Protocol for a Systematic Review of Gamified Attention Bias Interventions for Psychiatric Disorders

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Abstract

Background
Attention biases are subconscious processes that tend to result in individuals having increased attention for threatening or stimuli with high salience. These biases have been posited to be involved in the psychopathologies of several psychiatric disorders. Technological advances have transformed how such interventions are being delivered. Gamification technologies are increasingly being used for bias modification, as it could help increase motivation to train and make these tasks more engaging. While there are published research on gamification and attention bias, there remains several gaps in knowledge.

Objectives
The primary objective of the review is thus to identify attention bias modification games that have been published in the literature and to synthesise the current evidence for such interventions and to identify, if possible, the rationale for gamification. The secondary objective is to determine if gamified attention or cognitive bias modification influences secondary outcomes measures, as such anxiety levels or severity of depressive symptoms.

Methods
To achieve the objective of this review, a systematic review will be undertaken. For the studies that are identified, they will be reviewed by independent assessors and screened against our predefined inclusion and exclusion criteria. The Cochrane risk of bias tool will be used for assessment of the risk of biases in randomised trials that have been identified. The evidence will be synthesized by means of a qualitative synthesis.

Results
We expect that the review will be completed 12 months from the publication of this protocol.

Conclusions
This review is pertinent as it helps to provide an overview of the evidence base for gamified attention bias interventions. The findings from the current review will help in the future conceptualisation of gamified attention bias interventions.
**Introduction**

Attention biases are subconscious processes that tend to result in individuals having increased attention for threatening or stimuli with high salience (1). These biases have been posited to be involved in the psychopathologies of several psychiatric disorders, that of anxiety disorders, alcohol use and tobacco use disorders (1-5). The presence of attention bias implies that they could also be subjected to manipulation and modification. The same tools that are commonly used in the assessment of these unconscious biases could thus be utilised for bias modification(6). Jones et al. (2017) in their recent meta-analysis has reported that bias modification is particularly useful for individuals suffering from social anxiety disorders(7).

One of the main limitations of attentional bias modification has been that the intervention has conventionally been confined to that of a laboratory. The recent advances in both E-Health (Electronic Health) and M-health (Mobile Health) technologies have transformed the mechanisms by which such conventional interventions are administered. Wiers W et al. (2015) (8) administered the attention control training and approach bias retraining intervention using the Internet amongst 136 problem drinkers and found that there was a reduction in drinking across all the intervention groups. William A et al. (2015) (9) delivered an online cognitive bias modification training targeting imagery and interpretation bias amongst depressive individuals and found that the online intervention was effective in reducing depression symptoms and distress symptoms, with an effect size (Cohen’s D) of 0.62. These pioneering studies highlight the potential of attention bias modification delivered using the Internet. The rapid advances in Mobile health technologies have led to a further transformation of attention bias modification programs, as such mobile technologies are also being harnessed in the delivery of bias modification interventions. Clarke PJ et al. (2016) (10) reported that a mobile attention bias modification task was useful in helping to reduce the sleep-related threat, cognitive arousal and help to improve insomnia symptoms. Dennis TA et al. (2014) (11) reported how a single session of a gamified attention bias modification task was effective in reducing subjective anxiety and stress reactivity. Dennis TA et al. (2014)’s (11) trial demonstrates that apart from M-health being utilized, gamification strategies are also being incorporated into conventional attention bias modification tasks, and has been proven to be efficacious.

Wouter J et al. (2015) (12) in their prior review explored how gamification could help to address some of the issues of conventional bias modification tasks, particularly that of the motivation to train, given how repetitive bias modification interventions are. Wouter J et al. (2015) (12) in their prior review highlighted several gamification approaches specific for attention bias modification interventions and have explored how published works have utilised some of these approaches. While Wouter J et al. (2015)’s (12) review provides a timely insight into how gamification strategies have been adapted for bias modification interventions, their review was not a systematic review, and no databases search was performed. Since 2015, there have been further advances in the field of M-health technologies and gamification.

There remains to date no prior research that has systematically evaluated the literature for gamified attention bias modification interventions. There is a need for evidence synthesis of these studies, for there to be an understanding of the effectiveness of a gamified approach for bias modification. Hence, the current review is timely. The findings that arise from the current review is crucial as it will inform future research that seeks to integrate mobile technologies or gamification technologies into existing conventional bias modification interventions.

