EXPLORING SERIOUS GAMES FOR MENTAL HEALTH INTERVENTIONS AMONG SCHOOL-GOING ADOLESCENTS IN INDIA

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By

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Submitted

In fulfilment of the requirements of the degree of Doctor of Philosophy

to the

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CERTIFICATE

This is to certify that the thesis titled "**Exploring Serious Games for Mental Health Interventions among School-going Adolescents in India",** being submitted by **Ms Sneha John** to the **Indian Institute of Technology Delhi** for the award of the degree of **Doctor of Philosophy**, is a record of original bona fide research carried out by her under my supervision. In my opinion, the thesis has reached the standards fulfilling the requirements for submission relating to the degree. The results of the thesis have not been submitted, in part or whole, to any other institute or university for the award of any degree or diploma.

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DECLARATION BY AUTHOR

I certify that the thesis titled "**Exploring Serious Games for Mental Health Interventions among School-going Adolescents in India**", submitted to the **Indian Institute of Technology Delhi** for the award of the degree of Doctor of Philosophy, is a bona fide record of my research work done under the supervision of Prof. Kamlesh Singh, at the Department of Humanities and Social Sciences, Indian Institute of Technology Delhi. The contents of this thesis, in whole or in parts, have not been submitted to any other institute or University for the award of any degree or diploma.

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Sneha John

Abstract

The adolescent age group represents a crucial developmental phase where mental health needs are high, yet they do not receive the appropriate care. Mental health concerns among this group are the primary cause of disability and contribute significantly to the disease burden worldwide. Factors such as the stigma attached to mental illnesses, the potential of discrimination in social, cultural and professional circles, and the overwhelming lack of access to quality mental health care greatly influence the treatment and prevention measures worldwide. The onset of the coronavirus pandemic in the recent past was observed to have exacerbated the existing challenges around adolescent mental health due to factors like school closures, social distancing, and uncertainties around health and the future. This was particularly evident in a lower-middle-income country like India, where the timely identification of mental health risks in adolescents and providing standardised treatment across all income groups remains an uphill grind.

In response to these challenges, a growing body of research is being conducted on digital mental health interventions to aid mental health services. Our research focuses on one such specific digital technology called serious games. Serious games exploit characteristics of traditional video games to achieve engagement and combine them with evidence-based therapies to inform, train, and eventually enhance health-related outcomes. Some research evidence indicates they are promising, with the potential to reduce stigma and improve access, uptake, and engagement in mental health interventions.

School setups have facilitated mental health programs for dealing with adolescents' increasing social, emotional, and educational challenges, as a significant amount of their time is spent within the school ecosystem. However, using serious games in Indian school mental healthcare services is a relatively unexplored and innovative approach with limited research evidence. In this context, the present thesis aims to broaden our understanding of using digital

mental health interventions like serious games for adolescents in school setups in India. We conducted three studies as part of this thesis, and their findings contributed to achieving this broader objective.

The goal of Study 1 was to gain an insider perspective on the current nature and functioning of school mental health services in India. Such an inquiry was required at the elemental level of this research to develop a framework and objectives for future studies. We conducted semi-structured interviews with school mental health professionals in India to understand their working experience, including their roles, responsibilities, challenges, relationships with stakeholders, and strategies to navigate the pandemic-led changes in the school ecosystem. COVID-19 restrictions necessitated the virtual data collection for this study, conducted between March and May 2021. Using network sampling, the data were collected from 30 school-based mental health professionals (SBMHs) from different urban and semi-urban schools from various parts of India. Their ages ranged between 26 and 56, with the maximum participants aged 20-30 years (53%) and mostly identified as female (96%). They were qualified and experienced, and their years of practice ranged from 1 to 20 years. Within the sample, 24 participants had experience working with a private school, 3 worked in government schools, and 3 had experience in both.

Four themes emerged from the interviews, which describe their roles, perceived challenges, and experiences with the changing context. These four themes were counsellor role characteristics, counsellors addressing contemporary issues, counsellors' collaboration with stakeholders, counselling challenges, and adaptation to change. Pandemic-induced changes like transitioning to virtual operations, physical isolation, and re-evaluating priorities played a pivotal role in shaping the experiences of our key demographic group, namely, school counsellors and adolescents. The findings helped inform the forthcoming studies to assess the appropriateness of digital mental health interventions in school settings post-COVID-19.

