos and distress at that particular time because it requires a lot of cognitive organisation to work through an online program like that. (Guide 1)

While some guides had stated that geographic isolation was a reason for accessing an online program, others thought this was also a drawback. For example, two guides commented that isolation contributed towards the development of gambling problems. One guide reported that undertaking treatment online meant that no one else needed to know about the gambling problem. This was viewed as a potential impediment to successful change. Another guide thought connecting with others was a necessary part of recovery and that those drawn to online programs were avoiding connecting with others.

I think possibly people who are drawn to this kind of program are thinking, well, you know, I'll fix my problem and nobody needs to know about it but I think that's actually quite hard to do. I think the human contact can be really supportive because gambling does just cause such a wound in people's psyches. They often feel so much shame and isolation around it. (Guide 1)

Guides commented on the importance of good screening to determine user suitability prior to entry into the program. There was a strong discussion on user commitment by one guide, which suggested participants were not fully aware of what they were signing up to when entering the program.

I just seem to think that that appears to be a weak point in the process that it's got a superficial engagement and consent but it hasn't managed to attract people who are committed to the process. (Guide 1)

Look and feel of the program

Privacy, convenience and trustworthiness of program information

Guides were asked to report how easy the information in the program was to understand and whether they trusted the information provided. All guides reported that they trusted the information provided in the program. This was framed in terms of the program appearing friendly and easy to access. One

guide reported the program trustworthy because there was a sign-in process. This was perceived as increasing confidentiality and security of information.

You've got your login email and your password, and someone's got to be able to get those and you would assume with the site, being an official site, that you're safe and secure (Guide 6)

Further to this, another guide noted that access to the program online meant users did not need to take information sheets or materials to their home. This meant greater privacy in terms of materials that might be found by a family member at home. Another guide noted that participants could also clear their internet history to further protect their privacy.

Guides described the program as highly accessible and convenient. This meant users could engage with the program at home or anywhere there was internet access. They could also do it at their own pace and with or without concurrent counselling.

That they could just do that in their own space and review it and reflect in their own time. I think that's an important thing for people, especially if they're in the early stages of getting help, or later stages maybe. (Guide 4)

This was important for one guide from regional Victoria who reported that some gamblers could not regularly travel to face-to-face appointments. Instead, online appointments could provide access to treatment in between sessions or as an adjunct when travel was an issue.

One guide noted that this convenience also provided access to information and strategies at a time it was most useful. This guide stated that the program could be a useful relapse prevention strategy, for example.

If they are using it on their tablet – if they're in a position where they're thinking about going, if they can quickly look up information online, log into the program and remind themselves of what they need to do or what they can do, that is incredibly useful. (Guide 3)

Multiple guides noted the importance of access to the program from a tablet or mobile phone. For some, this was expected in a way similar to other products and services. One guide noted however that they expected gamblers had completed the program on a PC rather than a mobile device.

It actually didn't really cross my mind that some people might have been using it on a tablet or on their phone. I am, perhaps, a little too old school of thinking to use it on anything but a PC but I think that it's highly convenient... (Guide 3)

In terms of trustworthiness of the program, most guides said that they perceived the program as trustworthy. One guide reported the program appeared trustworthy because of the program content. This was because they liked the inclusion of specific content including budgeting, relaxation and self-monitoring. They also reflected that there was a sense of hopefulness about the program.

Three guides reported the program was trustworthy because of links to a credible team and university affiliation. Specifically, this was associated with the program developers as being knowledgeable in the area of problem gambling. Another guide commented that the inclusion of a university affiliation demonstrated trustworthiness especially for younger people.

Does it say it's related to the university on their introductory information? Because if it does, I think that gives – and maybe I'm just showing my age saying that, that I would find that much more credible if, as it is, if it's connected to universities, and to the gambling foundations and

so on. Young people are fairly savvy about – aren't they usually, about working what's shonky and what's legitimate. (Guide 5)

Program content

Six out of the seven guides reported the content was valuable. Overall, guides viewed the content positively. Indeed, multiple guides reflected that not only was the content suitable for gamblers but also for the guide. This was because of new information about CBT for gambling and tips for treatment.

I believe it was helpful to each of those people, from the little bits that we had with them. For me as a counsellor, it was also really helpful. (Guide 4)

Guides stated that the overall program content was comprehensive and framed in an accessible way (clear, straightforward and broken down into manageable parts). Furthermore, guides reported the topics were good and accessible to those at various levels of readiness to change. They also reported the content appeared broadly accessible to those at a year 9 or 10 reading level and could also be accessible to people with English as a second language.

Two guides differed in their views on the extent of the program content. One guide reported the program was thorough and covered important issues.

I thought it was a pretty thorough program, having worked in the area and the sort of things you might work with, with clients. It was a pretty good coverage. It didn't seem too over the top and it didn't seem too overwhelming, at least I didn't think so. I thought it was a pretty good coverage in terms of what somebody would need to, at least make a good genuine go at, whether it was cutting back on their gambling or stopping. (Guide 3)

Conversely, another guide thought the program was too extensive and could be overwhelming for users. It was perceived as overwhelming because of the number of activities within each module. However, as indicated below, the guide perceived the amount of work per module as manageable. They also noted users should be actively encouraged to make time to undertake the work of the program.

Well it does look long. It does look very long. As a client, it could be quite overwhelming, but when you actually open it up, it's not much per activity. So I'm just looking in module one for the first week, and you look at it, and you're like, "Oh my goodness, they've 13 activities," but it's actually not a lot expected in those 13 activities. So I suppose it's about making sure that the client actually does have enough time to sit down and do it. (Guide 6)

Navigation and progress through modules

Overall, there were only positive reports of navigation through the program. Guides noted that it was well set out and there were no problems navigating it.

One guide did, however, note that ease of navigation might depend on familiarity with the medium and technical knowledge. Videos were reported as helpful in making the content more interesting and also the welcome video helped in understanding how to navigate the site. In terms of moving between different parts of the program, guides said it was straightforward and easy to get from one section to the next.

Overall there was a positive response to the look and feel of the program. Guides described it as neutral, pleasing, not offensive, sensibly balanced, and appropriate; they also liked the visual aids.

It was very professional, but it was also easy for me or for clients to understand (Guide 6)

One guide reported it helpful to download the entirety of the program and print it out for easier reading. This guide noted that printing the program was a way of navigating and keeping track of where participants were in relation to program content.

I couldn't keep up with that so I downloaded everything so I had the books in front of me, printed out. I used that as a general reminder, and that's what I'm looking at now. So I think along the way that helped me to be on track with where they would be up to, and I kept my own tracking system for exactly where they would be up to. I'm just looking at the pages, to me they're click and tick sort of boxes, and things to read and have a little reflection on. (Guide 4)

Two guides reflected on the amount of text in the program. The first commented that it is likely reflective of the nature of CBT and that the program contained a reasonable amount of text to explain the process of change in thoughts. However, another guide reported that the program was text-heavy and potentially off-putting to some participants.

Guides commented on the order to which program modules should be offered to users. All agreed that users should have immediate access to at least some of the content but for the most part, there was a view that access should initially be limited. For example, one guide stated that there should be more control over how users approach and interact with the program content.

I didn't think was particularly useful was the fact that all of the modules were available straight away for them to do in whatever order they saw fit. I think when you have an online program, it's actually helpful to make it a bit more step-by-step, rather than 'okay, here it all is. Go for it, do what you want'. (Guide 3)

This guide went on to explain that the reason for stronger guidance in the order of modules was so that important elements such as goal setting is undertaken before attempting to implement strategies.

Experiences of being a guide

This section explores the experiences of being a guide on the GAMBLINGLESS program. It reports on the interactions of the guides with the participants of the program and whether they would want to do it again, their perceived role as a guide, and the content of emails to and from participants. This section also reports on the experiences of training and supervision when working on the GAMBLINGLESS program.

Overall, most guides would consider participating in the program again. This was because it was a good opportunity to learn new skills and techniques. Two guides reported that they were challenged by the modality but that it was a positive experience.

Oh well it pushed me to get involved with something technological and I'm a bit – I'm not someone who – I put my hand up deliberately because I think I'm more or less a luddite. I don't know if you're allowed to admit that. So, I'm pretty hopeless on this stuff so it was fantastic, fantastic, for me. So it was a very personal decision that, yeah, I wanted to do this, to push myself, to get involved. (Guide 5)

So, I was a bit challenged at the start but then I sort of felt that I grew a bit as a counsellor, because there's a person at the end of here. And just felt like I needed to tune in to who it was. (Guide 4)

However, there was a general sentiment that the role of being a guide was limited and there was a preference for the role being redefined if they were to participate again. Firstly, there was annoyance and frustration in terms of the lack of engagement from most participants and this meant the guide felt that their skills were not being under-used. Second, some guides stated that the role was mostly administrative rather than counselling.

It ended up being mainly administrative work really. So actually I guess in that way it's getting in the way of my actually doing the counselling work that I want to do so I'm a bit in the middle of terms of whether I would want to do it again. (Guide 2)

Third, guides with extensive experience in counselling reported role conflict in terms of what they could or should be doing with participants versus the activities as confined to their role.

I probably found it more harder to be just a guide, because I've been doing counselling for Gamblers Help for 13 years, so not to be able to step into counsellor mode, and refer them off to the 1800 number, or to the website, found it actually a bit different for me, I suppose you could say? So I found it quite limiting as a guide of what support you could actually offer them to encourage them, and so forth. (Guide 6)

Experiences of email communication with participants

All guides commented on the infrequency of communication with participants. Most of the emails sent were required by the program rather than initiated by the participant. This means guides sent one email a week for the duration of the program, regardless of whether the participant had responded. Where participants did engage with guides, emails were either administrative (i.e., forgot password or to advise participants of a change in scheduled email contact) or supportive and encouraging of participant engagement with the program.

Emails to participants who did engage with the guide ranged from supportive and encouraging to referral to services. Supportive and encouraging emails including answering questions about the content, encouragement and support (e.g., saying 'you're doing well'), offering help, offering advice related to the content, and providing reminders to complete the next module.

Guides also aimed to support motivation and continued engagement in the program. One guide described the challenges of staying motivated when they experience conflicted priorities.

Making sure that it's really clear to them that there is no such thing as the perfect moment to change. Even though they might be busy, to try and put the really simple things in place, to go through the program and just choose really basic changes to keep the ball rolling because they've accessed the program for a reason, which implies, to some degree, they want to change. So rather than to have started the program and then do nothing, is to try and keep the ball rolling and make sure that they are trying to do something. It doesn't have to be a big thing, just something to keep that desire to change; to keep it present. (Guide 2)

Guides provided referral to a range of services. Referrals were made because of underlying issues, legal issues, psychological distress, mental health issues and financial issues. Referrals were made to Gamblers Help services, including the Gamblers Helpline, general practitioners for a mental health referral, and support groups.

Perceived role as a guide

Guides generally understood and described their role as providing guidance and support. However, the actual conduct of the role varied slightly across guides. One guide described how they connected different parts of the program to current experience. For example, when participants expressed

negative emotions, the guide referred them back to an appropriate part of the program (e.g., relaxation strategies). This guide also noted that the challenges of being a guide was to respect that the participant had chosen this method and it was the role of the guide to support this decision. For the guide, this meant not becoming involved in the participant's journey.

I suppose the easiest thing, in a way is that you really just have to generally monitor how the clients are going and you are kind of not required to go in there, unless the situation becomes serious, you don't really have to be overly involved. That's not really your role as the guide, to get overly involved with the client. You are just there as support. If they do have any questions, then generally your role is really towards the back end of the program. (Guide 2)

However, guides did not always interpret the role in a similar way. One guide noted that their role was to encourage and ensure the content was undertaken. This is similar to many guides who did not appear familiar with all aspects of the program and therefore restricted their activity to support and encouragement and not extending this to linking participants into different parts of the program.

It generally differed based on whether I was getting emails from them. If I were getting emails from them, if they had questions, I would answer them or do my best to answer them. If they didn't have questions, it would more be probably a little bit more on the side of ensuring that they know their contents is being read. So, kind of giving them a little bit of a response to what they have talked about. (Guide 3)

This discrepancy is perhaps why some guides perceived their involvement as helpful while others did not. Guides who perceived themselves as unhelpful said this was because participants did not engage or respond to their emails. One guide noted the lack of contact, combined with the need to stay in touch with participants, was problematic.

And it's like trying to find something a little bit different to say to make it not seem like we're robots. Because, for example, for one week you'll say, "Hi, I'm just checking in to see how you're going. I haven't heard from you. All the best." And then the next week, do you write the same thing and sound like a robot, like you're not a real person? Or you've got to change it up and create something else. And that's tough. And then you got no emails from a lot of people, so doing that each week, that was a bit of a down side for me. (Guide 7)

In contrast, guides who perceived themselves as helpful said participants valued feedback, support and someone checking in with them. Multiple guides said they thought they were helpful just by being available if needed.

I think so. I don't think you can ever really underestimate the importance of somebody being there. As good as pure self-help programs are – and there are a lot of really good ones out there – I still think a therapist or a guide supported program just really has the crucial advantage of having that person being there, should the client need them. (Guide 3)

Content of emails and timing of responses from guides

Email contact with participants was aided by the provision of email templates and a schedule to which guides should be in contact with participants. Email templates were generally used for the welcome email and then weekly reminders to complete the modules and stick with the program.

Well, they started with welcome and introduction to the program and set out a schedule for further email contact, invited contact from the clients with boundaries around how frequently they would receive replies and then emails were specific to where they should be up to at that – the number of weeks post registration. Reminded them where they were up to and usually

reminded them how many weeks to go and then just reiterated the invitation to please contact if any problems along with pointing out that you noticed that you hadn't heard from them, etcetera, and some friendly text around hoping they were not having too many problems but if they were could they please make contact. That was the general gist of the email stream from memory. (Guide 1)

There was a mixed response in terms of email templates. Generally, guides were in favour of them stating that they made everyday communication easier. Templates could be modified and personalised and also tailored to the specific needs of the individual.

And so all the emails, I sent the number that I had to, with every single client. So they sent me a question through. I'd wait until the date that I was meant to reply back, do my normal reply, but adapt it to actually fit what they were actually saying as well. (Guide 6)

However, some guides reported the templates were not sufficiently developed. For example, one guide stated that the template should be easier to personalise but also that it should be built into the guidance system. This guide suggested a technical solution could involve guides being provided a selection of online templates (e.g., week 4). Templates could then be linked to the user record (thereby inserting the user name) with the option to automatically generate personalise content (e.g., name). Furthermore, multiple guides suggested a technical solution to emails could include a system of alerts and a record of emails sent and received.

Conversely, other guides were not positive about templates. This was because they experienced templates as generic and not requiring a clinician involvement.

I'm not really a huge fan of just sending that really generic, almost automated message because, what's the point in me being there. If you want, it could be easier to set up an automated email service. If I could see a little bit more about what their actual progress was, if they were doing anything or not, I think that would be more satisfying. (Guide 3)

There was also discrepancy in terms of scheduling or setting specific times to respond to emails. Some guides reported feeling constrained by scheduling a specific day each week to respond to participants. One guide noted that the benefit of email correspondence was that guidance could be provided at a time that it was most helpful.

I think in terms of the guide, the role of the guide, having the constraint that you respond on the same day of the week was not that great because when somebody sent an email I felt like, well, I want to reply now or I want to reply within a couple of days because leaving it for a week they will have gone off the boil and be thinking about something else. So I may have been missing an opportunity to provide something that's actually relevant for them. (Guide 2)

Furthermore, other guides stated scheduled emails were problematic in terms of sticking to the arrangement. Where there were absences from work due to leave or illness, an email needed to be sent to advise that the email correspondence would occur on an alternative day. This was perceived as creating unnecessary additional work. One guide suggested a response within 48 hours of an agreed time would be more practical.

Other guides were positive towards scheduling emails and viewed this as similar to scheduling client face-to-face appointments. Multiple guides reported scheduling emails as a way of ensuring that they remembered to check the GAMBLINGLESS system and also to send required emails. The benefit of this approach is that users could send emails any time over the week but the guide would respond on the same day at the same time. For the most part, guides let participants know in the initial email which day they would be contacting them each week.

Two guides also noted that scheduling a time for emails meant that there was a clearly demarcated time for undertaking the work of being a guide. Indeed, one guide noted that if they were not allocated specific time to undertake guidance, they would not want to do that work.

Even though emails were scheduled and agreements were made with participants, there were some issues in terms of sticking with the agreement. Multiple guides stated that emails were not always sent at the allocated time because they were not at work. This was due to being part time, on sick leave, annual leave or other priorities take precedent. For these guides, conflict was experienced in terms of managing their role as a guide and managing other work place priorities.

It was difficult as I've mentioned when I had other things on that day, the day that I had committed to do the guide emails a couple of times. (Guide 2)

At one stage towards the end I dropped the ball a little bit so I felt guilty that I didn't follow up quite enough. So, like, I missed a few emails, but I think that was because of personal circumstances, so I don't think it was a structural – there was anything structurally that got in the way. (Guide 5)

Content of emails and timing of responses from participants

Guides reported that the overall frequency of emails from participants was low but this appeared to vary across guides. Two guides reported that they had not received a response from any participants. Conversely, other guides reported up to 40 percent of their allocated participants had sent at least one email. Guides stated that most often just one or two contacts were made, with two guides reporting that participants sent up to four and five emails over the trial period.

