

The Use of Mobile Games in the Management of Patients With Attention Deficit Hyperactive Disorder: A Scoping Review

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INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopment disease affecting 5% of 4-17 year olds. (1) Conventional pharmacological therapy is less effective in 36% of patients and may have severe side effects. (2) Mobile gaming is highly popular and has previously been shown to be able to diagnose and treat ADHD, though previous research is limited in scope. Therefore, this scoping review will probe deeper to evaluate the effectiveness of these technologies and any areas for future research.

RESULTS

Study characteristics

The studies analyzed comprised 6 developmental research papers, 5 mixed methods studies, 4 experimental papers and 1 case report. (Developmental research involves studying the development of the game, experimental research involves creating a game and experimented it on a set of patients and mixed methods studies involve a combination of developmental and experimental research methods)

Demographics of study participants

- Most studies involved the use of groups of children <16 years old
- Most participants were male
- 4 out of 19 of the studies were conducted in low-income nations

Game characteristics

- 7 out of 11 of the games were developed by research teams, with the rest being commercially acquired

Subjective and objective data

- All studies that used functional assessments as metrics of ADHD performance (e.g Field Trial Test, Reading response task performance) except one demonstrated that the use of gamified interventions was helpful in patients with ADHD in at least one aspect (eg. reading response task performance improved ($p < 0.01$), Field Trial Test average score increased from 67.01 to 80.04)
- No study raised concerns of statistically significant (generally taken to be $p < 0.05$) worsening of ADHD symptoms after intervention
- Games were well-accepted by both parents and children, who welcomed the idea of a novel modality of treatment for children with ADHD

LIMITATIONS

Many studies had small sample sizes (median participant size is 18) with only 1 exceeding the recommended number of 50.

None of the studies included a control group of conventional therapy, thereby not allowing for effective comparative evaluation of cost effectiveness of mobile games.

Only 2 studies included participants above the age of 16, despite ADHD severely affecting adults as well. Location of studies was also skewed towards high-income countries, although low-income countries tend to be more affected by mental disorders.

The long-term impact of the approach on improvement of ADHD symptoms were not studied. Future studies can consider using validated tests and observing the long-term impact of the approach.

CONCLUSION

Many mobile games exist for diagnosis, treatment and education of ADHD. Integration with current treatment options provides many benefits in terms of range, behaviour and convenience. Future further optimisation including consulting reflective evidence from stakeholders, the use of robust clinical trials and meta-analyses will pave the way for a evidence based-prototype with sound clinical utility.

REFERENCES

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METHODS

Databases of Cochrane, MEDLINE, PsycInfo and Scopus were searched for relevant articles. 562 articles were screened by 2 independent reviewers based on title, abstract and full text. Data was extracted and categorised onto a spreadsheet. 19 studies were included in the final quantitative analysis. PRISMA-ScR guidelines were followed in the reporting of this scoping review.

DISCUSSION

The game elements deployed in many of the serious games are:

- Clear set of objectives
- Feedback upon achieving the objectives
- Internal reward system
- Positive affirmation
- Portable and location independent

The games can be deployed on different platforms to tap on their strengths:

- The Phygital approach bridges the digital world with real world and provides an extensive immersive experience.
- VR and AR allows for a more immersive gaming environment which may be advantageous in therapeutic setting
- PC games allow customisation, cross platform integration, greater flexibility and processing performance.
- A significant shortcoming of PC platforms is the lack of portability, which can impair treatment accessibility and lead to poorer patient compliance

The effectiveness of mobile games in the treatment of ADHD requires more research to confirm efficacy.

- However, they could be used as adjunct treatment combined with traditional medication and behavioural therapy.
- Game-based interventions are positively received by both patients and caregivers.
- They are also more willing to opt for such modalities as they are simple to prescribe.

IMAGES

Picture: EndeavorRx, an online game designed to treat ADHD approved for prescription by the US FDA

