User engagement with technology-mediated self-guided interventions for addictions: scoping review protocol

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ABSTRACT

Introduction Technology-mediated self-guided interventions (TMSGIs) for addictive disorders represent promising adjuncts and alternatives to traditional treatment approaches (e.g., face-to-face psychotherapy). However, meaningful evaluation of such interventions remains elusive given the lack of consistent terminology and application. Preliminary findings suggest that TMSGIs are useful but engagement remains modest for various reasons reported by users, including lack of personalisation. The aim of this review is to explore how TMSGIs have been defined and applied in addictions populations with an emphasis on technical and logistical features associated with greater user engagement.

Methods and analysis This scoping review protocol was developed in accordance with the Arksey and O’Malley framework. Articles from electronic databases (i.e., PsycINFO, Embase, MEDLINE and CINAHL) will be included if they targeted adolescents or adults with one or more substance or behavioural addictions, excessive behaviours or aspects thereof (e.g., craving) using a privately accessible technology-mediated intervention. Two independent reviewers will screen titles and abstracts for relevance before commencing full-text reviews. Extracted data will be presented in descriptive, tabular and graphical summaries as appropriate.

Ethics and dissemination Ethics committee approval is not required for this study. Review findings will be used to guide the development of preliminary recommendations for real-time addiction intervention development and provision. Emphasis will be placed on practical considerations of user engagement, accessibility, usability and cost. Knowledge users, including clinicians, researchers and people with lived experience, will be engaged for development of one such intervention following publication of review findings.

Registration This scoping review was registered with the Open Science Framework on 15 April 2022 and can be located at http://www.osf.io/3utp9/.

INTRODUCTION

Technology-mediated self-guided interventions (TMSGIs) represent promising low intensity supplements and alternatives to traditional treatment approaches and have demonstrated practical utility when applied to numerous physical and psychological health conditions, including substance-related and behavioural addictions. Broadly, TMSGIs are self-directed psychosocial interventions delivered via technologies that can be privately owned, such as smartphones or personal computers. Often, they take the form of independently accessed online activities, but a range of formats exist. The demand for TMSGIs is high among both treatment users and providers for several reasons and appears to be outpacing robust scientific evaluation. Some reasons for the high demand include cost-effectiveness, accessibility and privacy and lowered threshold for treatment access.

There have been some efforts to review and map the technical structure of TMSGIs. According to Naughton, intervention content within TMSGIs can be triggered by users, servers or contexts. User-triggered content is dependent on users deciding whether and when to access support (e.g., texting HELP to an advice line or opening an application to access content). Server-triggered content is delivered according to fixed schedules, random timing or a combination of both; delivery timing can be generalised or tailored to users’ needs and preferences. Finally, context-triggered contact involves the use of sensors to respond...
based on triggers in users’ environments; geolocation is
the most common form of data used for this purpose.\(^\text{10}\)
These methods are increasingly combined to deliver
interventions characterised by three core features: (a)
proactive content that directly corresponds to real-time
needs when users are at risk of engaging in negative
health behaviours; (b) content and timing that is tailored
based on ecological data collected and (c) inclusion of
content that is not solely user-triggered.\(^\text{11}\)

The addiction field in Canada and worldwide is ripe for
applications of TMSGIs given the large degree of unmet
needs\(^\text{12–14}\) and increasing accessibility to substances and
addictive behaviours.\(^\text{15,16}\) Using contemporary technology
(eg, sensors, global positioning system, audiovisual input/
output), TMSGIs offer a new way to measure and respond
to symptoms that fluctuate over short periods of time
within individuals,\(^\text{17}\) which is particularly relevant in the
treatment of addictive disorders. For instance, proximal
and transient factors (eg, cravings, mood lability, fluctua-
tions in motivation, triggers) exert large influences on
addiction maintenance, exacerbation and relapse\(^\text{18}\) and
represent optimal treatment targets.

Conceptualisation and development of TMSGIs
remains challenging given the inconsistent definitions
and applications.\(^\text{19}\) Various forms of TMSGIs, for example,
have been referred to as ecological momentary interven-
tions, ambulatory interventions and just-in-time adaptive
interventions (JITAIs), among others. One systematic
review\(^\text{20}\) exemplifies the challenges associated with eval-
uations of TMSGIs. In this review, the authors evaluated
the use of JITAIs for substance use disorders and found
mixed evidence for their effectiveness. However, most of
the evidence was based on pilot studies with very small
sample sizes. The authors thus did not draw any substanc-
tive conclusions for the use of JITAIs in the treatment of
substance use disorders. They did, however, conclude
that it remains unclear what defines such interventions
and how best to develop them for addiction populations.
Understanding the differences among various types of
TMSGIs thus remains an ongoing challenge. Despite this
challenge, however, other reviews have found support for
various forms TMSGIs. For instance, in their review of
technology-assisted self-help programmes for addictions,
Newman and colleagues\(^\text{21}\) found that these interventions
are often helpful in reducing both consumption and
severity of various addictions, with medium to large effect
sizes. Danielsson and colleagues observed similar patterns
when including analysis of both telephone and web inter-
ventions.\(^\text{4}\) Taken together, these findings suggest that
TMSGIs are promising, yet the lack of clarity on their
definitions and applications precludes meaningful eval-
uations of them.