The attributed reason for the lack of contact was readiness to change. Guides reported some participants were no longer able to make changing their gambling a priority. This was because of the presence of unexpected events (e.g., family illness) or feeling overwhelmed by the task of change.

I had one person who, every time I'd check in, one lady responded by saying she had some personal things going on in her life, so she couldn't do it. (Guide 7)

There was also some indication that some participants were not aware that emails were from a person. Multiple guides stated that participants had contacted them, apologising for not responding, because they had thought that the emails were computer-generated.

Overwhelmingly, guides reported that the content of participant emails indicated appreciation for support and guidance. This included appreciation for support, knowing that there was someone there and indications of feeling motivated. One guide reported that multiple participants had emailed an acknowledgement and appreciation for support.

Positive. I only got positive, and even if there wasn't much it was just "thank you, nice to know you're there", and that may have been all that was said. So it was just an acknowledgement that they were appreciating some sort of contact. (Guide 4)

Training and supervision of guides

Guides were unanimous in agreeing that there was sufficient training and supervision provided before and during the course of the trial. All guides received training prior to the commencement of the trial. Guides reflected that written materials were sufficient and helpful as was the opportunity to use the site prior to commencing as a guide:

The written material was good and you had a practice site where you could just go in, fiddle around, have a look around, yeah, so by the time I had clients allocated I was quite confident in navigating the system I think. The training for the guides was quite sufficient. (Guide 1)

One guide reflected that the training manual could be reorganised so that it was easier to access relevant information. This could include a flow chart of user pathways through the program and a flow chart on guide requirements. There was also a suggestion that having training materials online and embedded in the GAMBLINGLESS program could be helpful. Alternatively, one guide preferred a paper based system and indicated that a hard copy of the GAMBLINGLESS program would be a helpful addition to training materials.

Supervision and support was offered to the guide from academic program staff throughout the duration of the trial. Some guides exchanged emails when required but did not participate in any group discussions or phone calls. Those that did participate reported the amount of supervision was broadly appropriate for the number of participants allocated.

Integration into service delivery

Overall, there was general agreement that GAMBLINGLESS could, and indeed should, be integrated into service delivery. This was described in terms of expanding the suite of services available to people with gambling problems. Multiple guides noted that while it should be integrated, online services should not be a replacement for face-to-face counselling, but rather an additional option. Guides thought clients should be offered a range of options that could support change.

Online programs can be used either stand alone or in conjunction with groups, or counselling, or reading books. People come in or begin a journey in lots of different ways and think these things are invaluable. (Guide 5)

Guides reported GAMBLINGLESS could be offered concurrently or in tandem with face-to-face or other counselling. One guide suggested doing the program in tandem with counselling could improve motivation and shift control for recovery back to the client.

I think the program's quite useful, but I think it actually needs to be in tandem with something else. So if it was part of a counselling setting, so you're actually giving them a bit of control themselves, that they can go and do this and we can keep talking about it in counselling, so the counsellor knew what was actually happening, then that would actually be quite useful. I don't know whether it's a stand-alone, because they have to be pretty highly motivated to continue doing it, and clearly I didn't have many of them. (Guide 6)

Yep. I mean, it could be like seeing a face-to-face counsellor and the computer program incorporated together. That might even be even more beneficial to people. But just the computer program by itself – yeah, maybe I can understand why people wouldn't take it as seriously. (Guide 7)

Multiple guides reported the program could be another clinical strategy in their toolbox. For some, this was because their agency did not offer or deliver CBT for gambling and for others, it was viewed as a possible way of assigning structured homework. Another guide reported challenges in terms of focusing clients on the work of CBT when there was a multitude of other issues taking priority. They suggested that access to an online program could be a way for clients to talk about their challenges and undertaken a structured program at the same time.

Usually when gamblers come into me I'm dealing with they're hungry, they're homeless, they're emotionally distressed, there's all sorts of emotional stuff happening. So whilst dealing

with the crisis, you don't actually get to a lot of... But getting to actual really good educational stuff can be challenging. So I think to have this as a complementary extra could be really, really helpful. (Guide 4)

However, there were issues raised by one guide in terms of managing therapies with different philosophical and theoretical underpinnings. One guide reported that some counsellors do not practice CBT, thereby raising an issue in terms of how to support a client that undertakes this type of treatment. This guide raised issues around who would support a client undertaking CBT when it was not aligned with the preferred treatment approach.

Well, I think counsellors differing approaches. Some counsellors just don't do CBT focused work. So they might feel like it was an unwarranted disruption – it depends on what is being asked of them in terms of following it up. Does that mean that they then have to discuss what the client has been doing on the GAMBLINGLESS program as part of their session? And if not then that might seem a bit strange as well that they're doing this other completely different work on their gambling in their own time and then working in a different way. I think that could be confusing for the clients. (Guide 2)

One guide reported GAMBLINGLESS could be potentially helpful when other techniques or interventions have failed.

It could be when you're struggling with a client, and they're not actually doing anything, and they're saying they want to change, but nothing's actually happening, maybe some of these could actually work when you've already exhausted your bag of tricks, you could go through this and maybe find something else. (Guide 6)

Integration of GAMBLINGLESS within the counsellor's current role was mostly positive. One guide noted that they were ready to integrate a program like GAMBLINGLESS. One guide stated that they are prepared to offer services across phone, video conferencing and email and that it would be easy to integrate an online program such as GAMBLINGLESS.

We're already prepared to be multimodal as a service so we already do phone work and Skype work and emails that kind of thing so we have the facilities, the IT infrastructure, that's no problem at all and our service model is pretty ready to pick up interventions like this. (Guide 1)

The most significant barriers to service integration were, for the most part, technical and included a seamless client management system and access to client information (see section on future improvements to the GAMBLINGLESS program: client information).

Multiple guides also remarked that in order to integrate GAMBLINGLESS into service delivery, there needed to be evidence on its effectiveness. This included evidence that the program had an impact on gambling outcomes as well as evidence on for which clients the program would work best.

We'd need much more evidence as I say to be confident that it was a good product that worked for people. And maybe this evaluation will hopefully tell us something about that. (Guide 1)

Recommendations for improvement

Throughout the interviews, guides highlighted several areas that they thought would help improve the program. This included the content of the program and the nature of guidance. For the most part, guides were supportive of the content of the GAMBLINGLESS program and reported it as

comprehensive. One guide suggested that given high rates of co-morbid mental health issues including depression and anxiety, the GAMBLINGLESS program could be extended to offer support for these conditions.

The most frequent (non-technical) feedback on improving guidance was related to development of rapport. This was focused on the nature of the content of email communication as well as the nature of guidance more broadly. Multiple guides reported participants had questioned whether they were a real person or an automated email. Guides suggested there was tension between providing a standardised response and a personal interaction.

One person did express surprise that it was actually a genuine person emailing them and it wasn't spam. So I guess that human interaction is good. I recognise that at least for the purpose of doing research it needs to be fairly standardised so there's a bit of a tension between providing a standardised response and providing one that doesn't feel very individual. It does feel a bit robotic or spam. (Guide 2)

Another guide suggested the nature of guidance needed to be more personal. This guide suggested while early exchanges can be informed by the template, this should change across the course of the intervention so that it was more about personal circumstances and less about the program.

Just make it more personal so if you did strike up a bit of a rapport you did have some conversations with the clients then that would then be reflected in the subsequent communications. They would just become more based on that relationship and the particular circumstances of that person rather than to do with program specific. (Guide 1)

The most prolific suggestions for improvement were in relation to the client management and information system. This included improvement in (1) new client alerts, (2) ease of sending and receiving emails, and (3) access to client background information and progress through the program.

Improvement was identified in terms of how guides received alerts that a new participant had been allocated to them. Multiple guides reported that they had to enter the GAMBLINGLESS program to check their allocation and email exchanges. One guide compared this to constantly having to go to the waiting room to check whether their client had arrived. It was suggested that emails should be directed to the standard everyday email account so that guides were immediately aware of any changes to the client allocation or email correspondence.

The lack of integration between the program and the emailing process was problematic: Having to log into a different email program versus the guide website. They were kind of the worst things, in terms of being a guide is flicking between these things. To me, I just found that too labour intensive and too inefficient to have to do that all the time. (Guide 3)

Second, guides reported email exchanges with participants were not easy to navigate. Multiple guides reported difficulty in generating personalised emails from templates. Guides suggested this was automated in future editions with guides providing personalised shorter emails indicating that they were still there or alternatively emails that directly reflected user content. Guides also reported difficulty in swapping between email systems and again reported a better system would be one that is integrated into their own professional email system.

For me it was probably going from email to email and trying to keep up with where they are, so I had different windows opening up everywhere. So that could be streamlined a lot better. (Guide 4)

It was relatively easy. I just think it could be easier. I think you could just have a much more efficient front page kind of thing where you could just click on a client and everything would just pop up in front of you. (Guide 1)

Third, there were multiple requests for more information on user progress through the program. In terms of user information, guides would have liked access to:

- Reasons for accessing the program
- Scores on screening and assessment tools (e.g., severity of problem, severity of urges)
- Last log in and amount of time spent in program
- Progress through modules including content attempted or completed
- Any ratings of specific content helpfulness

Guides reported the reason for access to this information was to improve the value of guidance to participants. Guides reported this information could assist in tailoring emails so that they could be helpful in linking participants back to different parts of the program. Furthermore, guides reported access to this information would mean they could be specific in the encouragement and support.

Without knowing whether people were actually working through the program I hesitated and I ended up just going back to using something fairly standard from the templates that were provided. But it might have been that they were missing the mark because they were saying things like, you know, woohoo, you go, sort of thing, or well done, you're doing really brilliantly when I had no way of telling that they were doing anything at all. (Guide 2)

Even a bit more backend sort of data in terms of 'yes, okay. I see they've logged in a couple of times this week' or 'they've logged in and they seem to be reading this particular module'. Then you can tailor what you say. That might encourage a bit more exchange, and if that encourages exchange, then maybe that means they will be more likely to successfully make a change. (Guide 3)

Discussion

Phase 1 of this project was to develop an online self-directed cognitive-behavioural program for gambling (GAMBLINGLESS. FOR LIFE.) that can be delivered across Victorian and other Australian services. The aim was to develop a comprehensive and intensive cognitive-behavioural program that emulates the intensity and depth of a face-to-face cognitive-behavioural intervention and from which more brief and targeted interventions could be developed.

Phase 2 of the project involved a two-arm, parallel group, pragmatic randomised trial of this online self-directed program with online follow-up evaluations conducted at two and three months from pre-intervention. This design was selected with a view to decreasing the gap between the context in which most treatment outcome research is conducted and “real world” clinical practice, and maximising the ability to translate the findings into clinical practice in the state of Victoria. The GAMBLINGLESS program was delivered under two different conditions: (i) PSD (without any practitioner guidance); this condition served as an active control condition, and (ii) delivered with guidance provided via email by practitioners from existing gambling treatment services (GSD).

The primary aim of this study is to investigate the effectiveness of the GAMBLINGLESS program on gambling symptom severity, gambling behaviours (frequency and expenditure), additional help-seeking, psychological distress and quality of life. Secondary aims were to: (1) explore the profile of GAMBLINGLESS users; (2) identify the subgroups of problem gamblers who can most benefit from the GAMBLINGLESS program by identifying possible moderators of treatment outcome, as well as predictors of treatment outcomes, treatment engagement, and follow-up completion; (3) identify the processes or mechanisms that are responsible for changes in gambling outcomes following the GAMBLINGLESS program.

Phase 3 of this project aimed to explore the acceptability and feasibility of the GAMBLINGLESS program by both users and current treatment providers; and the degree to which the program could be effectively integrated into clinical practice in existing Victorian services.

Main findings

Profile of GAMBLINGLESS users

Nearly two-thirds of gamblers accessing GAMBLINGLESS were male (64.6%) and less than 40 years of age (63.6%). The majority were born in Australia (76.2%) and employed full-time (71.4%). Approximately one-third of users (33.5%) reported an annual personal net income of \$40,000 to \$64,999. This socio-demographic profile is very similar to gamblers using the national online gambling service (Rodda & Lubman, 2013; Rodda et al., 2017).

Gamblers contacting the GAMBLINGLESS program most commonly reported having issues with EGMs (74.3%) and the most common combination of gambling activities with which participants reported having issues was EGMs only (41.8%). Moreover, the highest past-month gambling frequency (6 days) and expenditure (\$1,533) was reported for EGMs. The high rate of gamblers accessing GAMBLINGLESS with problems associated with EGM gambling and high frequency and expenditure associated with EGMs is consistent with data from the national online gambling service (Rodda & Lubman, 2013; Rodda et al., 2017) and Australian face-to-face counselling services (Dowling, Smith, & Thomas, 2005; Productivity Commission, 2010). Issues with horse, harness or greyhound racing (45.2%) and sports and events betting (27.2%) were also commonly reported. Accordingly, participants relatively commonly reported issues with horse, harness or greyhound racing/sports and events betting (9.7%), EGMs/horse, harness or greyhound racing (8.7%), and horse, harness or

greyhound racing only (8.3%). After EGMs, these forms of gambling were also associated with the highest past-month frequency (3.9 days for horse, harness or greyhound racing; 1.9 days for sports and events betting) and expenditure (\$714 for horse, harness or greyhound racing; \$359 for sports and events betting). These rates of issues with horse, harness or greyhound racing and sports and events betting are even higher than those in gamblers accessing the national online gambling counselling (chat and email) services (Rodda & Lubman, 2013). The finding that problems with gambling activities involving strategy are relatively common in gamblers accessing self-directed programs suggest that peers or professionals supporting gamblers in the use of these programs require an understanding of these gambling activities, as well as EGM gambling.

The mean total gambling frequency in the previous 30 days for the entire sample of GAMBLINGLESS users was 13.4 days, which is somewhat lower than the 18 days reported by the users of the national online gambling service (Rodda et al., 2017), while the mean total gambling expenditure in the previous 30 days for the entire sample was \$1,640. Almost all users (96.1%) reported PGSI scores that were classified in the problem gambling range. Very small proportions of participants classified in the moderate risk (3.4%) and non-problem gambling (0.5%) categories. These findings, which are consistent with those of chat and email clients using the national online counselling service for problem gambling (Rodda & Lubman, 2013), suggest that online self-directed programs attract gamblers who experience problems at the severe end of the gambling continuum and that further effort is required to target gamblers with lower problem gambling severities (Browne et al., 2016). They also highlight that the PGSI is not all that useful in differentiating people accessing online these programs. In contrast, the G-SAS classified half of GAMBLINGLESS users (49.0%) into the moderate severity range, with smaller proportions into the severe severity (35.0%), mild severity (7.8%), and extreme severity (6.8%) ranges. This G-SAS profile is very similar to that obtained from users of the national online gambling service (Rodda et al., 2017). The G-SAS has the added advantages of established reliability and validity in assessing changes in gambling symptoms across treatment (Kim et al., 2009). The high correlation of baseline G-SAS and PGSI scores in the current study also suggests that the G-SAS is valid in measuring symptom severity prior to treatment.

Users of the GAMBLINGLESS program reported considerable psychological dysfunction. Nearly three-quarters (71.8%) reported moderate to very high levels of psychological distress on the K6; 50.0% rated their quality of life as very poor, poor, or neither good nor poor; 80.6% screened positive for hazardous drinking on the AUDIT-3; 17.0% screened positive for past-month illegal drug use or prescription medication for non-medical reasons; and 7.8% reported past-month suicidal plans or attempts. These findings are consistent with the considerable empirical evidence that treatment-seeking problem gamblers display high rates of mood disorders, anxiety disorders, alcohol and substance use problems, impaired quality of life, and suicidality (Dowling et al., 2015; Grant & Kim, 2005; Ledgerwood & Petry, 2004; Ledgerwood, Steinberg, Wu, & Potenza, 2005). The findings highlight the need for online self-directed programs for gambling to routinely screen and assess for psychiatric comorbidity and provided referral or resources that adequately address these comorbid issues (Dowling, Cowlshaw, et al., 2014; Dowling, Jackson, et al., 2014; Petry, 2005; Westphal & Johnson, 2007). This is confirmed by the findings in the current study that approximately half of users indicated that they would like further assistance with stress and tension (54.3%) and depression or moodiness (43.5%) at the completion of the GAMBLINGLESS program. Future reiterations of this program may therefore consider the development of supplementary modules addressing these issues. The provision of such resources, in combination with screening protocols, would allow for a more flexible and individually tailored approach to self-directed intervention, in which treatment intensity increases with increasing client needs (Marotta, 2003). This more individualised approach for gamblers with comorbid psychiatric issues may serve to maximise treatment response, increase engagement, enhance client satisfaction, and reduce attrition (Dowling et al., 2015; Dowling, Merkouris, & Lorains, 2016; Ladouceur et al., 2006).