To assess the readiness of the school mental health setups for digital technology like serious games, we conducted Study 2 with a pre-post cohort design (N = 68) using an intervention group (N = 34, M age = 14.82) and a control group (N = 34, M age = 14.76). The study intended to evaluate the feasibility, acceptability, and effectiveness of an existing computerised Cognitive Behavioural Therapy (cCBT) program in a video game format called 'Pesky Gnats' among school-going adolescents in India. The study aimed to explore the impact of the program on self-reported sub-clinical levels of anxiety and depression symptoms. The participants' ages ranged between 12 and 17 and were enrolled in a private school with English as the medium of instruction. They presented with concerns about low mood, anxiety, and issues with interpersonal relationships. The Revised Children's Anxiety and Depression Scale (RCAD-47) (Chorpita et al., 2000) scores were used to determine sub-clinical levels of anxiety and depression as an inclusion criterion as well as an outcome measure. Other measures include the Children's Outcome Rating Scale (CORS) (Miller et al., 2003) and the Children's Session Rating Scale (CSRS) (Duncan et al., 2003). The intervention group received seven sessions of 50 minutes each, while the control group received no intervention and was referred to the school psychologist post-study.

Digital mental health interventions with aspects of games garnered positive feedback and high levels of acceptability. The Child Session Rating Scale (CSRS) (Duncan et al., 2003) was used to provide feedback on four dimensions of the therapeutic alliance. The average rating, out of 10, was high on aspects like Relationship (9.7), Goals (9.61), Approach (9.62), and Overall (9.61). The RCAD-47 Scale (Chorpita et al., 2000) and CORS (Miller et al., 2003) provided quantitative evidence of the program's effectiveness and were administered during pre- and post-conditions. Participants in the intervention group showed reliable reductions in all sub-scales of the RCAD scale (p <.01). In contrast, those in the control group did not see any significant change in their self-reported symptoms (p =

0.52). The scores of CORS (Miller et al., 2003) indicated a similar result. Improvement in perceived well-being was observed in all measured areas post-intervention (p <.01). The participants reported their perceived well-being in their personal lives, close interpersonal relationships like family and friends, social relationships and experiences in school, and overall sense of well-being.

Although we received an overall recruitment rate of 68 per cent, it was observed that participants who dropped out of the programs did so because of their inability to attend school regularly for varied reasons and discontinued at the initial stages. Of those enrolled, 70 students completed the study, yielding an overall retention rate of about 62.5%. Using school as a setting for game-based mental health intervention proved moderately feasible, as it provides services that can facilitate mental health and provide cost-effective reach to adolescents.

With insights from the previous two studies and a few small focus group discussions, Study 3 aimed to propose and design a blueprint for a serious game. To understand the appropriateness of a digital mental health intervention (DMHI) like serious games for school mental health facilities, four focus group discussions (FGDs) with school counsellors (N = 18) were conducted. The school counsellors reviewed the serious game used in the second study to get a basic idea of a serious game, as it is a relatively new concept for counsellors in India. The program's essential features, overall narrative, and game elements were highlighted and displayed to gather their perspective on the usability and adaptability of such programmes for Indian school counselling services. The participants highlighted their perspectives on the broader themes of appropriateness of digital interventions, confidentiality and data security concerns, using assessments and their impact on stigmatisation and labelling, modules for teaching relaxation and mindfulness skills, the importance of a

counsellor-assisted approach, inclusivity and accessibility concerns, and empowerment through skill-building.

Within the context of the Indian demographic, it led to the design and development of a prototype for an assisted serious game as a potential mental health tool for Indian school-going adolescents. The prototype was designed with the help of a team comprising three undergraduate BTech students of IIT Delhi who had prior experience and knowledge of game design and development, led by the primary researcher, who is a psychologist. The setting, design and mechanics of the new serious game were informed through the cumulative insights from all the previous studies in this thesis, domain knowledge of the game developers and the mental health professionals.

Overall, the findings across the three studies in this thesis demonstrate the need, appropriateness, impact, and usefulness of using digital mental health interventions like serious games as an assistive tool for advancing school mental health services in India.