While preliminary evidence demonstrates support
for TMSGIs, successful treatment outcomes are often
critically impeded by a lack of user engagement.\(^\text{19,22}\)
For example, a recent trial reported that over 40% of
treatment-seeking individuals with gambling problems
never logged in to the no-cost online self-help workbook
they signed up for despite rating the content itself highly.\(^\text{23}\)
More broadly, engagement reflects a combination of
objective and subjective markers of treatment uptake,
such as number of activities completed and subjective
interest, respectively. These engagement factors then
influence treatment success. There are several reasons
that disengagement may occur, such as lack of treatment
progress, lack of intervention personalisation, individual
differences (eg, forgetfulness) or treatment goal changes
or successes.\(^\text{24}\) In sum, the low burden of TMSGIs may
counteract obstacles to entering treatment but may also
give rise to variable user commitment and utilisation.\(^\text{25}\)
Research is needed to elucidate which technical features
facilitate or discourage treatment engagement in these
highly demanded interventions.

**Objectives**

The aim of this review is to clarify and summarise the
extant literature on TMSGIs in addictions and provide
a foundation for subsequent development.\(^\text{26}\) Given the
limited amount and variability in focus of the existing
research, we will employ scoping review methodology
to identify and describe TMSGIs for people with various
substance-related and behavioural addictions. The defi-
nition of addiction will be broad to ensure all relevant
articles are included (eg, TMSGIs that target ‘heavy
drinking’ but do not explicitly refer to addiction). Inter-
ventions need not target addictions in their entirety
but may instead focus on one or more aspects of them
(eg, cravings, triggers). Specific emphasis will be placed
on technical and logistical aspects of TMSGIs and their
hypothesised impact on subjective or objective treatment
engagement. Research findings will be aggregated in
pursuit of a common glossary\(^\text{19}\) and to make preliminary
recommendations to guide development of future addic-
tion TMSGIs with an emphasis on technical and logistical
features that maximise user engagement (eg, frequency of
notifications, medium of delivery).

**METHODS AND ANALYSIS**

The review protocol was developed based on traditional
frameworks and associated revisions\(^\text{26–28}\) and in accord-
ance with the Preferred Reporting Items for Systematic
Reviews and Meta-Analyses (PRISMA) extension for review
protocols.\(^\text{29}\) Any protocol amendments will be docu-
mented in the Open Science Framework pre-registered
project alongside the full protocol (online supplemental
file 1) and manual (online supplemental file 2). Articles
will be imported from electronic databases and reviewed
in Covidence.\(^\text{30}\) Results will be reported in accordance
with the scoping review extension of PRISMA.\(^\text{31}\)

**Research questions**

The research questions were developed for broad identifi-
cation of studies. The population of interest is adults
and adolescents with one or more substance or behavioural
addictions, excessive behaviours or aspects thereof (eg,
cravings, triggers). Addictions need not be defined specifically by diagnostic criteria. Excessive behaviours will also be included even if the term ‘addiction’ is not explicitly used (eg, heavy drinking, binge eating). Interventions of interest should offer technology-mediated non-pharmaceutical support, education, prevention, assessment or treatment for one of the aforementioned problems. Interventions must be delivered in the context of treatment users’ natural environments via technology that is privately owned, accessed or operated, and not exclusive to professional settings. Outcomes must include both of the following: (a) at least one psychological construct directly related to the problem (eg, behaviour, cognition, emotion, motivation) and (b) at least one measure of participant engagement.

**Question 1.** What types of TMSGIs for addiction-related concerns exist?

**Question 2.** What impact do various technical and logistical features of TMSGIs have on user engagement?

**Relevant literature identification**

In consultation with librarians, the search strategy was developed to encompass all empirical articles that evaluate TMSGIs for addictions. Search terms were selected to identify English-language articles on PsycINFO, Embase, MEDLINE and CINAHL (online supplemental file 3). Boolean operators were applied to combine and refine search terms. The initial search strategy was developed in PsycINFO and adapted to the remaining databases. Articles from each database were searched from inception to 5 April 2022; a second iteration will follow after full-text screening is initially completed to cover the period between 5 April and the date of the second search. Following full-text review, the reference sections of all included articles will be manually searched for other relevant articles to ensure completeness of results. A reflexive and iterative approach will be taken to refine search criteria and data extraction throughout the review process (ie, databases will be searched multiple times). This approach is critical given the rapidly evolving research base on treatments that incorporate new and emerging technologies and inconsistent use of terms to define such interventions.