Users of the GAMBLINGLESS program were required to select their goal of treatment, in recognition of increasing evidence that offering controlled or reduced gambling as an alternative treatment goal to abstinence may provide a more realistic and appealing option to some clients, particularly for those who doubt their ability to abstain (Dowling & Smith, 2007; Ladouceur, 2005; Robson, Edwards, Smith, & Colman, 2002). At baseline, just under half of users (48.5%) indicated that their goal was total abstinence, with an additional quarter of the sample indicating that their goal was to reduce problematic gambling activities (27.2%) or to abstain only from problematic gambling activities (24.3%), respectively. These findings are consistent with research conducted in Victorian face-to-face gambling services (Dowling, 2007; Dowling & Smith, 2007) and the national online gambling service (Rodda et al., 2017), which suggests that one-quarter to one-third of clients select a controlled or reduced gambling treatment goal when it is available. It is apparent that, at least in the Australian context, that controlled or reduced gambling is a relatively popular goal for gamblers accessing both face-to-face, online, and self-directed treatment options. This is understandable given that Australia has generally adopted a harm minimisation approach to its social perspectives on gambling. Given that there is some evidence that clients who shift their treatment goal report better outcomes than those who do not (Ladouceur, Lachance, & Fournier, 2009), users were permitted the flexibility of transferring from the originally selected treatment goal during the course of the GAMBLINGLESS program. Consistent with previous research (Cox, Rosenberg, Hodgins, Macartney, & Maurer, 2004; Hodgins, Leigh, Milne, & Gerrish, 1997; Ladouceur et al., 2009), the findings of the current study suggested that the choice of treatment goal appears fluid, with nearly half (43.6%) of GAMBLINGLESS users shifting their treatment goal from baseline to the 3-month follow-up evaluation.

Overall, 15.5% of GAMBLINGLESS users accessed high-intensity interventions (15.5%) and low-intensity interventions (10.7%). Moreover, nearly half of participants (47.6%) engaged in self-directed actions in the previous 30 days. This pattern of help-seeking behaviour reflects those of the users of the national online gambling service (Rodda et al., 2017). These findings suggest that gamblers accessing online self-directed programs concurrently attempt to access multiple help options. These options, however, predominantly involve the use of self-directed actions, rather than high-intensity interventions, such as face-to-face counselling, or low-intensity interventions, such as telephone counselling. These findings support the GAMBLINGLESS program in encouraging users to seek formal, as well as informal, sources of help and provided contact details for multiple help options.

GAMBLINGLESS users generally reported high rates of gambling-related cognitive distortions, particularly beliefs related to difficulties stopping gambling due to a lack of control (perceived inability to stop gambling) (69.4%) and continued gambling as a result of how much money was won last time (interpretive bias) (65.5%); with smaller proportions of users endorsing beliefs that gambling makes things seem better (gambling-related expectancies) (35.9%), losses when gambling is bound to be followed by a series of wins (predictive control) (20.4%), and having specific rituals and behaviours increase their chances of winning (illusion of control) (19.4%). They also displayed relatively low rates of behavioural coping strategies to cope with gambling temptations: trying to reduce stress (59.2%), doing other things when tempted (59.2%), avoiding situations and/or places where they used to gamble or leaving tempting situations (58.3%), and focusing on techniques they know about how to gamble less (36.9%). Using readiness rulers, users of the GAMBLINGLESS program reported high readiness to change ($M = 9.5$) and high importance of change ($M = 9.2$), but lower confidence in their ability to change ($M = 5.9$). This readiness profile is consistent with that identified for gamblers accessing the national online gambling service (Rodda et al., 2017; Rodda et al., 2015). Moreover, URICA readiness to change scores indicated that users endorsed the contemplation item most highly ($M = 4.6$), followed by the maintenance ($M = 3.7$) and action ($M = 3.4$) items; the pre-contemplation item, however, was not highly endorsed ($M = 1.4$). The calculation of the URICA readiness to change scores suggested that GAMBLINGLESS users were most likely to be classified into the contemplation stage of change (43.7%), followed by the action stage of change (29.6%) and the pre-contemplation stage of change (26.7%). GAMBLINGLESS users generally reported low confidence in their ability to

resist the urge to gamble on the Brief Situational Confidence Questionnaire, particularly in situations involving urges and temptations ($M = 3.6$), unpleasant emotions ($M = 4.1$), financial pressures ($M = 4.1$), social pressures to gamble ($M = 4.2$), testing control over gambling ($M = 4.2$), conflict with others ($M = 4.7$) and alcohol or drugs ($M = 4.9$). Although users felt more confident in the ability to resist the urge to gamble in situations involving physical discomfort ($M = 5.8$), pleasant emotions ($M = 5.7$), and having pleasant times with others ($M = 5.4$), the scores for these situations still represented relatively low gambling-related self-efficacy (i.e., only just over 50% confidence of resisting an urge in these situations).

Taken together, the findings provide consistent evidence to suggest that the users of the GAMBLINGLESS program reported generally high readiness to change, but very low confidence in their ability to limit or stop gambling and in resisting the urge to gamble in most situations. They also displayed high rates of cognitive distortions and relatively low rates of behavioural strategies to cope with gambling temptations. Taken together, these findings support the content of the GAMBLINGLESS program, in which the focus was less on motivational approaches to increase readiness to change and more on the development of self-efficacy, the reduction of gambling-related cognitive distortions, and the enhancement of behavioural coping strategies, particularly in relation to managing gambling urges and coping with high-risk situations. Accordingly, they also generally support the measurement of these constructs as hypothesised processes of the change resulting from the GAMBLINGLESS program.

Effectiveness of the GAMBLINGLESS program

This study aimed to investigate the effectiveness of the GAMBLINGLESS program on G-SAS gambling symptom severity, G-SAS gambling urges, gambling behaviours (frequency and expenditure), K6 psychological distress, EUROHIS quality of life, and additional help-seeking (high intensity and low intensity interventions). It was hypothesised that the GSD intervention will lead to better outcomes than the PSD intervention at the 2- and 3-month follow-up evaluations, as assessed by reductions in gambling symptom severity, gambling behaviours and psychological distress, and increases in quality of life and help-seeking.

There were no significant differences between the PSD and GSD interventions on almost all measures at the 2- or 3-month follow-up evaluation. Moreover, intervention group (PSD or GSD) did not significantly predict clinically significant change, the completion of an activity within the GAMBLINGLESS modules, or the completion of follow-up assessments. Taken together, these findings suggest that, contrary to expectations, the addition of guidance to the GAMBLINGLESS program did not significantly improve treatment outcomes, treatment engagement, or follow-up attrition. The only exception was for gambling frequency, whereby the GSD group reported a greater reduction in days gambled than the PSD group; however, there were significant reductions in gambling frequency for both groups at the 3-month follow-up evaluation. There was also a significant reduction in gambling frequency within treatment groups at the 2-month follow-up evaluation.

There were significant reductions in GSAS gambling symptom severity, GSAS gambling urges, and K6 psychological distress within treatment groups at the 2- and 3-month follow-up evaluations. There was a clinically meaningful improvement, as demonstrated by large effect sizes (Cohen's d), in these measures from baseline to the 2-month follow-up evaluation ($d = 0.36$ - 1.26) and the 3-month follow-up evaluation ($d = 0.87$ - 1.36). For clinically significant change (Jacobson & Truax, 1991) calculated from G-SAS gambling symptom severity data from baseline to the final follow-up evaluation, 50.0% of users recovered, 13.8% improved, 33.8% showed no real change, and 2.5% deteriorated. These rates of clinically significant change based on gambling symptom severity are similar to those identified for face-to-face MI/CBT gambling interventions (Milton, Crino, Hunt, & Prosser, 2002; Petry, Weinstock, Ledgerwood, & Morasco, 2008). For example, based on SOGS scores and dollars wagered, Petry et al. (2008) noted that 2.6% of participants completing a 4-session face-to-face MET plus CBT

intervention were classified as recovered, 47.4% of participants were classified as improved, and 50.0% were classified as unchanged. Moreover, for clinically significant change calculated from K6 psychological distress data at the final follow-up evaluation, 31.6% of users recovered, 14.5% improved, 44.7% experienced no real change, and 9.2% deteriorated. These findings indicate that a considerable proportion of GAMBLINGLESS users displayed clinically significant change, not only in gambling symptom and urge severity, but also in psychological functioning.

There were significant reductions in gambling expenditure and improvements in quality of life at the 2-month, but not the 3-month, follow-up evaluation. There were also no clinically significant change in quality of life from baseline to either follow-up evaluation ($d=0.06-0.42$). Although the mean gambling expenditure reduced by 63%, the median gambling expenditure only reduced by 15% and there was a high amount of variance around the gambling expenditure mean. Further examination is required to determine the degree to which gambling expenditure maintained the reductions identified at the 2-month follow-up over longer periods of time. The PSD and GSD interventions displayed similar quality of life trajectories as those for gambling expenditure. Interestingly, the mean for the EUROHIS quality of life item was identical at the 2- and 3-month follow-up evaluations. These findings could again suggest that there was insufficient power to identify intervention group and time differences or that the single item measure employed in this study was not sensitive enough to change or masked changes in specific dimensions of quality of life (Potter, Cantarero, & Wood, 2012). Future evaluations of the GAMBLINGLESS program should therefore employ a multi-dimensional measure of quality of life with established sensitivity to change in a larger sample.

In contrast, there was a significant increase in high-intensity intervention help-seeking at the 3-month, but not the 2-month, follow-up evaluation. There were, however, no significant differences in low-intensity intervention help-seeking at either follow-up evaluation. There was also no clinically significant change on high- or low-intensity intervention help-seeking from baseline to either follow-up evaluation ($d=0.00-0.19$). It is evident from the trajectories that help-seeking involving high-intensity interventions gradually increased over the course of the evaluation period. Interestingly, however, given the low-intensity nature of the GAMBLINGLESS program, low-intensity intervention help-seeking was lower than high-intensity intervention help-seeking at baseline and did not significantly improve over the course of the program. Consistent with the aims of the GAMBLINGLESS program, it may be that exposure to the GAMBLINGLESS program promotes a realisation that a more intensive service is required via an increase in awareness and/or a decrease in stigma.

Taken together, the findings of this study generally confirm the effectiveness of both PSD interventions (Casey et al., 2017; LaBrie et al., 2012; Petry et al., 2006) and interventions that approximate GSD (Carlbring & Smit, 2008; Hodgins et al., 2009; Hodgins et al., 2001; LaBrie et al., 2012) for problem gambling. The comparable outcomes between the PSD and GSD interventions in the current study are consistent with those of LaBrie et al. (2012), who found no difference between a self-directed toolkit intervention (consisting of three sections based on a combination of inoculation, stage change and relapse prevention theory) and a guided self-directed toolkit intervention (in which guidance consisted of one telephone call). Taken together, these findings provide preliminary evidence that the addition of guidance does not improve outcomes for self-directed interventions. Given the paucity of available literature, however, further research investigating the addition of guidance to self-directed interventions is warranted.

Moreover, findings from other fields suggest that the addition of therapeutic support delivered by trained professionals improves treatment outcomes (Johansson & Andersson, 2012; Palmqvist, Carlbring, & Andersson, 2007). These raise the question about whether adding therapeutic components to the GAMBLINGLESS program would improve treatment outcomes. Several studies provide some evidence to suggest that workbook plus MI interventions are more effective in reducing gambling frequency, gambling expenditure, expenditure per gambling day, and problem gambling

severity than workbook only interventions (Hodgins et al., 2004; Hodgins et al., 2009; Hodgins et al., 2001). Although these findings suggest that interventions involving the addition of motivational interviews to self-directed workbooks produce better outcomes, the MI plus workbook conditions did not significantly differ from the workbook only conditions on all outcome measures across multiple follow-up evaluations (Hodgins et al., 2009; Hodgins et al., 2001). Despite these inconsistent findings, future research is required to determine the degree to which the addition of therapeutic components to the GAMBLINGLESS program offers advantages over the PSD intervention. Similarly, evidence that online self-directed programs delivered in combination with peer support or coaching can improve treatment outcomes and retention (Proudfoot et al., 2012; Simon et al., 2011) suggests that this may also be an avenue for future research investigating the efficacy of the GAMBLINGLESS program. The potential benefit of additional therapeutic components must, however, be balanced against the in-depth findings in this study that suggested that some users have a preference for the anonymity and freedom of using an unguided intervention.

Subgroups benefiting most from the GAMBLINGLESS program

The majority of treatment outcomes in the gambling literature are based on measures of statistical significance (Merkouris, Thomas, Browning, & Dowling, 2016). It has been argued, however, that this method alone is insufficient in evaluating treatment efficacy as it fails to take in to consideration the clinical significance of any effect (i.e., meaningful changes in the client's life; Jacobson & Truax, 1991). Moreover, there are very few available studies that attempt to identify the degree to which particular factors moderate the efficacy of problem gambling interventions (Dowling, Merkouris, et al., 2016). In clinical research, moderators are variables that specify the conditions under which a treatment is effective and the individuals for whom therapies work relative to other individuals and therapies. The current study therefore aimed to identify subgroups of gamblers who can most benefit from the GAMBLINGLESS program by identifying possible moderators of treatment outcome, as well as predictors of treatment outcomes. The factors that predicted treatment engagement and follow-up assessment completion were also identified.

Treatment outcome

This study therefore evaluated whether several variables (gender, age, and EGM use) moderated changes in G-SAS gambling symptom severity and K6 psychological distress scores at the 2- and 3-month follow-up evaluations for each intervention. The findings revealed that there were no significant gender (male vs female), age, and gambling activity preference (EGM only/EGM plus other gambling activities) differences in treatment effects at the 2- or 3-month follow-up evaluations for either G-SAS gambling symptom severity or K6 psychological distress. These findings suggest that male and female gamblers, gamblers of different ages, and gamblers with different gambling activity preferences had similar changes in gambling symptom severity and psychological distress scores at the two- and three-month evaluations. Although this study failed to identify subgroups of gamblers who most benefit from the GAMBLINGLESS program, these findings indicate that the program is equally effective for various subgroups of users.

Similarly, there were few significant predictors of clinically significant change on G-SAS gambling symptom severity scores at the 2 or 3-month follow-up evaluation. These findings are consistent with previous research that there are few clear predictors of gambling outcomes following psychological treatment (Merkouris, Thomas, et al., 2016). However, K6 psychological distress and readiness ruler scores were significant independent positive predictors of clinically significant change in both the univariable and multivariable analyses, suggesting that users who are more psychologically distressed and more ready to change are most likely to benefit from the GAMBLINGLESS program. The findings relating to readiness to change are somewhat consistent with previous research examining gambling outcomes from psychological treatments for gambling; although readiness to change has not been a

significant predictor of gambling outcomes, being in the action stage of change has generally been a significant predictor of gambling outcomes (Merkouris, Thomas, et al., 2016). The prediction of improved outcomes by increased psychological distress is not consistent with previous literature, however, which has generally found that psychological distress is generally not a significant predictor of improved gambling outcomes (Merkouris, Thomas, et al., 2016). It may be that psychological distress experienced as a gambling-related harm (Browne et al., 2016) provides an additional impetus for seeking assistance from this online self-directed intervention. The findings of this study further highlight the need for future research that examines the moderators and predictors of gambling outcomes from self-directed interventions so that these interventions can be personalised to meet individual needs (Merkouris, Thomas, et al., 2016).

Treatment engagement

Exploring the predictors of treatment engagement during the GAMBLINGLESS program allows for the identification of clients at risk of “dropping out” of the program and establishing the basis for developing interventions to enhance engagement. Like most online self-guided psychological interventions (Donkin et al., 2011; Eysenbach, 2005; Melville, Casey, & Kavanagh, 2010; Verheijden, Jans, Hildebrandt, & Hopman-Rock, 2007), low engagement was a limitation of the GAMBLINGLESS program, with only one-third of users (33.0%) completing one activity in the program. This is of concern given that poor engagement limits exposure to the full program or the required “dosage” of treatment (Eysenbach, 2005). There were, however, few significant predictors of completing a module activity within the GAMBLINGLESS program. This is consistent with previous studies of treatment adherence, which have identified few clear predictors of adherence to online psychological interventions (Beatty & Binnion, 2016). In the univariable analyses, age, past-month additional help-seeking, and weekly internet use significantly positively predicted the completion of at least one activity; while past-month gambling expenditure over \$800 significantly negatively predicted the completion of at least one activity. In the multivariable analyses, only gambling expenditure failed to remain a significant predictor of module activity completion after controlling for all other variables. Taken together, these findings suggest that older users who are seeking a range of help-seeking options, and who have good access to the internet are most likely to complete a module activity in the GAMBLINGLESS program.

Prior research has shown that treatment adherence is related to improved outcomes for online self-directed treatments (Christensen, Griffiths, & Farrer, 2009; Donkin et al., 2011; Ghaderi, 2006) and for gambling treatments specifically (Dowling & Cosic, 2011). As such, further research attempting to understand the predictors of, and reasons for, low engagement and adherence to these interventions is required to develop more effective online interventions (Eysenbach, 2005). Moreover, this emerging field of research would benefit from in-depth studies to provide a more comprehensive and deep understanding of the contributing factors that influence user engagement. Beatty and Binnion (2016, p. 791) provide a number of recommendations for future studies on monitoring adherence to online psychological interventions, including: (a) the use of multiple measures of adherence, including number of logins, login duration, modules completed, homework tasks completed, self-report adherence measures, or pages viewed; (b) routinely supplementing quantitative with qualitative analysis of reasons for attrition and adherence; (c) carefully considering the methodological framework to be adopted, appropriately powering studies, and using web-based control comparators where possible as these control for treatment expectancies and demand effects; and (d) considering the sex and age of the sample to be recruited, as both appear to influence adherence.