**Research Aims**

The primary objective of the review is to identify attention bias modification games that have been published in the literature and to synthesise the current evidence for such interventions and to identify, if possible, the rationale for gamification. The secondary objective is to determine if gamified attention or cognitive bias modification influences secondary outcomes measures, as such anxiety levels or severity of depressive symptoms.
To achieve the objective of this review, a systematic review will be undertaken. For the studies that are identified, they will be reviewed by independent assessors and screened against our predefined inclusion and exclusion criteria. The Cochrane risk of bias tool will be used for assessment of the risk of biases in randomised trials that have been identified. The evidence will be synthesized by means of a qualitative synthesis.

**Methods**

**Search Strategy**
To identify the relevant articles, the following search terminologies will be used: “attention bias” OR “cognitive bias” AND “games”. The following databases will be searched: PubMed, MEDLINE and PsycINFO. If full-text access is not available, the original authors will be contacted for their articles.

**Inclusion and Exclusion Criteria**
Only articles that are in English language will be included for the current qualitative review. The inclusion criteria are: (a) Articles must describe either an attention or cognitive bias intervention; (b) the delivery of the bias modification must be in the form of a game and (c) the condition being targeted in the intervention must be a psychiatric disorder. Articles will be excluded if they included an attention bias or cognitive bias modification task that was not in the format of a game.

**Condition or Domain being Studied**
The current systematic review focuses on psychiatric disorders, that of affective disorders, anxiety disorder and substance use disorders.

**Participants**
Participants must have been diagnosed with a primary psychiatric disorder. Participants could be individuals from the community or a treatment-seeking cohort, and they could either be adolescent or adult participants.

**Intervention**
The intervention in this case is that of an attention or cognitive bias intervention task, which could be that of Stroop test, Visual or Dot-probe task, Attentional Visual Search or Cognitive Bias Modification for Interpretations.

**Comparisons**
Participants may be compared with other participants who have received either treatment as usual or placebo or sham training.

**Outcome**
For the outcome, the main outcome would be whether the gamified intervention has been effective, and if effective, the effect size for the intervention. For the secondary outcome, we will report if there are reduction in the symptoms of specified psychiatric disorders.

**Data Extraction, Sorting and Selection**
All the articles will be screened based on their titles and abstract by two independent authors (MWBZ and JY). Full copies of the shortlisted articles will then be evaluated against the inclusion and exclusion criteria. Any disagreement between the two authors will be resolved using a discussion with the 3rd author (RH). An electronic document will be utilized to record systematically the reasons for inclusion and exclusion of each of the article. This current review will adhere to the reporting guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P).

The following data will be systematically extracted from each article and recorded on a standardized electronic data collation form and cross-checked by another independent assessor:

1. Publication details: authors(s) and study year
2. Study design and methods: study design, sample size, type of sample (treatment seeking or community cohorts), country in which study was conducted, demographics of sample, diagnosis of participants, methods in which diagnosis is made
3. Method of attention bias assessment and modification
4. Primary outcome: Effectiveness of gamified attention bias modification
5. Secondary outcome: Severity of underlying psychiatric condition

Quality Assessment

Risk of bias assessment will be assessed by means of the Cochrane Collaboration Risk of Bias tool for randomized trials.

Strategy for Data Integration/Synthesis
For the systematic review, we will synthesize and report whether attention bias was present and how its presence was determined. We will also synthesize the findings of the studies narratively and report whether attention bias modification was effective.

Results
We expect that the review will be completed 12 months from the publication of this protocol. We will report the results based on the identified outcomes as specified above.

Discussion
To our knowledge, this will be the first study that has reviewed the status of gamified attention bias modification interventions for psychiatric disorders, given that there are already several studies that have independently reported the usage of such an approach (11, 13). The current review will add onto the findings reported previously by Wouter J et al. (2015) (12) in their review of serious gaming approaches for attention bias modification interventions. The current review also seeks to determine the rationale for gamification, as prior studies have reported that gamification has been considered primarily to help increase intrinsic motivation to train, given that conventional attentional bias interventions tend to be highly repetitive in nature. The current review will also help in determining if gamified attention bias modification interventions have their basis on conventional bias modification approaches, and gamification strategies that are commonly adopted and how these gamification strategies might help in ensuring that the overall intervention is efficacious.
References