**Study selection**

Eligibility criteria were developed a priori by the research team. Two independent reviewers will apply these eligibility criteria to screen article titles and abstracts following automatic deduplication within Covidence. No reason for exclusion at this stage will be indicated as the purpose is only to remove clearly irrelevant articles. To pass title and abstract screening, articles must satisfy the following general criteria: (a) focus on one or more problems with substance use, behavioural addiction, excessive behaviour or aspect thereof (eg, cravings, triggers); (b) use of technology as a means to deliver non-pharmaceutical support, education, prevention, assessment or intervention for the problem defined in (a); (c) intervention technology hardware must be privately owned, accessed or operated (eg, smartphone, watch, tablet, sensor, computer) and not exclusive to professional settings (eg, IMRI, other medical equipment); (d) focus on psychological constructs such as behaviour, cognition, emotion or motivation (ie, not genetic, animal or pharmaceutical studies) and (e) reported in the English language.

Following title and abstract screening, the review manual for full-text review will be tested on the first 20 articles to assess criteria and agreement with two independent reviewers. Then, these reviewers will commence full-text reviews. In addition to the eligibility criteria for title and abstract screening, articles in full-text review must satisfy the following conditions: (a) original empirical study that is not solely qualitative; (b) sample exclusively comprised of adults or adolescents aged 16 years or greater; (c) intervention is delivered at least partially without professional, clinical, social or technical support and (d) study measures and reports on at least one outcome associated with subjective or objective user engagement (eg, quality ratings, number of logins, number of completed activities, proportion of users that completed all activities). Articles that otherwise satisfy eligibility criteria will be discussed separately from the evidence synthesis if they are qualitative, non-empirical or grey literature. In the event that studies contain duplicate samples with different follow-up durations, only the study reporting the longest follow-up will be retained.

The pre-registered review manual contains specific instructions to be provided to independent reviewers. After both title and abstract screening and full-text review, disagreements that arose will be resolved through consultation with a third reviewer (author BB) until consensus is achieved. Interrater agreement for both title and abstract screening and full-text review will be assessed and reported with Cohen’s kappa. A kappa cut score of 0.80 will be used for both phases of article selection, indicating a substantial level of agreement.

**Data extraction**

Once articles have been selected for inclusion within Covidence, data will be extracted, exported and compiled in Microsoft Excel following recommended practices. The following information will be extracted from each eligible article: (a) reference type (eg, peer-reviewed article, preprint); (b) publication year; (c) country or location; (d) research objectives; (e) research design (eg, two-arm randomised controlled trial); (f) sample size; (g) sample information, including eligibility criteria, mean age, ethnicity and sex/gender; (h) context and setting; (i) type of addiction(s) targeted; (j) whether the intervention was delivered in a standalone or supplementary manner; (k) intervention details, including theoretical orientation, content, features, software and operating system; (l) addiction-related measures and outcomes; (m) engagement-related measures and outcomes; (n) reported study limitations and (o) author conclusions related to the development and provision of relevant...
interventions, particularly technical features (vs intervention file content). The review protocol (online supplemental file 1) contains further details on the data that will be extracted from articles.

Results collation, summary and reporting
A descriptive overview of the findings will be provided in tabular and graphical forms as appropriate. Narrative summaries will be provided alongside tables and graphics and directly reflect the information extracted from eligible articles. Results will be discussed from a trans-diagnostic perspective, although significant differences that emerge among addictions will be noted. Important discrepancies in operational definitions will be highlighted (eg, differences in conceptualisation of TMSGIs or addictions). Recommendations will be derived based on the review findings to guide future research on the development and provision of TMSGIs with an emphasis on technical and logistical features associated with greater user engagement.

Patient and public involvement
The overarching aim of our research programme is to develop a transdiagnostic addiction TMSGI delivered in real-time via smartphone application. Although the scoping review itself does not entail consultation or engagement with knowledge users, subsequent stages of this research programme will incorporate these strategies. Specifically, development and usability testing will solicit and address feedback from multidisciplinary addiction clinicians and researchers as well as individuals with past or present lived experience. Quantitative and qualitative feedback will be used to refine the intervention prior to deployment in the context of pilot testing.

Ethics and dissemination
Ethics committee approval is not required for this review. The findings elucidated via this scoping review will be published in an open-access peer-reviewed academic journal and presented at an international conference. The generated preliminary recommendations will be framed not only to guide our own research programme but more broadly to guide research, development and practical implementation of TMSGIs for addiction-related concerns (eg, suggestions for optimising frequency of smartphone notifications). Considerations of accessibility, feasibility and cost will be central to the development of these recommendations. As previously mentioned, stakeholder engagement will help refine and apply these recommendations to our own research programme.

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Contributors

Both authors (BB and DH) made substantial contributions at each stage of this work, including drafting, revision and final approval. Based on the CRediT statement, BB (review guarantor) was responsible for conceptualisation, methodology, formal analysis, investigation, data curation, writing—original draft, writing—review and editing, visualisation and project administration. DH was responsible for conceptualisation, methodology, validation, resources, writing—review and editing, supervision and project administration.

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Competing interests

None declared.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication

Not applicable.

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Supplemental material

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