Follow-up completion

Exploring the predictors of follow-up assessment completion allows for the identification of clients at risk of follow-up attrition. In this study, 38.8% of participants completed either the 2- or 3-month follow-up assessments. This follow-up completion rate is consistent with previous studies of online

psychological interventions which have been found to be substantially lower than in conventional trials and interventions (Murray et al., 2009). For example, follow-up completion rates in previous studies of online interventions have ranged from 8% to 89%, depending on the follow-up procedures utilised (Holländare et al., 2011; Verheijden et al., 2007). Although several measures were employed to boost follow-up completion in this study, including email reminders, telephone reminders, and cash reimbursements, it is clear that achieving desirable follow-up rates remains a significant challenge to online trials (Murray et al., 2009).

The findings of this study suggest that there are few significant predictors of follow-up completion (defined as users who completed at least one of the two- or three-month follow-up assessments). Consistent with the findings from treatment outcome and engagement, there appear to be few clear predictors of follow-up attrition in the gambling literature (Melville, Casey, & Kavanagh, 2007). In the univariable analyses, age, past-month additional help-seeking, and weekly internet use significantly positively predicted the completion of at least one of the follow-up assessments. The interaction between sex and age was also statistically significant, indicating that older males were more likely to complete at least one follow-up assessment relative to other subgroups of users. In the multivariable analyses, only age failed to remain a significant independent predictor of follow-up completion after controlling for all other variables. Few of these significant variables have been explored in past research investigating treatment dropout among gambler, with the exception of age, which is generally not significantly associated with dropout (Melville et al., 2007). Given that adequate follow-up rates can safeguard against bias and allow for the provision of the estimated effect of the intervention (Murray et al., 2009), further research exploring the variables associated with follow-up attrition from online psychological interventions such as the GAMBLINGLESS program.

Mechanisms or processes of change

A secondary aim of this study was to identify the processes or mechanisms that are responsible for changes in gambling outcomes following the GAMBLINGLESS program. Hypothesised process of change measures included GRCS gambling-related cognitions, AACRI behavioural coping with gambling temptations, readiness rulers (importance, readiness and confidence), URICA readiness to change, and BSCQ gambling-related self-efficacy. The only significant difference between groups on these process measures was identified for the confidence readiness ruler, where users allocated to the GSD intervention were more improved at the 3-month follow-up evaluation. Most of the remaining process measures (gambling-related cognitions, behavioural coping with gambling temptations, and gambling-related self-efficacy) improved from baseline to both of the follow-up periods. Taken together, these findings suggest that many of the constructs targeted by the GAMBLINGLESS program improved following user exposure to the program.

The theoretical model of change was explored by analysing the likely trajectory of change for the primary outcome measure (G-SAS gambling symptom severity) and a process variable and how each of these variables is likely to induce change in the other across intervention group using a cross-lagged panel design. This model provided information about the presumed reciprocal causation between G-SAS gambling symptom severity and the hypothesised process variables (GRCS gambling-related cognitions, AACRI behavioural coping with temptations, readiness rulers, URICA readiness to change, and BSCQ gambling-related self-efficacy) from a temporal perspective for both PSD and GSD. It therefore simultaneously tested the influence of baseline G-SAS gambling symptom severity on post-treatment process variables and the influence of baseline process variables on post-treatment gambling symptom severity when moderated by intervention group.

While all of the separate cross-lagged models showed acceptable fit, the findings revealed that there were no statistically significant cross-lagged paths for any of the process variables. These findings indicated that baseline gambling symptom severity did not have a statistically significant effect on

three months follow-up process measures; and that baseline process measures did not have a statistically significant effect on three-month follow-up gambling symptom severity. They suggest that there is no reciprocal causal relationship between gambling symptom severity and any of the process measures for either of the interventions. These findings are in contrast to a limited literature identifying coping skills (Petry, Litt, Kadden, & Ledgerwood, 2007) and quality of life (Sander & Peters, 2009) as significant mediators of change in gambling outcomes following treatment. It is evident that further research is required exploring the processes or mechanisms that are responsible for changes in outcomes following treatment for problem gambling.

In the cross-lagged models tested in the current study, the paths within each variable were also examined from baseline to follow-up evaluations to assess the stability of concepts across time when adjusting for all other paths. The path coefficients in all of the models, with the exception of BSCQ gambling-related self-efficacy, indicated that gambling symptom severity was significantly more stable from baseline to the 3-month follow-up evaluation for the PSD than the GSD intervention. These consistent findings suggest that gambling symptom severity is more stable across time for users who did not receive guidance when adjusting for all other paths; in contrast, there was a substantial rearrangement of gambling symptoms across time for users who received guidance. These findings may be reflective of a “response shift” in their conceptualisation, prioritisation, and/or calibration of their gambling symptoms across the course of the GSD intervention (Schwartz, Andresen, Nosek, & Krahn, 2007; Schwartz & Sprangers, 1999; Sprangers & Schwartz, 1999). It may be that those users allocated to the GSD intervention view their gambling symptoms differently and with more insight as a result of their exposure to the more active treatment condition and their experiences during guidance than users allocated to the PSD intervention. Although this study did not employ statistical procedures to identify a response shift in G-SAS gambling symptom severity scores, the stability of gambling symptom severity across time for the PSD users compared to the GSD users may signal this as an effects of the GSD intervention. Alternatively, these results may reflect unreliability of the G-SAS in terms of comparing mean scores. For this reason, future research is required to test the measurement invariance of the G-SAS in treatment outcome studies (Ong, Peh, Asharani, & Guo, 2016).

There was less consistency in the stability in the process measures across time across the two interventions. For example, importance was more stable from baseline to the 3-month follow-up evaluation for the GSD than the PSD intervention, suggesting that there was a greater rearrangement of importance of change across time for users who did not receive guidance. In contrast, gambling-related cognitions were statistically significantly stable from baseline to the 3-month follow-up evaluation for both the PSD and GSD interventions, suggesting that there was little variability in response in terms of gambling-related cognitions across time for users, regardless of whether or not they received guidance.

Acceptability and feasibility of the GAMBLINGLESS program

Phase 3 of this project aimed to explore the acceptability and feasibility of the GAMBLINGLESS program by both users and current treatment providers; and the degree to which the program could be effectively integrated into clinical practice in existing Victorian services.

The GAMBLINGLESS program was designed to be a comprehensive cognitive-behavioural program for gambling from which more brief and targeted interventions could be developed. To achieve a greater understanding of how users engaged with the program and the activities from which they most benefited, completion data and helpfulness ratings were collected for each activity. Like most online self-guided psychological interventions (Donkin et al., 2011; Eysenbach, 2005; Melville et al., 2010; Verheijden et al., 2007), low engagement was a limitation of the GAMBLINGLESS program, with only one-third of users (33.0%) completing one activity in the program. This is of concern given that poor engagement is related to reduced treatment efficacy (Christensen et al., 2009; Donkin et al., 2011;

Dowling & Cosic, 2011; Ghaderi, 2006) as it limits exposure to the full program or the required “dosage” of treatment (Eysenbach, 2005). This implies that the GAMBLINGLESS program may benefit from additional strategies to enhance motivation to engage in the program. Although the program would likely benefit from a reduction in the number of modules, content brevity must be balanced with therapeutic dosing so that the burden of participation does not lead to disengagement but the modules contain sufficient detail to be therapeutic and address the presenting issue (Verheijden et al., 2007). Other strategies may include the follow-up modules that make long-term support possible, face-to-face contact before referral into the program, frequent reminder emails, rewards and bonuses, tailored emails and website content, and enhancement of the program graphics and interactivity (Verheijden et al., 2007; Wangberg, Bergmo, & Johnsen, 2008).

Moreover, despite all activities being accessible to all users, the completion data suggested that users appeared to start at module 1 then progressively drop off their participation as the program progressed. While one-third of users completed at least one activity in module 1, only 5% of users completed any activity within module 4. This suggests that the program requires a fewer number of activities and that users would benefit from a greater degree of direction about which modules to complete based on their needs. It is therefore recommended that future versions of the GAMBLINGLESS program reduce the number of activities and conduct an assessment so that the program is more targeted to individual needs.

The activities selected for more brief versions of the GAMBLINGLESS program may be based on the star rating system employed within the program, which was designed to examine the helpfulness of each activity. The activities that were rated most helpful were coping with lapses (module 4), identifying the benefits of gambling less (module 1), putting it all together (module 4), deciding to quit or cut back (module 1), and money I spend gambling (module 1). In the open-ended questions, several users also identified that the most helpful parts of the program were the activities that aided in their understanding of their gambling. These ratings suggest that these activities should be included in subsequent versions of the GAMBLINGLESS program. In contrast, the activities that were rated the least helpful were my future (module 4), managing my urges III and IV (module 4), seeking other help (module 2), solving my problems (module 2), learning to relax (module 2), and putting it all together (module 1). These ratings suggest that these activities were not found helpful by users and should either be redeveloped or excluded from future revisions of the GAMBLINGLESS program. These findings should, however, be interpreted cautiously given the relatively small number of users employing the rating system in the latter part of the program.

Users allocated to the GSD intervention indicated that they had developed relatively strong therapeutic relationships with their guides (professional therapists). Subscale scores on the Working Alliance Inventory – Short Form indicated that users reported the highest scores on the Bond subscale, indicating that they had developed a strong personal bond with their guide. Slightly lower scores were achieved on the Task and Goal subscales, indicating that they felt that they had slightly less collaboration between themselves and the guides on specific, technical, in-session behaviours and techniques; and slightly less agreement on the desired outcomes in relation to their treatment goals. Moreover, the responses to the open-ended questions indicated that several users identified guidance as the most helpful part of the program and that several users allocated to the PSD intervention desired more guidance.

These findings are consistent with previous research that it is possible to develop a successful therapeutic relationship over the Internet in the absence of non-verbal cues and can be equivalent to face-to-face therapy (Preschl, Maercker, & Wagner, 2011; Sucala et al., 2012). Although the guidance delivered in the GAMBLINGLESS program, however, was limited to non-therapeutic contact (support, monitoring progress, clarifying program information, answering technical questions, and encouraging module completion) via one-appointment-based email contact per week (with a maximum duration of

20 minutes per contact), there is increasing consensus that some online cognitive-behavioural programs, even in the absence of guidance or therapeutic contact, can emulate relational features that can foster a therapeutic alliance with users (Barazzzone, Cavanagh, & Richards, 2012). Given findings that there is a relationship between the therapeutic alliance and e-therapy outcomes (Preschl et al., 2011; Sucala et al., 2012) and between therapeutic alliance and gambling treatment outcomes (Dowling & Cosic, 2011), the development of a therapeutic alliance by PSD users with these features may explain, at least in part, the comparable outcomes achieved between the PSD and GSD interventions in the current study. Future research is therefore required to explore the degree to which the features of the GAMBLINGLESS program itself can foster a therapeutic alliance with users, independent of guidance.

Overall, the GAMBLINGLESS program was positively evaluated by the majority of users. A high proportion of users indicated that the information in the program was easy to understand (82.1%), the internet was a good mode of delivery (77.5%), the program was easy to use (76.2%), they could trust the information in the program (75.6%), they were likely to return to use the program (73.8%), the program was convenient to use (71.4%), the information provided in the program was useful (70.0%), they enjoyed the program (69.1%), they were satisfied with the program (67.5%), they liked the look of the program (65.0%), the program kept their interest and attention (58.5%), and they thought the program was a good fit for them (57.5%). Moreover, few users indicated that they were concerned about their privacy when using the GAMBLINGLESS program (14.6%). The convenience of the online delivery, the information provided in the program, and the ease of use of the program were also identified as the most helpful part of the program by several users in the open-ended questions. Furthermore, almost one-third of users (29.8%) indicated that there was no part of the program that they did not find helpful.

Despite these evaluations, there are aspects of the program that users identified as least helpful. Several users indicated that they did not like parts of the look of the program, including the graphics and the colours, some minor technical issues (e.g., lack of compatibility with Android), and the limited time to complete the program. These findings suggest that future versions of the GAMBLINGLESS programs may benefit from enhanced graphics, a focus on compatibility issues, and additional time to complete the program.

In order to determine whether there was particular content that future versions of the GAMBLINGLESS program could incorporate, users were asked to identify additional needs after completing the program. Interestingly, some of the most commonly endorsed additional needs involved content that is already included in the GAMBLINGLESS program. Specifically, 71.7% of users wanted to learn how to relax better, 67.4% of users wanted to learn some skills to keep from returning to gambling, 60.9% wanted to find enjoyable ways to spend their free time, 54.3% wanted to learn how to solve problems in their life, and 52.2% wanted help in getting motivated to change. These findings are understandable given that most users appeared to progress through the program linearly and did not complete many of the activities associated with these needs. Again, this result highlights the need for future versions of the GAMBLINGLESS program to provide a more individualised approach by potentially identifying users who want to learn specific skills and directing them to relevant activities. Interestingly, however, several of the GAMBLINGLESS program activities that address these issues were rated most poorly by users, such as managing urges, problem solving, and learning to relax. While these findings imply that these topic areas are desired by users but the activity content requires revision, it is important to note the small numbers of users providing helpfulness ratings for many of these activities.

Other highly rated additional needs did not have associated content in the GAMBLINGLESS program. Specifically, 69.6% of users would like to improve their physical health, 63.0% wanted help in overcoming boredom, 56.5% wanted to have healthier relationships, 54.3% wanted help to decrease their stress and tension, 54.3% wanted help with feelings of loneliness, 50.0% wanted help with angry

feelings and how they express them, and 50.0% wanted to learn how to express their feelings in a more healthy way. Future versions of this program may therefore consider the development of supplementary modules or the provision of referral information that address these issues. Again, this approach would allow for a more flexible and individually tailored approach to the online self-directed treatment of gambling.

Interestingly, only a relatively small proportion of users of the GAMBLINGLESS program (28.3%) wanted additional help to stop or decrease their use of alcohol, tobacco, or other drugs. This is despite over 81% of users screening positive for hazardous drinking and 17% screening positive for illegal drug use or prescription medication for non-medical reasons. It is unclear why this additional help was less desirable than other forms of help. It may be that gamblers using the GAMBLINGLESS program view help for other issues, such as relaxation, physical health, boredom, and leisure activities as relevant to managing their gambling, but do not view alcohol and other drug use issues as related to their gambling behaviour. Alternatively, it may be that gamblers feel overwhelmed by the idea of simultaneous change attempts for multiple addictive behaviours. Finally, this may be an artefact of the single item instruments employed to screen for alcohol and drug use, which may have resulted in a high rate of false positives and therefore inflated the likelihood of alcohol and other drug use issues in this sample. Further research is clearly required to explore the degree of alcohol and drug use in gamblers accessing online gambling using more accurate screening instruments, the degree to which gamblers view their alcohol use as related to their gambling, and the degree to which they feel confident addressing multiple addictive behaviours.

Finally, it is interesting that only a relatively small proportion of GAMBLINGLESS users wanted advice about financial problems. The GAMBLINGLESS program included a range of different financially-related activities, including calculating gambling expenditure relative to the Australian population (module 1), limiting access to money (module 2), and budgeting (module 2). It may therefore be that users felt that there is sufficient information about financial problems in the existing GAMBLINGLESS program and that additional content around these issues is not necessary.

A series of interviews with 8 users and 7 guides were conducted to further understand in greater detail the experiences of users and guides participating in the GAMBLINGLESS program. Overall, there was general agreement from both users and guides that the program was helpful, although there was some variation across both users and guides. There was also a variety of responses in terms of what users and guides liked and disliked about the program. For some users, the program was too confronting or contained too much detailed or lengthy information, while for other users, the intensity of content was helpful as it challenged them to think differently about their gambling. For most users, unhelpful activities were those that did not necessarily apply to them; although they understood that these activities may apply to others. Interviews indicated users reported change across multiple domains, with most participants attributing these changes to the GAMBLINGLESS program or a combination of help-seeking activities including the GAMBLINGLESS program. In contrast, some guides felt they did not have sufficient information on the progress or improvement of most of their allocated users because few users made contact with them. Guides were provided access to indicators of progress or improvement through email contact with users and the self-assessment built into the modules. Because email exchanges with guides were minimal, information via user contact was unavailable to some guides. Furthermore, guides indicated dissatisfaction with the amount of information provided on user progress through the modules and would have preferred real time access to user information (i.e., see exactly what content has been attempted). This lack of information appeared to be associated with some guides doubting the effectiveness of the program (and change to gambling behaviours). Future program iterations could include increased access to information on user access and use of the GAMBLINGLESS program over the course of the allocated guidance period.

There was consistency between users and guides in terms of the overall look and feel of the GAMBLINGLESS program. It was described as being trustworthy and as having good levels of privacy and convenience. It was also described as easy to navigate, professional, and visually appealing. The modality via the internet was also viewed positively by users as it enhanced anonymity and convenience. The program content was viewed by both users and guides as broadly appropriate, credible, and well-structured, although there was a general view from guides that access to all of the content should initially be limited; and some guides thought the program was too lengthy as lengthy as they were unaware that the program was divided into discrete activities. The majority of users and guides indicated that they would use the program again and recommend it to others and most guides would consider participating in the program again as it was a good opportunity to learn new skills and techniques.