Keywords: Digital Mental Health Interventions, Serious Games, School-based Mental Health Programs, Mental Health Promotion, Cognitive Behaviour Therapy, COVID-19, Indian Adolescents, Anxiety, Depression

सारांश

किशोरावस्था आयु वर्ग एक महत्वपूर्ण विकासात्मक चरण है, जिसमें मानसिक स्वास्थ्य की ज़रूरत अत्यधिक होती है, फिर भी उन्हें उचित देखभाल नहीं मिलती। इस आयु वर्ग में मानसिक स्वास्थ्य समस्याएं विकलांगता का प्रमुख कारण हैं और वैश्विक बीमारी के भार में महत्वपूर्ण योगदान देती हैं। मानसिक बीमारियों से जुड़े सामाजिक कलंक, सामाजिक, सांस्कृतिक और पेशेवर क्षेत्रों में भेदभाव की संभावना, और गुणवत्तापूर्ण मानसिक स्वास्थ्य सेवाओं की भारी कमी जैसे कारक उपचार और रोकथाम उपायों को वैश्विक स्तर पर प्रभावित करते हैं। हाल ही में कोविड-19 महामारी के आगमन ने किशोरों के मानसिक स्वास्थ्य से जुड़ी पहले से मौजूद चुनौतियों को और अधिक बढ़ा दिया, विशेष रूप से स्कूल बंद होने, सामाजिक दूरी, और स्वास्थ्य व भविष्य को लेकर अनिश्चितताओं के कारण। यह प्रभाव निम्न-मध्यम आय वर्ग वाले देश जैसे भारत में और अधिक स्पष्ट रूप से देखा गया, जहाँ किशोरों में मानसिक स्वास्थ्य जोखिम की समय पर पहचान और सभी आय वर्गों में मानकीकृत उपचार प्रदान करना एक बड़ी चुनौती है।

इन चुनौतियों के उत्तर में, मानसिक स्वास्थ्य सेवाओं में सहायता हेतु डिजिटल इंटरवेंशन्स पर शोध तेजी से बढ़ रहा है। हमारा शोध एक विशेष डिजिटल तकनीक पर केंद्रित है जिसे 'सीरियस गेम्स' कहा जाता है। ये गेम पारंपरिक वीडियो गेम्स की विशेषताओं का उपयोग कर सहभागिता नियोजित करते हैं और उन्हें साक्ष्य-आधारित थैरपी की विधियों के साथ जोड़कर सूचना प्रदान करने, प्रशिक्षण देने और अंततः स्वास्थ्य संबंधी परिणामों में सुधार लाने के लिए उपयोग किए जाते हैं। कुछ शोध प्रमाणित करते हैं कि ये मानसिक स्वास्थ्य इंटरवेंशन्स, स्टिग्मा कम करने, पहुँच को बढ़ाने, उपयोग में वृद्धि, और सहभागिता को बेहतर करने की संभावनाएँ रखते हैं।

जैसा कि किशोरों के समय का महत्वपूर्ण भाग स्कूल में व्यतीत होता है, स्कूल व्यवस्था में सामाजिक, भावनात्मक और शैक्षणिक चुनौतियों का सामना करने के लिए मानसिक स्वास्थ्य कार्यक्रमों को सक्षम बनाया गया है । हालांकि, भारत में स्कूल आधारित मानसिक स्वास्थ्य सेवाओं में 'सीरियस गेम्स' का उपयोग एक नवाचारात्मक और कम खोजा गया दृष्टिकोण है, जहाँ इस पर सीमित शोध उपलब्ध है। इस

संदर्भ में, इस थीसिस का उद्देश्य भारत में स्कूल सेटअप में किशोरों के लिए डिजिटल मानसिक स्वास्थ्य इंटरवेंशन, जैसे कि सीरियस गेम्स, के उपयोग को समझने के मकसद से किया गया। हमने इस थीसिस में तीन अध्ययन किए, और उनके निष्कर्षों ने इस व्यापक उद्देश्य को प्राप्त करने में योगदान दिया।

