Current Opportunities in Research and Development of Games for Mental Health

Abstract
In this paper we address some of the opportunities we see in the field of games for mental health based on our own experiences in our lab and our doctoral projects.

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Game Research; Anxiety; Depression; Intervention; Assessment; Mental Health; Youth

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J.4 [Social and Behavioral Sciences]: Psychology; K.8.0 [Personal Computing]: General – Games

Introduction
Video games have been proposed as promising tools to overcome current gaps and barriers in mental health treatment, such as stigma, high costs, limited accessibility and problems in treatment adherence [2,5]. While indeed promising, the field of games for mental health is still in its infancy and there are still many opportunities to explore. In this paper we will address some of these opportunities based on our own experiences in our lab and our doctoral projects.
The overarching goal of our doctoral projects, which is outlined in the NWO Creative Industries grant [4], is to use insights from evidence-based clinical practice and theoretical models to develop and rigorously test the effectiveness of immersive, interactive games that help children and adolescents overcome feelings of anxiety and depression. Although one project focuses on anxiety and the other on depression we encountered similar challenges and discovered new opportunities.

While the starting goal of the projects was to develop and test two intervention games, we realized that these games, our research and by extension game research in general could serve a broader purpose.

**Opportunities in Mental Health Games Research**

**Identifying and evaluating specific elements and working mechanisms in treatment**

Both in the development phase as well as in the evaluation phase of an intervention game it is crucial to identify specific game mechanics, therapeutic principles, and mechanisms of change that lead to the best possible outcomes. We use this information primarily to inform further development of the game itself. However, these elements may then also be used for different games, with different goals. For instance, while a game for depression may not be suited for the treatment of anxiety, certain elements of the game may be transferrable.

Within our research lab projects start by consulting current empirical literature to find evidence-based therapeutic principles and theoretical models focused on the outcome that we aim to change such as anxiety or depression. After having selected the most appropriate principles we work together with game designers to translate these into game mechanics. Unfortunately, the empirical evidence is not always clear-cut. For instance, while there are many studies dedicated to establishing the effectiveness of certain treatments there is less information regarding particular components or factors of the treatment that contribute the most to the clinical outcomes. Furthermore, even when these components are identified, important knowledge gaps often still remain. For example, exposure has been identified as a particularly effective component of anxiety treatment [6]. However, there is still a debate as to how exposure can be operationalized in the best manner. When placing an individual in a situation where they are exposed to their fears it is unclear whether it is beneficial to provide an individual with the opportunity to display safety behavior so the treatment becomes more acceptable or whether allowing this type of behavior – although comforting to the individual – may be detrimental to the treatment outcome [7]. These knowledge gaps can be addressed by developing specific game prototypes around these components, and by designing our experiments in such a way that these questions can be answered.

**Creating new assessment and monitoring tools**

One reason that there is so little known about the specific elements and working mechanisms in treatment is due to, among other things, the constraints of current assessment tools. Most intervention studies (both game-based and traditional) only use self-report measures. Furthermore, assessments are often limited to pre- and post-
measures. Therefore, there is less insight into what happens during the actual treatment or practice moments. One of the opportunities we see in the field of games for mental health is the use of these intervention games as assessment tools in research and for clinical purposes. Besides the advantage of using the intervention games themselves to assess progress within the treatment, games also provide a more objective perspective than self-reports and are certainly less intrusive than observations in “offline” situations.

For example, in our lab we started off with the idea of developing a game to target rejection sensitivity in children. Rejection sensitivity is a risk factor in the development of depression [1]. Most research on rejection sensitivity is done with the rejection sensitivity questionnaire, which uses hypothetical situations to assess how rejection sensitive people would feel and think in those situations [3]. Besides the fact that it might be very difficult for some people to accurately assess how they would feel in a hypothetical situation, the questionnaire also doesn’t measure how they would behave in the actual situation, even though this might be very relevant for how the treatment is set up (e.g. a withdrawn person might need a different treatment strategy than an aggressive person). In a game we can create rejection situations and measure the player’s behavior in response to those rejection moments. If we are trying to develop a game that targets a group of people who are vulnerable, those people will probably behave differently in the game than others and we could start identifying them based on their behavior in the game. It was through the design and study of the intervention game ScrollQuest (see sidebar) that we realized the potential of the same game for assessment purposes [10].

Utilizing alternative research designs and developing new research paradigms
Interventions are often evaluated in their entirety using Randomized Controlled Trials (RCTs), which are time-consuming and mainly look at the effect of the final product. Furthermore, RCTs don’t allow for testing during development even though there is valuable information to be gathered during that time. Moreover, traditional research does not always allow for the study of individual components, making it difficult to retroactively pinpoint specific game mechanics or mechanisms of change that drive the effect, which in turn makes it difficult to improve the games. This obstacle was encountered in various studies within our lab group that preceded our project (e.g. research on Mindlight [9], see sidebar). This led to the realization that we need new research strategies to answer these questions. Game development projects allow for more freedom to utilize alternative research designs and develop new research paradigms.

DEEP (see sidebar) is one of the games that is currently being further developed and evaluated as a possible tool to help youth regulate their stress and anxiety [8, 11]. This development and evaluation is being conducted in an iterative fashion. For instance, we developed an exposure prototype of DEEP where players had the opportunity to stop their movement and seek shelter in safe havens. By comparing this prototype with a version that did not include these elements, we could test the additive effect this safety component had on player experience and physiological regulation. In this way, specific game components or
therapeutic principles can be evaluated as part of the development process.

In the project of Moving Stories (see sidebar) we look at different levels of validation during different phases of the development. For each prototype we ask players questions regarding three domains: play experience, learning effect and validation. Within those domains the questions get more complicated the further we go in development. For example, with the first prototype we assessed whether the game world encouraged the players to explore. Later, we asked whether players were comparing different game strategies with other players outside of the game. While the questions vary in complexity, they both work towards the final goal of the learning effect domain.

Contributing to current understanding of anxiety and depression
In addition to developing new and engaging ways for individuals to improve their mental wellbeing, we believe that the knowledge that is gained within game research can also contribute to the improvement of current theoretical frameworks and models of mental health. For instance, while the studies on DEEP contribute to the development of a new intervention for anxiety treatment, they also contribute to a broader understanding of the working mechanisms that underlie biofeedback interventions [11]. In addition, they can provide further insight into stress and anxiety regulation by observing patterns and changes in physiology, behavior and player experience over the course of various play sessions. The research on ScrollQuest might lead to a new assessment tool, but it could also provide more insight into how different response patterns in rejection situations are related to different mental health outcomes.

Closing Remarks
While it is important that we continue to design individual games for mental health and to evaluate their effectiveness in empirical and clinical studies it is also imperative to keep in mind that there are still many opportunities to broaden the scope of our work in the field of mental health games.

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References