Users and guides were asked to report the helpfulness of guidance for the GAMBLINGLESS program. Overall, all of the users, whether they received guidance or not, stated that some kind of support and encouragement is important and should be included in future versions of this program. Email was their preferred method for receiving guidance due to convenience and privacy concerns, although some thought guidance could include some text messages or occasional, but scheduled, telephone calls. They did not have an overwhelming preference from whom they received guidance (ie, professional gambling counsellor, peers, or automated emails). Guides also reported guidance was potentially helpful in terms of offering support and being available for the person attempting change. Guides were also unanimous in agreeing that there was sufficient training and supervision provided before and during the course of the trial. Consistently, however, there were indicators that the type and form of guidance did not meet expectations, resulting in many users not engaging with guides and most of the guides being frustrated by the limitations of their role and lack of user engagement. Some guides also experienced conflict in terms of managing their role as a guide and managing other workplace priorities. Given that there was agreement that guidance as a general overarching activity is helpful, it is perhaps useful to consider a range of possible options for providing support. This means perhaps better catering to user needs by asking them what they want or need at the commencement of the program.

Overall, guides generally agreed that the GAMBLINGLESS program could, and indeed should, be integrated into service delivery. This was described in terms of expanding the suite of services available to people with gambling problems. Multiple guides, however, noted that online services should be offered as an adjunct, rather than a replacement, for face-to-face counselling. This likely reflects that the majority of guides were recruited from the Victorian Gamblers Help services who may hold the view that in-person counselling is the dominant and preferred model for psychiatric care. Guides, however, were optimistic about the integration of the program within their current roles. This, however, raised questions for one guide regarding managing therapies with a different theoretical orientation from their own.

Throughout the interviews, guides highlighted several areas that they thought would help improve the program. This included the content of the program and the nature of guidance. For the most part, users and guides were supportive of the content of the GAMBLINGLESS program and reported it as comprehensive. Two suggested expansions to program content were recommended including more extensive financial and money management tools and access to resources to address co-morbid conditions such as anxiety and depression or alcohol use. The need to improve guidance and the content of emails was identified by both users and guides. This was related most frequently to providing tailored emails according to the user's progression through the program. Beyond this improvement, guides also requested greater access to baseline user information, user log-ins and activity as well as content accessed or completed. Again, the purpose of access to user information was so that emails could be better targeted and better support the goals of the program.

Strengths and limitations

This is the first study in Australia to examine the effectiveness of a guided online self-directed intervention for problem gambling. As most individuals with a gambling problem do not seek face-to-face treatment, this study may help address the gap in available treatment options for problem gambling by evaluating an online CBT self-directed program. Additionally, through the use of an online delivery platform, the GAMBLINGLESS program has the potential to reach subgroups of people who would otherwise not receive, or have access to, psychological interventions, and therefore enabling greater access to a cost-effective treatment option for gambling. A further strength of this trial is the use of gambling counsellors as guides. This, in combination with the use of a pragmatic trial design alongside the use of an adjunctive in-depth methodology, will enable the translation of this research in to clinical practice and will allow for the up-skilling of current gambling clinicians. Moreover, the usability and acceptability data obtained from the evaluation of this comprehensive program will allow for the development of empirically supported brief online programs for problem gambling.

When considering the practical implications of the findings of this study, it is important to note several methodological limitations. As with any online program, potential limitations of this study are low program completion engagement rates and low data collection follow-up rates. The literature on internet-based psychological therapies indicates that dropout across all treatment stages (i.e. pre-treatment, during treatment and follow-up) can be quite high, ranging from 2% to 83% (Melville et al., 2010). Although attempts were made to increase data collection follow-up rates, including multiple and varying modes of contact and participant remuneration, missing data due to the follow-up attrition may have reduced the statistical power of the study. Although this study was deliberately designed as a pragmatic trial to address the degree to which the GAMBLINGLESS program is effective in “real world” clinical practice with “real-life” clients and to explore the degree to which the program can be effectively integrated into clinical practice in existing Victorian face-to-face, helpline, and online services, the absence of a non-treatment control group precludes definitive statements about the efficacy of the program. It is highly recommended that future evaluations of the GAMBLINGLESS program are conducted relative to a control group in order to make such statements. In this study, there was also a reliance upon self-report measures, which may have resulted in self-report biases. While corroboration of self-report has been identified as important in determining the accuracy of gambling behaviour and impacts (Walker et al., 2006), the anonymous nature of this mode of intervention limits this opportunity. Moreover, influences including location (e.g., work, home), physical factors (e.g., intoxication) and psychological condition (e.g., distress) may impact administration validity of self-report measures (Barak & Buchanan, 2004). Furthermore, single item measures were employed to assess quality of life and certain process measures (e.g., GRCS), which may not have been sensitive to change. Finally, although the results of this study suggest that the GAMBLINGLESS program is effective in the short-term, there are plans to conduct a 12-month follow-up assessment (Merkouris, Dowling, Rodda, & Youssef, 2016) in order to examine the longer-term efficacy of the program.

Clinical implications

Overall, the GAMBLINGLESS program was positively evaluated by the majority of users and guides. There was general agreement from both users and guides that GAMBLINGLESS could, and indeed should, be integrated into service delivery. This was described in terms of expanding the suite of services available to people with gambling problems. However, guides reported that before considering the integration of GAMBLINGLESS into the service system, some issues related to the overall program, screening for user suitability, and delivery or guidance or support require further consideration.

GAMBLINGLESS program content

- The demonstrated effectiveness of the GAMBLINGLESS program and the acceptance by both users and guides suggests that the availability of this type of online self-directed gambling program is warranted in the state of Victoria.
- The GAMBLINGLESS user profile in terms of cognitive distortions, behavioural strategies, confidence/self-efficacy, and readiness to change indicates that the delivery of online self-directed gambling programs with a MI/CBT therapeutic orientation is appropriate.
- Positively rated program content, such as coping with relapse, identifying the benefits of gambling less, information to assist in the decision to quit or cut back, the calculation of gambling expenditure, and quizzes on program content should be retained. More negatively rated program content, such as envisioning the future, some of the more intensive urge management strategies, the more intensive relaxation techniques, additional help-seeking, problem solving, and detailed goal identification should either be redeveloped or excluded.
- Users may benefit from supplementary content or additional resources related to depression, stress and anxiety; boredom and loneliness; physical health; and anger management.
- The help-seeking profiles of GAMBLINGLESS users highlight the need to make contact details for multiple help options available across the course of the program.

Look and feel of the GAMBLINGLESS program

- Both users and guides indicated that the GAMBLINGLESS program was easy to use and navigate but guides wanted greater integration between the user and guide program interface.
- The GAMBLINGLESS program was designed to be a comprehensive evidence-based program from which more brief and targeted interventions could be developed. The length of the program, however, should be examined as this was possibly a reason for low user engagement. Some users found the intensity helpful, while others found it overwhelming. Content brevity must be balanced with therapeutic dosing. Although it broadly follows a therapeutic schedule (around an hour each module), the online modality affords an opportunity to offer the program in smaller segments and more frequently (i.e., 15 minutes every day of the week).
- Like most online self-directed programs, low engagement was a limitation of the GAMBLINGLESS program, highlighting the need for additional strategies to enhance motivation to engage in the program, such as the inclusion of follow-up modules that make long-term support possible, face-to-face contact before referral into the program, frequent reminder emails, rewards and bonuses, tailored emails and website content, and enhancement of the program graphics and interactivity.
- Despite the open availability of all activities in the GAMBLINGLESS program, users appeared to begin at module 1 then progressively drop off their participation. Some users also reported that some activities were more relevant to them than others and that they would benefit from some direction about which activities were most relevant to them. Users may therefore benefit from a more individualised approach by directing users to relevant activities based on what they wish to get out of the program.
- Both users and guides indicated they could trust the information in the program due to the credibility of the organisations and academic team. To ensure the program is trustworthy there should be continued identification or alliance with Deakin University. This should include identification of the researchers involved in the program development and evaluation.

User suitability

- The GAMBLINGLESS program attracted gamblers who experienced problems at the severe end of the gambling continuum. Further effort is therefore required to target gamblers with lower problem gambling severities.
- The GAMBLINGLESS program was equally effective for most gambler subgroups, providing a preliminary indication that the program content, look and feel may not need to be personalised to individual user characteristics.
- The GAMBLINGLESS program was offered to anyone with a gambling problem but the current study suggests further screening could be conducted to ensure users have access to the service most likely to fit their needs. For example, some users reported that GAMBLINGLESS was too intensive thereby suggesting a different type of intervention may be more appropriate (e.g., self-exclusion, brief intervention).
- Over half of GAMBLINGLESS users selected a non-abstinence goal and nearly half shifted their goal across the course of the program. Consistent with a harm minimisation approach, it is recommended that users continue to be provided the option of non-abstinence goals.
- One quarter of GAMBLINGLESS users resided in Victoria, highlighting the potential for users residing from other states accessing a Victorian online self-directed gambling program.

Delivery of guidance or support

- The similarity in outcomes by users receiving guidance and the low rate of uptake of guidance contrasts with a general agreement that guidance would be helpful; this suggests a rethink of the nature of support.
- Future development needs consider the development of screening that is able to better link user needs for guidance and support and the type and amount of support provided.
- Users held no preference about whether peers or professionals should provide support, although automated guidance was not a preferred option. Automated guidance should therefore be avoided and peer guidance may be a valuable addition to the GAMBLINGLESS program.
- Users indicated that email was their preferred method for receiving guidance due to convenience and privacy concerns, although some thought guidance could include some text messages or occasional, but scheduled, telephone calls. Guidance can therefore be reasonably provided by email, telephone, or via other avenues, such as chat. According to guides, however, the content of emails requires more personalisation.
- Screening should include determining the type of support (i.e., psychological therapies, coaching), the best person to provide support (e.g., peer to peer support, professional), the modality for support (i.e., email, phone, chat, face-to-face). Screening should also include determination of the amount of support needed (e.g., as needed, weekly, everyday) and over what duration support should be provided (e.g., weeks or months).
- The potential benefit of adding therapeutic contact to the GAMBLINGLESS program must be balanced against the preference of some users for the anonymity and freedom of using an unguided intervention.

- Some guides also experienced conflict in terms of managing their role as a guide and managing other workplace priorities. Integration of the GAMBLINGLESS program into existing services requires workload allocation to this activity.

Screening, assessment, and evaluation

- The PGSI failed to adequately discriminate between gamblers accessing the GAMBLINGLESS program, while the G-SAS classified users across a continuum of problem severity. The G-SAS has the added advantage of established reliability and validity in measuring symptom severity prior to treatment and assessing changes in gambling symptoms across treatment. Subsequent evaluations of online self-directed programs may consider employing this measure (or the gambling urge subscale) as a measure of gambling symptom severity prior to treatment and employed as a measure of change across the program.
- GAMBLINGLESS users reported considerable psychological dysfunction, highlighting the need for online self-directed programs to adequately screen for psychiatric comorbidity and provide referral information or resources that adequately address these issues.
- Guides indicated that they would be more comfortable with integrating the GAMBLINGLESS program into their service delivery if the program had demonstrated efficacy. Although this trial provides preliminary evidence of the effectiveness of the program, research comparing user outcomes to those of a non-treatment control group are required before definitive statements are made regarding its efficacy.

Improvement in user management systems

- Guides should have access to user information so that emails can be better tailored to the user's progress through the GAMBLINGLESS program.
- Information could include user demographics, screening and assessment information, progress through the program including content attempted and completed as well as time spent in the program.
- User management and communication should be undertaken in one system, but email correspondence should be undertaken within the professional's own work email. To ensure the integrity of the program, emails should be blind copied into the GAMBLINGLESS program.

Training and supervision

- This new medium as well as the role of being a guide brings new challenges to experienced counsellors in terms of providing professional oversight. Indeed, the current study suggests that more experienced counsellors were most frustrated in their guidance role. To address this issue, two possible options include recruiting guides who are less experienced or qualified but enthusiastic and positive towards providing minimal support. Alternatively, experienced counsellors require further training in how to manage being on the periphery of their user's journey of change.
- Guides reported limited in-depth knowledge of the content of the program and this was possibly a barrier to effectively linking users to relevant sections of the program. Furthermore, multiple guides indicated they did not know what screening was undertaken prior to commencement of the intervention. Future training should include the requirement of the guide completing the entirety of the program as a participant (including the registration and follow-up). This would potentially improve knowledge of the program and ability to link users appropriately.

- Although guides were optimistic about the integration of the program within their current roles, this raises the issue regarding how counsellors who do not employ CBT in their practice. Counsellors could be selected for guidance based on their practice of CBT, their willingness to employ an alternative theoretical orientation to their own, or their willingness to undertake training in CBT.

References

- Abbott, M., Bellringer, M., Hodgins, D. C., Palmer Du Preez, K., Landon, J., Sullivan, S., & Feigin, V. (2012). Effectiveness of problem gambling brief telephone interventions: A randomised controlled trial. *Wellington: Ministry of Health*.
- Acock, A. (2013). *Discovering structural equation modeling using Stata*. College Station, Texas: Stata Press.
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Arlington, VA: American Psychiatric Association.
- Andersson, G., Carlbring, P., Berger, T., Almlöv, J., & Cuijpers, P. (2009). What makes internet therapy work? *Cognitive behaviour therapy*, 38(S1), 55-60.
- Andersson, G., & Cuijpers, P. (2008). Pros and cons of online cognitive-behavioural therapy. *British Journal of Psychiatry*, 193(4), 270-271. doi:10.1192/bjp.bp.108.054080
- Andersson, G., Estling, F., Jakobsson, E., Cuijpers, P., & Carlbring, P. (2011). Can the patient decide which modules to endorse? An open trial of tailored internet treatment of anxiety disorders. *Cognitive behaviour therapy*, 40(1), 57-64.
- Bailer, U., de Zwaan, M., Leisch, F., Strnad, A., Lennkh-Wolfsberg, C., El-Giamal, N., . . . Kasper, S. (2004). Guided self-help versus cognitive-behavioral group therapy in the treatment of bulimia nervosa. *International Journal of Eating Disorders*, 35(4), 522-537.
- Barak, A., & Buchanan, T. (2004). Internet-based psychological testing and assessment. In R. Kraus, G. Stricker, & C. Speyer (Eds.), *Online Counseling: A Handbook for Mental Health Professionals*. UK: Elsevier Academic Press.
- Barazzone, N., Cavanagh, K., & Richards, D. A. (2012). Computerized cognitive behavioural therapy and the therapeutic alliance: A qualitative enquiry. *British Journal of Clinical Psychology*, 51(4), 396-417.
- Beatty, L., & Binnion, C. (2016). A Systematic Review of Predictors of, and Reasons for, Adherence to Online Psychological Interventions. *International Journal of Behavioral Medicine*, 23(6), 776-794. doi:10.1007/s12529-016-9556-9
- Boudreaux, E. D., Sullivan, A., Abar, B., Bernstein, S. L., Ginde, A. A., & Camargo, C. A. (2012). Motivation rulers for smoking cessation: a prospective observational examination of construct and predictive validity. *Addiction science & clinical practice*, 7(1), 1.
- Bowman, D., Scogin, F., Floyd, M., Patton, E., & Gist, L. (1997). Efficacy of self-examination therapy in the treatment of generalized anxiety disorder. *Journal of Counseling Psychology*, 44(3), 267.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Breslin, F. C., Sobell, L. C., Sobell, M. B., & Agrawal, S. (2000). A comparison of a brief and long version of the Situational Confidence Questionnaire. *Behaviour Research and Therapy*, 38(12), 1211-1220.
- Browne, M., Langham, E., Rawat, V., Greer, N., Li, E., Rose, J., . . . Best, T. (2016). *Assessing gambling-related harm in Victoria: a public health perspective*. Melbourne: Victorian Responsible Gambling Foundation.
- Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT alcohol consumption questions (AUDIT-C): An effective brief screening test for problem drinking. *Archives of Internal Medicine*, 158(16), 1789-1795.
- Busseri, M. A., & Tyler, J. D. (2003). Interchangeability of the working alliance inventory and working alliance inventory, short form. *Psychological Assessment*, 15(2), 193.
- Carlbring, P., & Smit, F. (2008). Randomized trial of internet-delivered self-help with telephone support for pathological gamblers. *J Consult Clin Psychol*, 76(6), 1090.
- Carrard, I., Crepin, C., Rouget, P., Lam, T., Van Der Linden, M., & Golay, A. (2011). Acceptance and efficacy of a guided Internet self-help treatment program for obese patients with binge eating disorder. *Clinical Practice and Epidemiology in Mental Health*, 7, 8-18. doi:10.2174/1745017901107010008
- Carter, J. C., & Fairburn, C. G. (1998). Cognitive-behavioral self-help for binge eating disorder: a controlled effectiveness study. *J Consult Clin Psychol*, 66(4), 616-623.
- Casey, L. M., Oei, T. P. S., Raylu, N., Horrigan, K., Day, J., Ireland, M., & Clough, B. A. (2017). Internet-Based Delivery of Cognitive Behaviour Therapy Compared to Monitoring, Feedback and Support for Problem Gambling: A Randomised Controlled Trial. *Journal of Gambling Studies*, 1-18.
- Christensen, H., Griffiths, K., Groves, C., & Korten, A. (2006). Free range users and one hit wonders: Community users of an internet-based cognitive behaviour therapy program. *Australian and New Zealand Journal of Psychiatry*, 40(1), 59-62. doi:10.1111/j.1440-1614.2006.01743.x
- Christensen, H., Griffiths, K. M., & Farrer, L. (2009). Adherence in internet interventions for anxiety and depression: systematic review. *Journal of medical Internet research*, 11(2), e13.
- Christensen, H., Griffiths, K. M., Mackinnon, A. J., & Brittcliffe, K. (2006). Online randomized controlled trial of brief and full cognitive behaviour therapy for depression. *Psychological Medicine*, 36(12), 1737-1746. doi:10.1017/S0033291706008695

- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. 2nd edn. Hillsdale, New Jersey: L: Erlbaum.
- Coull, G., & Morris, P. G. (2011). The clinical effectiveness of CBT-based guided self-help interventions for anxiety and depressive disorders: a systematic review. *Psychological Medicine*, 41(11), 2239-2252.
- Cowlishaw, S., Merkouris, S. S., Dowling, N. A., Anderson, C., Jackson, A., & Thomas, S. (2012). Psychological therapies for pathological and problem gambling. *Cochrane Database of Systematic Reviews*, 11, CD008937. doi:10.1002/14651858.CD008937.pub2
- Cox, W. M., Rosenberg, H., Hodgins, C. H., Macartney, J. I., & Maurer, K. A. (2004). United Kingdom and United States healthcare providers' recommendations of abstinence versus controlled drinking. *Alcohol Alcohol*, 39(2), 130-134.
- Cuijpers, P., Donker, T., van Straten, A., Li, J., & Andersson, G. (2010). Is guided self-help as effective as face-to-face psychotherapy for depression and anxiety disorders? A systematic review and meta-analysis of comparative outcome studies. *Psychological Medicine*, 40(12), 1943-1957.
- Cunningham, J. A., Hodgins, D. C., Bennett, K., Bennett, A., Talevski, M., Mackenzie, C. S., & Hendershot, C. S. (2016). Online interventions for problem gamblers with and without co-occurring mental health symptoms: Protocol for a randomized controlled trial. *BMC Public Health*, 16(1), 1.
- Delfabbro, P. (2008). *A Review of Australian Gambling Research*. Gambling Research Australia.
- den Boer, P. C. A. M., Wiersma, D., & van den Bosch, R. J. (2004). Why is self-help neglected in the treatment of emotional disorders? A meta-analysis. *Psychological Medicine*, 34(06), 959-971.
- Dickerson, M., Hinchey, J., & Legg England, S. (1990). Minimal treatments and problem gamblers: A preliminary investigation. *Journal of Gambling Studies*, 6(1), 87-102.
- Donkin, L., Christensen, H., Naismith, S. L., Neal, B., Hickie, I. B., & Glozier, N. (2011). A systematic review of the impact of adherence on the effectiveness of e-therapies. *Journal of medical Internet research*, 13(3), e52.
- Dowling, N. A. (2007). *The selection of controlled gambling in Australian problem gambling treatment services*. Paper presented at the Psychology making an impact: Proceedings of 42nd Australian Psychological Society annual conference, Brisbane.
- Dowling, N. A., & Cosic, S. (2011). Client engagement characteristics associated with problem gambling treatment outcomes. *International Journal of Mental Health and Addiction*, 9(6), 656-671.
- Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2014). The prevalence of comorbid personality disorders in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Journal Of Personality Disorders*, 1-20.
- Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2015). Prevalence of psychiatric co-morbidity in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry*, 49(6), 519-539. doi:10.1177/0004867415575774
- Dowling, N. A., Jackson, A. C., Suomi, A., Lavis, T., Thomas, S. A., Patford, J., . . . Abbott, M. (2014). Problem gambling and family violence: prevalence and patterns in treatment-seekers. *Addictive behaviors*, 39(12), 1713-1717.
- Dowling, N. A., Merkouris, S. S., & Lorains, F. K. (2016). Interventions for comorbid problem gambling and psychiatric disorders: Advancing a developing field of research. *Addictive Behaviours*, 58, 21-30. doi:10.1016/j.addbeh.2016.02.012
- Dowling, N. A., & Smith, D. (2007). Treatment goal selection for female pathological gambling: A comparison of abstinence and controlled gambling. *Journal of Gambling Studies*, 23(3), 335-345. doi:10.1007/s10899-007-9064-6
- Dowling, N. A., Smith, D., & Thomas, T. (2005). Electronic gaming machines: are they the 'crack-cocaine' of gambling? *Addiction*, 100(1), 33-45.
- Dowling, N. A., Youssef, G. J., Jackson, A. C., Pennay, D. W., Francis, K. L., Pennay, A., & Lubman, D. I. (2016). National estimates of Australian gambling prevalence: Findings from a dual-frame omnibus survey. *Addiction*, 111(3), 420-435. doi:10.1111/add.13176
- Eysenbach, G. (2005). The law of attrition. *Journal of medical Internet research*, 7(1). doi:10.2196/jmir.7.1.e11
- Ferris, J., & Wynne, H. (2001). *The Canadian Problem Gambling Index: Final report*. Ottawa, ON: Canadian Centre on Substance Abuse.
- Fledderus, M., Bohlmeijer, E. T., Pieterse, M. E., & Schreurs, K. M. G. (2012). Acceptance and commitment therapy as guided self-help for psychological distress and positive mental health: a randomized controlled trial. *Psychological Medicine*, 42(03), 485-495.
- Furmark, T., Carlbring, P., Hedman, E., Sonnenstein, A., Clevberger, P., Bohman, B., . . . Holmström, A. (2009). Guided and unguided self-help for social anxiety disorder: randomised controlled trial. *The British Journal of Psychiatry*, 195(5), 440-447.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D. I., & Blaszczynski, A. (2014). The prevalence and determinants of problem gambling in Australia: Assessing the impact of interactive gambling and new technologies. *Psychology of Addictive Behaviors*, 28(3), 769.

- Garvin, V., Striegel-Moore, R. H., & Wells, A. M. (1998). Participant reactions to a cognitive-behavioral guided self-help program for binge eating: developing criteria for program evaluation. *Journal of Psychosomatic Research*, 44(3-4), 407-412.
- Ghaderi, A. (2006). Attrition and outcome in self-help treatment for bulimia nervosa and binge eating disorder: A constructive replication. *Eating behaviors*, 7(4), 300-308.
- Glasgow, R. E., & Emmons, K. M. (2007). How can we increase translation of research into practice? Types of evidence needed. Vol. 28. *Annual Review of Public Health* (pp. 413-433).
- Gooding, P., & Tarrier, N. (2009). A systematic review and meta-analysis of cognitive-behavioural interventions to reduce problem gambling: hedging our bets? *Behaviour Research and Therapy*, 47(7), 592-607. doi:10.1016/j.brat.2009.04.002
- Gordon, A. J., Maisto, S. A., McNeil, M., Kraemer, K. L., Conigliaro, R. L., Kelley, M. E., & Conigliaro, J. (2001). Three questions can detect hazardous drinkers. *Journal of Family Practice*, 50(4), 313-313.
- Grant, J. E., & Kim, S. W. (2005). Quality of life in kleptomania and pathological gambling. *Comprehensive Psychiatry*, 46(1), 34-37. doi:<http://dx.doi.org/10.1016/j.comppsy.2004.07.022>
- Gueorguieva, R., & Krystal, J. H. (2004). Move over ANOVA: Progress in Analyzing Repeated-Measures Data and Its Reflection in Papers Published in the Archives of General Psychiatry. *Archives of General Psychiatry*, 61(3), 310-317. doi:10.1001/archpsyc.61.3.310
- Hanley, T., & Reynolds, D. (2009). Counselling psychology and the internet: A review of the quantitative research into online outcomes and alliances within text-based therapy. *Counselling Psychology Review*, 24(2), 4-13.
- Hesse, M. (2006). The Readiness Ruler as a measure of readiness to change poly-drug use in drug abusers. *Harm reduction journal*, 3(1), 1.
- Hirai, M., & Clum, G. A. (2006). A meta-analytic study of self-help interventions for anxiety problems. *Behavior Therapy*, 37(2), 99-111.
- Hodgins, D. C., Currie, S., el-Guebaly, N., & Peden, N. (2004). Brief motivational treatment for problem gambling: a 24-month follow-up. *Psychology of Addictive Behaviors*, 18(3), 293.
- Hodgins, D. C., Currie, S. R., Currie, G., & Fick, G. H. (2009). Randomized trial of brief motivational treatments for pathological gamblers: More is not necessarily better. *J Consult Clin Psychol*, 77(5), 950.
- Hodgins, D. C., Currie, S. R., & el-Guebaly, N. (2001). Motivational enhancement and self-help treatments for problem gambling. *J Consult Clin Psychol*, 69(1), 50.
- Hodgins, D. C., Fick, G. H., Murray, R., & Cunningham, J. (2013). Internet-based interventions for disordered gamblers: Study protocol for a randomized controlled trial of online self-directed cognitive-behavioural motivational therapy. *BMC Public Health*, 13(1). doi:10.1186/1471-2458-13-10
- Hodgins, D. C., Leigh, G., Milne, R., & Gerrish, R. (1997). Drinking goal selection in behavioral self-management treatment of chronic alcoholics. *Addictive behaviors*, 22(2), 247-255.
- Holländare, F., Johnsson, S., Randestad, M., Tillfors, M., Carlbring, P., Andersson, G., & Engström, I. (2011). Randomized trial of Internet-based relapse prevention for partially remitted depression. *Acta Psychiatrica Scandinavica*, 124(4), 285-294. doi:10.1111/j.1600-0447.2011.01698.x
- Holmes, C., & Foster, V. (2012). A Preliminary Comparison Study of Online and Face-to-Face Counseling: Client Perceptions of Three Factors. *Journal of Technology in Human Services*, 30(1), 14-31. doi:10.1080/15228835.2012.662848
- Holtgraves, T. (2009). Evaluating the problem gambling severity index. *Journal of Gambling Studies*, 25(1), 105-120. doi:10.1007/s10899-008-9107-7
- Hosmer, D., & Lemeshow, S. (2000). *Applied logistic regression* (2nd ed.). New York: Wiley.
- Hotopf, M. (2002). The pragmatic randomised controlled trial. *Advances in Psychiatric Treatment*, 8(5), 326-333.
- Humke, C., & Radnitz, C. L. (2005). An instrument for assessing coping with temptation: psychometric properties of the alcohol abuse coping response inventory. *Substance Use & Misuse*, 40(1), 37-62.
- Jacobson, N. S., & Truax, P. (1991). Clinical significance: a statistical approach to defining meaningful change in psychotherapy research. *J Consult Clin Psychol*, 59(1), 12.
- Johansson, R., & Andersson, G. (2012). Internet-based psychological treatments for depression. *Expert Review of Neurotherapeutics*, 12(7), 861-870. doi:10.1586/ern.12.63
- Jones, C., Bryant-Waugh, R., Turner, H., Gamble, C., Melhuish, L., & Jenkins, P. (2012). Who benefits most from guided self-help for binge eating? An investigation into the clinical features of completers and non-completers. *Eating behaviors*, 13(2), 146-149.
- Kazdin, A. E., & Blase, S. L. (2011). Rebooting psychotherapy research and practice to reduce the burden of mental illness. *Perspectives on Psychological Science*, 6(1), 21-37.
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S.-L., . . . Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(06), 959-976.
- Khan, N., Bower, P., & Rogers, A. (2007). Guided self-help in primary care mental health: Meta-synthesis of qualitative studies of patient experience. *British Journal of Psychiatry*, 191(3), 206-211. doi:10.1192/bjp.bp.106.032011

- Kim, S. W., Grant, J. E., Potenza, M. N., Blanco, C., & Hollander, E. (2009). The Gambling Symptom Assessment Scale (G-SAS): a reliability and validity study. *Psychiatry Research*, 166(1), 76-84.
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.
- LaBrie, R. A., Peller, A. J., LaPlante, D. A., Bernhard, B., Harper, A., Schrier, T., & Shaffer, H. J. (2012). A Brief Self-Help Toolkit Intervention for Gambling Problems: A Randomized Multisite Trial. *American Journal of Orthopsychiatry*, 82(2), 278-289.
- Ladouceur, R. (2005). Controlled gambling for pathological gamblers. *Journal of Gambling Studies*, 21(1), 49-57.
- Ladouceur, R., Lachance, S., & Fournier, P. M. (2009). Is control a viable goal in the treatment of pathological gambling? *Behaviour Research and Therapy*, 47(3), 189-197. doi:10.1016/j.brat.2008.11.004
- Ladouceur, R., Sylvain, C., Sévigny, S., Poirier, L., Brisson, L., Dias, C., . . . Pilote, P. (2006). Pathological gamblers: Inpatients' versus outpatients' characteristics. *Journal of Gambling Studies*, 22(4), 443-450.
- Lal, S., & Adair, C. E. (2014). E-mental health: A rapid review of the literature. *Psychiatric Services*, 65(1), 24-32. doi:10.1176/appi.ps.201300009
- Ledgerwood, D. M., & Petry, N. M. (2004). Gambling and suicidality in treatment-seeking pathological gamblers. *The Journal of Nervous and Mental Disease*, 192(10), 711-714.
- Ledgerwood, D. M., Steinberg, M. A., Wu, R., & Potenza, M. N. (2005). Self-reported gambling-related suicidality among gambling helpline callers. *Psychology of Addictive Behaviors*, 19(2), 175.
- Lewin, S., Glenton, C., & Oxman, A. (2009). Use of qualitative methods alongside randomised controlled trials of complex healthcare interventions: methodological study. *British Medical Journal*, 339.
- Lidren, D. M., Watkins, P. L., Gould, R. A., Clum, G. A., Asterino, M., & Tulloch, H. L. (1994). A comparison of bibliotherapy and group therapy in the treatment of panic disorder. *J Consult Clin Psychol*, 62(4), 865.
- Loeb, K. L., Wilson, G. T., Gilbert, J. S., & Labouvie, E. (2000). Guided and unguided self-help for binge eating. *Behaviour Research and Therapy*, 38(3), 259-272.
- Lovell, K., Bower, P., Richards, D., Barkham, M., Sibbald, B., Roberts, C., . . . Hennessy, S. (2008). Developing guided self-help for depression using the Medical Research Council complex interventions framework: a description of the modelling phase and results of an exploratory randomised controlled trial. *Bmc Psychiatry*, 8(1), 1.
- Lynch, F. L., Striegel-Moore, R. H., Dickerson, J. F., Perrin, N., DeBar, L., Wilson, G. T., & Kraemer, H. C. (2010). Cost-Effectiveness of Guided Self-Help Treatment for Recurrent Binge Eating. *J Consult Clin Psychol*, 78(3), 322-333. doi:10.1037/a0018982
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007) Mediation analysis. Vol. 58. *Annual Review of Psychology* (pp. 593-614).
- Marotta, J. J. (2003). Oregon's Problem Gambling Services: Public health orientation in a stepped-care approach [H2]. *Journal of Gambling Issues*.
- Melville, K. M., Casey, L. M., & Kavanagh, D. J. (2007). Psychological treatment dropout among pathological gamblers. *Clinical Psychology Review*, 27, 944-958.
- Melville, K. M., Casey, L. M., & Kavanagh, D. J. (2010). Dropout from Internet-based treatment for psychological disorders. *British Journal of Clinical Psychology*, 49(4), 455-471.
- Merkouris, S. S., Dowling, N. A., Rodda, S., & Youssef, G. J. (2016). Transitioning into and out of low or moderate risk gambling: Socio-demographic, gambling-related harm and change profiles: Victorian Responsible Gambling Foundation.
- Merkouris, S. S., Thomas, S. A., Browning, C. J., & Dowling, N. A. (2016). Predictors of outcomes of psychological treatments for disordered gambling: A systematic review. *Clinical Psychology Review*, 48, 7-31.
- Miller, W. R., & Brown, J. M. (1994). What I Want for Treatment (2.0) A questionnaire designed explain what you would like to have happen in your treatment.
- Milton, S., Crino, R., Hunt, C., & Prosser, E. (2002). The effect of compliance-improving interventions on the cognitive-behavioural treatment of pathological gambling. *Journal of Gambling Studies*, 18(2), 207-229.
- Murray, E., Khadjesari, Z., White, I., Kalaitzaki, E., Godfrey, C., McCambridge, J., . . . Wallace, P. (2009). Methodological challenges in online trials. *Journal of medical Internet research*, 11(2), e9.
- National Institute for Clinical Excellence (NICE). (2004). *Core interventions in the treatment and management of anorexia nervosa, bulimia nervosa, and binge eating disorder*. Retrieved from London:
- National Research Council. (2010). *The Prevention and Treatment of Missing Data in Clinical Trials. Panel on Handling Missing Data in Clinical Trials. Committee on National Statistics, Division of Behavioral and Social Sciences and Education*. Washington, DC: The National Academies Press.
- Neal, P., Delfabbro, P., & O'Neil, M. (2005). *Problem gambling and harm: Toward a national definition*. Retrieved from Melbourne:
- Nordgreen, T., Havik, O., Öst, L., Furmark, T., Carlbring, P., & Andersson, G. (2012). Outcome predictors in guided and unguided self-help for social anxiety disorder. *Behaviour Research and Therapy*, 50(1), 13-21.

- Nordin, S., Carlbring, P., Cuijpers, P., & Andersson, G. (2010). Expanding the limits of bibliotherapy for panic disorder: randomized trial of self-help without support but with a clear deadline. *Behavior Therapy*, 41(3), 267-276.
- Ong, H. S. R., Peh, C.-X., Asharani, P. V., & Guo, S. (2016). Factor structure of the Gambling Symptom Assessment Scale among treatment-seeking adults in Singapore. *International Gambling Studies*, 16(3), 442-454.
- Palmqvist, B., Carlbring, P., & Andersson, G. (2007). Internet-delivered treatments with or without therapist input: does the therapist factor have implications for efficacy and cost? *Expert Review of Pharmacoeconomics & Outcomes Research*, 7(3), 291-297.
- Pantalon, M. V., & Swanson, A. J. (2003). Use of the University of Rhode Island change assessment to measure motivational readiness to change in psychiatric and dually diagnosed individuals. *Psychology of Addictive Behaviors*, 17(2), 91-97. doi:10.1037/0893-164X.17.2.91
- Patsopoulos, N. A. (2011). A pragmatic view on pragmatic trials. *Dialogues Clin Neurosci*, 13(2), 217-224.
- Petry, N. M. (2005). *Pathological gambling: Etiology, comorbidity, and treatment*. American Psychological Association.
- Petry, N. M., Ammerman, Y., Bohl, J., Doersch, A., Gay, H., Kadden, R., . . . Steinberg, K. (2006). Cognitive-behavioral therapy for pathological gamblers. *J Consult Clin Psychol*, 74(3), 555.
- Petry, N. M., Litt, M. D., Kadden, R., & Ledgerwood, D. M. (2007). Do coping skills mediate the relationship between cognitive-behavioral therapy and reductions in gambling in pathological gamblers? *Addiction*, 102(8), 1280-1291.
- Petry, N. M., Weinstock, J., Ledgerwood, D. M., & Morasco, B. (2008). A randomized trial of brief interventions for problem and pathological gamblers. *J Consult Clin Psychol*, 76(2), 318.
- Potter, J., Cantarero, R., & Wood, H. (2012). The multi-dimensional nature of predicting quality of life. *Procedia-Social and Behavioral Sciences*, 50, 781-790.
- Power, M. J. (2003). Development of a common instrument for quality of life. In A. Nosikov & C. Gudex (Eds.), *Developing Common Instruments for Health Surveys* (pp. 145-163). Amsterdam: IOS Press.
- Preschl, B., Maercker, A., & Wagner, B. (2011). The working alliance in a randomized controlled trial comparing online with face-to-face cognitive-behavioral therapy for depression. *Bmc Psychiatry*, 11(1), 189.
- Productivity Commission. (2010). *Gambling, Report no. 50*. Canberra.
- Proudfoot, J., Parker, G., Manicavasagar, V., Hadzi-Pavlovic, D., Whitton, A., Nicholas, J., . . . Burckhardt, R. (2012). Effects of adjunctive peer support on perceptions of illness control and understanding in an online psychoeducation program for bipolar disorder: a randomised controlled trial. *Journal of Affective Disorders*, 142(1), 98-105.
- Rapee, R. M., Abbott, M. J., Baillie, A. J., & Gaston, J. E. (2007). Treatment of social phobia through pure self-help and therapist-augmented self-help. *British Journal of Psychiatry*, 191(3), 246-252. doi:10.1192/bjp.bp.106.028167
- Raylu, N., & Oei, T. P. S. (2004). The Gambling Related Cognitions Scale (GRCS): Development, confirmatory factor validation and psychometric properties. *Addiction*, 99(6), 757-769.
- Relton, C., Torgerson, D., O'Cathain, A., & Nicholl, J. (2010). Rethinking pragmatic randomised controlled trials: introducing the "cohort multiple randomised controlled trial" design. *Bmj*, 340, c1066.
- Richardson, R., & Richards, D. A. (2006). Self-help: Towards the next generation. *Behavioural and Cognitive Psychotherapy*, 34(1), 13-23. doi:10.1017/S1352465805002481
- Ritterband, L., Ardan, K., Thorndike, F., Magee, J., Saylor, D., Cox, D., . . . Borowitz, S. (2008). Real world use of an Internet intervention for pediatric encopresis. *Journal of medical Internet research*, 10(2), e16.
- Robson, E., Edwards, J., Smith, G., & Colman, I. (2002). Gambling decisions: An early intervention program for problem gamblers. *Journal of Gambling Studies*, 18(3), 235-255.
- Rodda, S., & Lubman, D. I. (2013). Characteristics of gamblers using a national online counselling service for problem gambling. *Journal of Gambling Studies*, 1-13.
- Rodda, S., Lubman, D. I., & Dowling, N. A. (2017). *Examining the impact of e-mental health in problem gambling*. Melbourne: Victorian Responsible Gambling Foundation.
- Rodda, S., Lubman, D. I., Dowling, N. A., Bough, A., & Jackson, A. C. (2013). Web-based counseling for problem gambling: exploring motivations and recommendations. *Journal of medical Internet research*, 15(5), e99.
- Rodda, S., Lubman, D. I., Dowling, N. A., & McCann, T. V. (2013). Reasons for using web-based counselling among family and friends impacted by problem gambling. *Asian Journal of Gambling Issues and Public Health*, 3(1), 1.
- Rodda, S., Lubman, D. I., Iyer, R., Gao, C. X., & Dowling, N. A. (2015). Subtyping based on readiness and confidence: the identification of help-seeking profiles for gamblers accessing web-based counselling. *Addiction*, 110(3), 494-501. doi:10.1111/add.12796
- Sanchez-Ortiz, V. C., Munro, C., & Stahl, D. (2011). A randomized controlled trial of internet-based cognitive-behavioural therapy for bulimia nervosa or related disorders in a student population. *Psychological Medicine*, 41(2), 407-417.

- Sander, W., & Peters, A. (2009). Pathological gambling: influence of quality of life and psychological distress on abstinence after cognitive-behavioral inpatient treatment. *Journal of Gambling Studies*, 25(2), 253-262.
- Schmidt, S., Mühlen, H., & Power, M. (2006). The EUROHIS-QOL 8-item index: psychometric results of a cross-cultural field study. *The European Journal of Public Health*, 16(4), 420-428.
- Schwartz, C. E., Andresen, E. M., Nosek, M. A., & Krahn, G. L. (2007). Response shift theory: important implications for measuring quality of life in people with disability. *Archives of physical medicine and rehabilitation*, 88(4), 529-536.
- Schwartz, C. E., & Sprangers, M. A. G. (1999). Methodological approaches for assessing response shift in longitudinal health-related quality-of-life research. *Social science & medicine*, 48(11), 1531-1548.
- Simon, G. E., Ludman, E. J., Goodale, L. C., Dykstra, D. M., Stone, E., Cutsogorge, D., . . . Pabiniak, C. (2011). An online recovery plan program: can peer coaching increase participation? *Psychiatric Services*, 62(6), 666-669.
- Smith, P. C., Schmidt, S. M., Allensworth-Davies, D., & Saitz, R. (2010). A single-question screening test for drug use in primary care. *Archives of Internal Medicine*, 170(13), 1155-1160.
- Soderstrom, C. A., DiClemente, C. C., Dischinger, P. C., Hebel, J. R., McDuff, D. R., Auman, K. M., & Kufera, J. A. (2007). A controlled trial of brief intervention versus brief advice for at-risk drinking trauma center patients. *Journal of Trauma and Acute Care Surgery*, 62(5), 1102-1112.
- Sprangers, M. A. G., & Schwartz, C. E. (1999). Integrating response shift into health-related quality of life research: a theoretical model. *Social science & medicine*, 48(11), 1507-1515.
- StataCorp. (2015). Stata: Release 14.1. Statistical Software. College Station, TX: StataCorp LP.
- Sterne, J. A. C., White, I. R., Carlin, J. B., Spratt, M., Royston, P., Kenward, M. G., . . . Carpenter, J. R. (2009). Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. *Bmj*, 338, b2393.
- Sucala, M., Schnur, J. B., Constantino, M. J., Miller, S. J., Brackman, E. H., & Montgomery, G. H. (2012). The therapeutic relationship in e-therapy for mental health: a systematic review. *Journal of medical Internet research*, 14(4), e110.
- Suurvali, H., Cordingley, J., Hodgins, D. C., & Cunningham, J. (2009). Barriers to seeking help for gambling problems: A review of the empirical literature. *Journal of Gambling Studies*, 25(3), 407-424.
- Thiels, C., Schmidt, U., Treasure, J., Garthe, R., & Troop, N. (1998). Guided self-change for bulimia nervosa incorporating use of a self-care manual. *American Journal of Psychiatry*.
- Thomas, S. A., Merkouris, S. S., Radermacher, H. L., Dowling, N. A., Misso, M. L., Anderson, C. J., & Jackson, A. C. (2011). Australian guideline for treatment of problem gambling: An abridged outline. *The Medical Journal of Australia*, 195(11), 664-665. doi:10.5694/mja11.11088
- Thorndike, F. P., Saylor, D. K., Bailey, E. T., Gonder-Frederick, L., Morin, C. M., & Ritterband, L. M. (2008). Development and perceived utility and impact of an internet intervention for insomnia. *E-journal of applied psychology: clinical and social issues*, 4(2), 32.
- Titov, N., Andrews, G., Choi, I., Schwencke, G., & Mahoney, A. (2008). Shyness 3: Randomized controlled trial of guided versus unguided Internet-based CBT for social phobia. *Australian and New Zealand Journal of Psychiatry*, 42(12), 1030-1040. doi:10.1080/00048670802512107
- Tracey, T. J., & Kokotovic, A. M. (1989). Factor structure of the working alliance inventory. *Psychological Assessment*, 1, 207-210.
- Treweek, S., & Zwarenstein, M. (2009). Making trials matter: Pragmatic and explanatory trials and the problem of applicability. *Trials*, 10. doi:10.1186/1745-6215-10-37
- Verheijden, M. W., Jans, M. P., Hildebrandt, V. H., & Hopman-Rock, M. (2007). Rates and determinants of repeated participation in a web-based behavior change program for healthy body weight and healthy lifestyle. *Journal of medical Internet research*, 9(1), e1.
- Vernmark, K., Lenndin, J., Bjärehed, J., Carlsson, M., Karlsson, J., Öberg, J., . . . Andersson, G. (2010). Internet administered guided self-help versus individualized e-mail therapy: A randomized trial of two versions of CBT for major depression. *Behaviour Research and Therapy*, 48(5), 368-376.
- Wagner, G., Penelo, E., & Wanner, C. (2013). Internet-delivered cognitive-behavioural therapy v. conventional guided self-help for bulimia nervosa: long-term evaluation of a randomised controlled trial. *The British Journal of Psychiatry*, 202, 135-141.
- Walker, M., Toneatto, T., Potenza, M. N., Petry, N. M., Ladouceur, R., Hodgins, D. C., . . . Blaszczynski, A. (2006). A framework for reporting outcomes in problem gambling treatment research: The Banff, Alberta Consensus. *Addiction*, 101(4), 504-511.
- Waller, R., & Gilbody, S. (2009). Barriers to the uptake of computerized cognitive behavioural therapy: A systematic review of the quantitative and qualitative evidence. *Psychological Medicine*, 39(5), 705-712. doi:10.1017/S0033291708004224
- Walsh, B. T., Fairburn, C. G., Mickley, D., Sysko, R., & Parides, M. K. (2004). Treatment of bulimia nervosa in a primary care setting. *American Journal of Psychiatry*, 161(3), 556-561.
- Wangberg, S. C., Bergmo, T. S., & Johnsen, J. A. (2008). Adherence in Internet-based interventions. *Patient Prefer Adherence*, 2, 57-65.

- Westphal, J. R., & Johnson, L. J. (2007). Multiple co-occurring behaviours among gamblers in treatment: Implications and assessment. *International Gambling Studies*, 7(1), 73-99.
- White, I. R., Kalaitzaki, E., & Thompson, S. G. (2011). Allowing for missing outcome data and incomplete uptake of randomised interventions, with application to an Internet-based alcohol trial. *Statistics in medicine*, 30(27), 3192-3207.
- Williams, R. J., Volberg, R. A., & Stevens, R. M. G. (2012). *The population prevalence of problem gambling: Methodological influences, standardized rates, jurisdictional differences, and worldwide trends*. Retrieved from
- Wilson, G. T., & Zandberg, L. J. (2012). Cognitive-behavioral guided self-help for eating disorders: effectiveness and scalability. *Clinical Psychology Review*, 32(4), 343-357.
- Wojtowicz, M., Day, V., & McGrath, P. J. (2013). Predictors of participant retention in a guided online self-help program for university students: prospective cohort study. *Journal of medical Internet research*, 15(5), e96.
- Yakovenko, I., Quigley, L., Hemmelgarn, B. R., Hodgins, D. C., & Ronksley, P. (2015). The efficacy of motivational interviewing for disordered gambling: systematic review and meta-analysis. *Addictive Behaviours*, 43(11), 72-82. doi:10.1016/j.addbeh.2014.12.011
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Appendices

Appendix 1. Descriptive statistics across time-points for outcome measures and process measures

| | Baseline | | | 2-months | | | 3-months | | |
|--|-----------------|-----------------|-------------------|-----------------|-----------------|----------------------------|-----------------|-----------------|-------------------|
| | PSD (n = 38) | GSD (n = 42) | Total (n = 80) | PSD (n = 24) | GSD (n = 31) | Total (n = 50 to 55) | PSD (n = 26) | GSD (n = 29) | Total (n = 55) |
| Primary and secondary outcome measures | | | | | | | | | |
| G-SAS gambling symptom severity | 30.6 (8.0) | 28.8 (8.1) | 29.7 (8.1) | 17.5 (11.9) | 19.5 (11.8) | 18.6 (11.8) | 20.4 (10.6) | 15.1 (9.9) | 17.6 (10.5) |
| G-SAS gambling urges | 10.2 (3.0) | 9.3 (2.8) | 9.7 (2.9) | 6.1 (4.7) | 6.9 (4.2) | 6.6 (4.4) | 7.2 (4.1) | 5.1 (3.5) | 6.1 (3.9) |
| Gambling frequency ^a | 13.8 (12.2) | 15.3 (21.2) | 14.6 (17.4) | 6.1 (7.9) | 15.8 (39.9) | 11.5 (30.5) | 7.9 (8.5) | 3.7 (4.7) | 5.7 (7.0) |
| Gambling frequency mdn (Q1, Q3) ^a | 11 (5, 20) | 8 (4, 20) | 10 (4.5, 20) | 3.5 (0, 8) | 4 (0, 16) | 4 (0, 12) | 5 (1, 14) | 1 (0, 7) | 3 (0, 10) |
| Gambling expenditure M (SD) ^a | 1349 (2645) | 1351 (4657) | 1350 (3812) | 510 (1124) | 657 (1041) | 293 (1070) | 747 (973) | 272 (352) | 497 (748) |
| Gambling expenditure mdn (Q1, Q3) ^a | 427 (0, 1600) | 90 (0, 1010) | 235 (0, 1150) | 33 (0, 500) | 220 (0, 850) | 110 (0, 700) | 264 (10, 1050) | 200 (0, 500) | 200 (0, 600) |
| K6 psychological distress | 16.8 (6.1) | 17.7 (5.5) | 17.3 (5.8) | 12.5 (5.0) | 13.9 (6.0) | 13.3 (5.5) | 14.0 (6.0) | 12.7 (6.3) | 13.3 (6.1) |
| EUROHIS quality of life | 3.2 (1.1) | 3.4 (1.0) | 3.3 (1.1) | 3.7 (0.8) | 3.6 (1.0) | 3.6 (0.9) | 3.3 (1.0) | 3.8 (0.9) | 3.6 (1.0) |
| High Intensity interventions ^a M (SD) | 0.57 (1.2) | 0.57 (1.3) | 0.57 (1.3) | 0.73 (1.4) | 0.71 (1.8) | 0.72 (1.6) | 1.58 (3.8) | 0.93 (1.6) | 1.24 (2.8) |
| Low Intensity interventions ^a M (SD) | 0.19 (0.5) | 0.40 (1.1) | 0.30 (0.9) | 0.23 (1.1) | 0.79 (1.3) | 0.54 (1.2) | 0.35 (0.8) | 0.55 (1.3) | 0.45 (1.1) |
| Process measures | | | | | | | | | |
| GRCS gambling-related cognitions | 18.8 (5.4) | 19.0 (7.2) | 18.9 (6.4) | 12.0 (7.5) | 14.3 (7.2) | 13.3 (7.4) | 14.4 (5.6) | 14.3 (8.1) | 14.4 (7.0) |
| AACRI coping with temptations | 5.7 (3.3) | 6.3 (2.4) | 6.0 (2.9) | 7.8 (2.4) | 8.4 (2.0) | 8.1 (2.2) | 7.5 (2.7) | 8.5 (2.3) | 8.0 (2.5) |
| Importance ruler | 9.1 (1.3) | 9.6 (0.9) | 9.4 (1.1) | 8.7 (2.1) | 8.4 (2.3) | 8.5 (2.2) | 9.2 (1.3) | 9.0 (1.7) | 9.1 (1.5) |
| Readiness ruler | 9.5 (1.1) | 9.7 (0.7) | 9.6 (0.9) | 8.4 (2.2) | 8.6 (2.2) | 8.5 (2.2) | 9.3 (1.3) | 9.2 (1.3) | 9.2 (1.3) |
| Confidence ruler | 5.9 (3.4) | 5.6 (2.8) | 5.8 (3.1) | 7.0 (3.3) | 6.2 (2.7) | 6.6 (3.0) | 5.8 (3.0) | 7.6 (2.2) | 6.7 (2.7) |
| URICA readiness to change | 9.9 (2.5) | 10.7 (2.2) | 10.3 (2.4) | 8.8 (2.6) | 9.8 (2.1) | 9.4 (2.3) | 9.3 (2.9) | 10.5 (2.5) | 9.9 (2.7) |
| BSCQ gambling-related self-efficacy | 46.1 (21.6) | 49.4 (18.6) | 47.9 (20.0) | 70.2 (29.1) | 62.6 (21.3) | 65.9 (25.0) | 59.3 (27.2) | 70.4 (22.2) | 65.2 (25.1) |

^a Past 30 days

Appendix 2. Patterns of missing data for G-SAS

Patterns of missing G-SAS data for both PSD and GSD participants are displayed in Table 23. All participants included in the analyses in this report completed at least one follow-up assessment. For the PSD intervention, approximately 32% of participants completed all 3 assessments, with a further 32% completing the 2-month follow-up only and 37% completing the 3-month follow-up only. For the GSD intervention, approximately 43% completed all three assessments, with a further 31% completing the 2-month follow-up only and 26% completing the 3-month only.

Table 23. Patterns of missing G-SAS gambling symptom severity scores for PSD and GSD intervention groups

| Frequency | Percent (%) | Cumulative (%) | Pattern | | |
|------------|-------------|----------------|----------|----|----|
| | | | Baseline | 2m | 3m |
| PSD | | | | | |
| 14 | 36.84 | 36.84 | X | | X |
| 12 | 31.58 | 68.42 | X | X | |
| 12 | 31.58 | 100.00 | X | X | X |
| 38 | 100.00 | | X | X | X |
| GSD | | | | | |
| 18 | 42.86 | 42.86 | X | X | X |
| 13 | 30.95 | 73.81 | X | X | |
| 11 | 26.19 | 100.00 | X | | X |
| 42 | 100.00 | | X | X | X |

Appendix 3. Assessing Model Fit

To assess how well the mixed model fitted G-SAS gambling symptom severity data, individual-specific intercepts and slopes were predicted after estimation by obtaining best linear unbiased predictions (BLUPs). A normal Q-Q plot for the random intercept BLUP values is shown in Figure 15. The (mostly) linearity of the points indicated that the model provided a good fit of the data that accounted for individual variation at study baseline. For predicted random slopes, there was also a reasonably strong degree of normality in BLUPs as shown in Figure 16.

To assess fitted values that took into account both fixed and random-effects for each participant, standardised residuals were calculated. The distribution of standardized residuals from the mixed model of G-SAS gambling symptom severity outcome data is shown in Figure 17. There did not seem to be any poorly fitting data, but it was informative to identify individuals that had observations greater than two standard deviations (Table 1). One PSD study participant had a moderate residual from high (worse symptoms) G-SAS gambling symptom severity scores at 2-month follow-up. Two participants had moderate residuals from low G-SAS symptom severity scores at baseline.

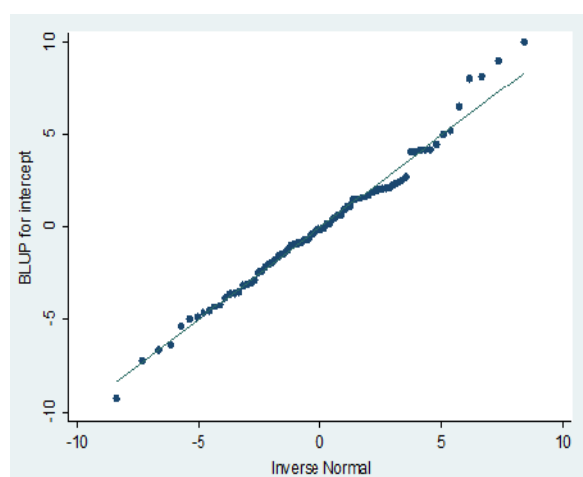


Figure 15. Best linear unbiased predictors (BLUPs) for random intercepts.

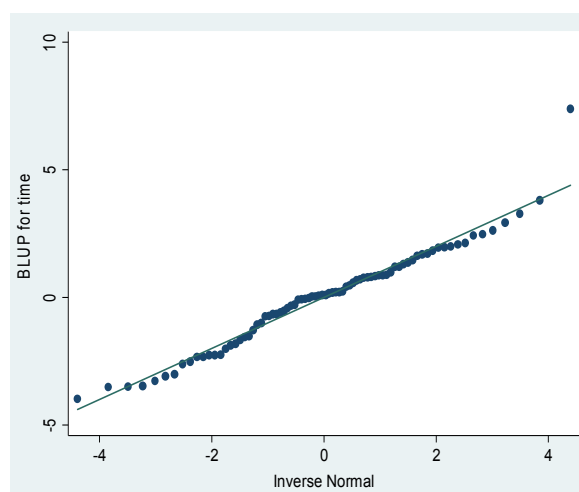


Figure 16. Best linear unbiased predictors (BLUPs) for random slopes.

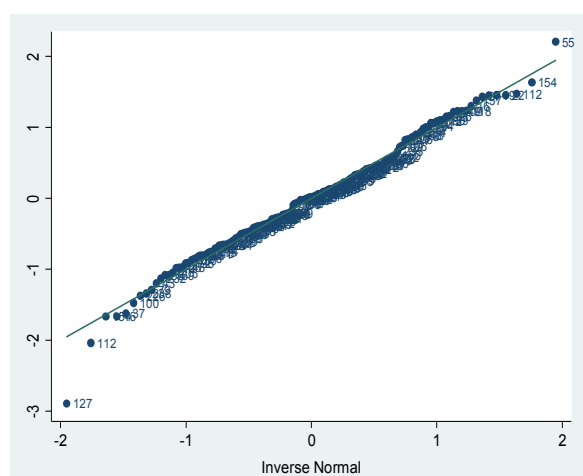


Figure 17. Standardized residuals for mixed model of G-SAS data

Table 24. Individual residuals greater than two standard deviations

| Study participant | Age group (years) | Gender | Intervention group | Time | G-SAS |
|--------------------------|--------------------------|---------------|---------------------------|-------------|--------------|
| 55 | 40-44 | Male | PSD | 2-months | 44 |
| 112 | 30-34 | Female | GSD | Baseline | 18 |
| 127 | 50-54 | Female | PSD | Baseline | 3 |

Appendix 4. Sensitivity Analysis

The analysis of G-SAS gambling symptom severity data involved MLE and this was based on the assumption that missing data were missing at random (MAR). In order to assess for any departures from MAR, three sensitivity analyses were conducted using analysis of covariance (ANCOVA) for 2-month and 3-month G-SAS gambling symptom severity scores as outcome, treatment group as independent variable, and adjusted for baseline G-SAS gambling symptom severity scores. Figure 18 shows the variation in estimated intervention effects at 2-months when mean unobserved G-SAS outcome and mean observed G-SAS outcome differ over a specified range of 6 units (i.e. approximately 0.5 SD). The analysis allows for different missing data mechanisms in each group as one intervention group (i.e., GSD) may have been more intensive than the other (i.e., PSD) and so resulting in a further departure from MAR. When the difference between mean unobserved and mean observed outcomes are assumed to be equal in both PSD and GSD intervention groups, the treatment effects are not very sensitive to departures from MAR. For different missing data mechanisms between PSD and GSD intervention groups, the results indicate relatively small departures from MAR with estimates ranging from 0.43 to 3.84. Overall, the sensitivity analysis suggests that trial findings at 2-month follow-up are mostly consistent with the MAR assumption from a substantive perspective (i.e., the nature of the trial design and interventions). Similar findings were found for departures at 3-month follow-up, with estimates ranging from -2.40 to -5.93.

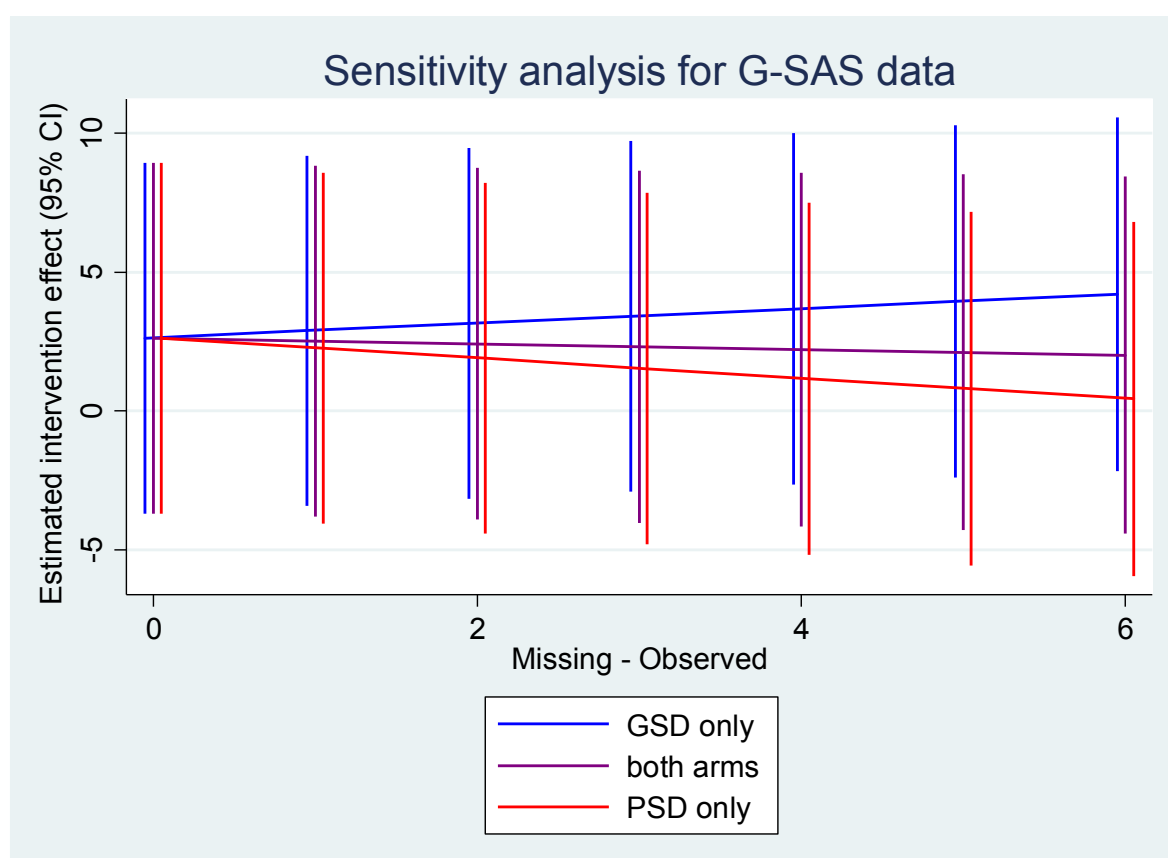


Figure 18. Sensitivity analysis for G-SAS gambling symptom severity data at 2-month follow-up.

An alternative sensitivity analysis was also performed via a pattern mixture approach with multiple imputation. This was done by (1) imputing the missing response values (e.g. 2-month G-SAS gambling symptom severity data) using chained equations for 50 imputations; (2) checking that these

results were the same as for the linear regression for observed data only; and (3) for imputed data, increasing the mean response above that predicted under MAR, and re-analysed. If the data were missing not at random (MNAR), it is likely that the mean at follow-up (for participants for whom it is missing) was higher than that predicted under MAR. We used the distribution N (M=3.0, SD=6.0) to summarise the assumed difference between MNAR and MAR. The treatment effect estimates are reported in Table 25. There are no distinct differences between these estimates under different mechanisms of missingness. In summary, these sensitivity analyses further suggest that findings from mixed models for G-SAS gambling symptom severity data were plausible under a MAR assumption. All standard errors are of considerable size, however, which most likely reflects reduced study power.

Table 25. Estimated effect of GSD intervention (vs PSD intervention) from regression, multiple imputation under MAR, and multiple imputation under MNAR

| Analysis | Estimate | S.E. | p |
|----------------------------|----------|------|-------|
| Regression | 2.62 | 3.14 | 0.408 |
| Multiple imputation (MAR) | 2.25 | 3.04 | 0.537 |
| Multiple imputation (MNAR) | 2.01 | 3.23 | 0.421 |

Appendix 5. Moderators of G-SAS and K6 outcomes – three-way interaction effects

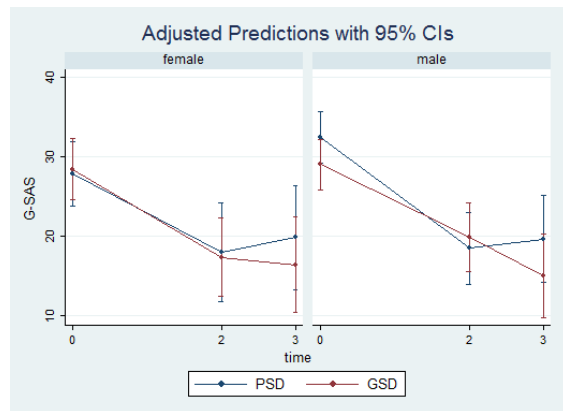


Figure 19. G-SAS gambling symptom severity scores by intervention group, time and gender.

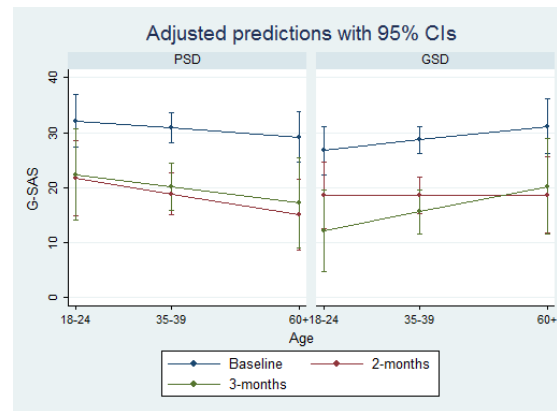


Figure 20. G-SAS symptom severity scores by intervention group, time, and age group.

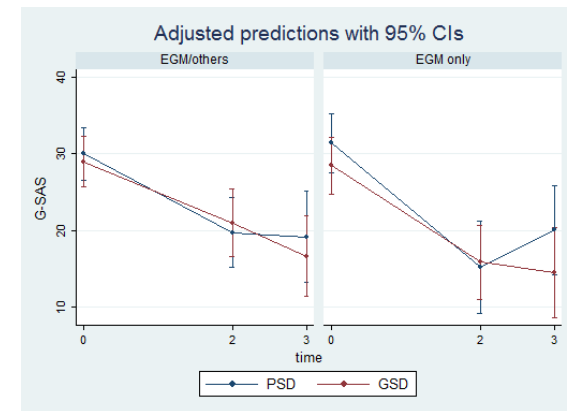


Figure 21. G-SAS gambling symptom severity scores by intervention group, time and EGM use.

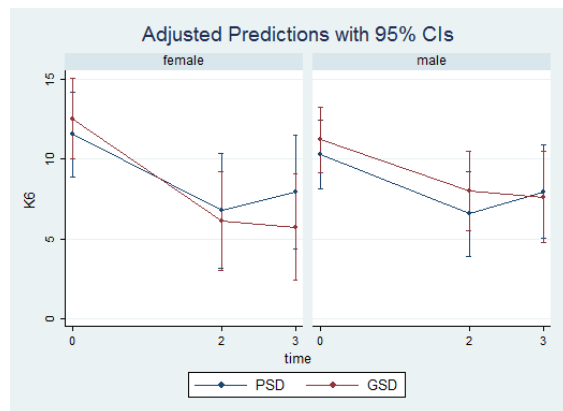


Figure 22. K6 psychological distress scores by intervention group, time and gender.

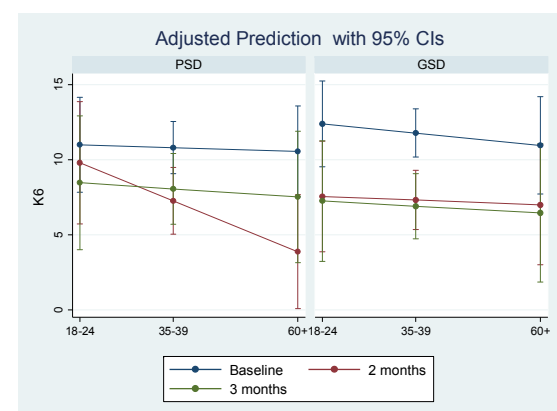


Figure 23. K6 psychological distress scores by intervention group, time and age group.

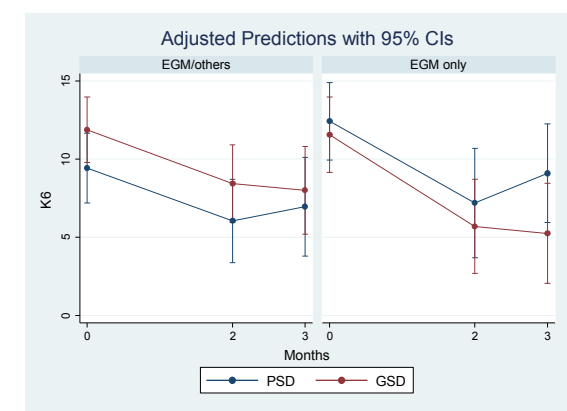


Figure 24. K6 psychological distress scores by intervention group, time and EGM use

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