अध्ययन 1 का उद्देश्य भारत में स्कूल मानसिक स्वास्थ्य सेवाओं की वर्तमान स्थिति और कार्यप्रणाली का आंतरिक दृष्टिकोण समझना था। इस स्तर की जानकारी भविष्य के अध्ययन हेतु रूपरेखा और उद्देश्य तय करने के लिए आवश्यक थी। इसके लिए भारत के विभिन्न शहरी और अर्ध-शहरी क्षेत्रों के स्कूल मानसिक स्वास्थ्य पेशेवरों (SBMHs) के साथ अर्द्ध-संरचित साक्षात्कार किए गए। कोविड-19 प्रतिबंधों के कारण यह डेटा मार्च 2021 से मई 2021 के बीच वर्चुअल रूप में एकत्र किया गया। नेटवर्क सैंपलिंग के माध्यम से 30 पेशेवरों से जानकारी प्राप्त की गई, जिनकी आयु 26 से 56 वर्ष के बीच थी। इनमें से अधिकांश (96%) महिलाएं थीं और 53% प्रतिभागी 20-30 वर्ष की आयु सीमा में थे। वे योग्य एवं अनुभवी थे तथा उनका कार्य अनुभव 1 से 20 वर्ष तक का था। उनमें से, 24 पेशेवर निजी स्कूलों में, 3 सरकारी स्कूलों में, और 3 दोनों प्रकार के स्कूलों में कार्यरत थे।

साक्षात्कार से चार प्रमुख थीम उभरे: परामर्शदाता की भूमिका की विशेषताएँ, समकालीन मुद्दों का समाधान, हितधारकों के साथ सहयोग, परामर्श की चुनौतियाँ, और बदलाव के साथ अनुकूलन। महामारी-प्रेरित परिवर्तन जैसे कि वर्चुअल कार्यप्रणाली, भौतिक अलगाव और प्राथमिकताओं का पुनर्मूल्यांकन, परामर्शदाताओं और किशोरों के अनुभवों को आकार देने में निर्णायक रहे। इन निष्कर्षों ने कोविड-19 के बाद स्कूल सेटअप में डिजिटल मानसिक स्वास्थ्य इंटरवेंशन की उपयुक्तता का आकलन करने हेतु अगले अध्ययन की दिशा तय करने में मदद की।

अध्ययन 2 में यह परखा गया कि स्कूल मानसिक स्वास्थ्य ढाँचे डिजिटल तकनीकों जैसे कि सीरियस गेम्स के लिए कितने तैयार हैं। इसमें पूर्व-उत्तर सहकर्मी डिज़ाइन (pre-post cohort design) का उपयोग किया गया (N = 68), जिसमें एक इंटरवेंशन समूह (N = 34, औसत आयु = 14.82) और एक नियंत्रण समूह (N = 34, औसत आयु = 14.76) शामिल था। इसका उद्देश्य था कि एक वीडियो गेम प्रारूप वाले

कंप्यूटरीकृत संज्ञानात्मक व्यवहार थेरेपी (cCBT) कार्यक्रम 'Pesky Gnats' की उपयोगिता, स्वीकार्यता और प्रभावशीलता को परखा जाए। प्रतिभागियों की आयु 12 से 17 वर्ष थी और वे एक निजी अंग्रेजी माध्यम स्कूल में नामांकित थे। उन्हें उदास मूड , चिंता और पारस्परिक संबंधों की समस्याएं थीं। उप-नैदानिक स्तर की चिंता और अवसाद के निर्धारण और परिणाम माप के लिए Revised Children's Anxiety and Depression Scale (RCAD-47) (Chorpita et al., 2000) का उपयोग किया गया। अन्य मापदंडों में Children's Outcome Rating Scale (CORS) (Miller et al., 2003) और Children's Session Rating Scale (CSRS) (Duncan et al., 2003) शामिल थे। इंटरवेंशन समूह को सात सत्र, प्रत्येक 50 मिनट के दिए गए, जबकि नियंत्रण समूह को कोई इंटरवेंशन नहीं दिया गया तथा अध्ययन के बाद में उन्हें स्कूल मनोवैज्ञानिक के पास भेजा गया।

गेम से संबंधित डिजिटल इंटरवेंशन को सकारात्मक प्रतिक्रियाएं और उच्च स्तर की स्वीकार्यता मिली। CSRS (Duncan et al., 2003) द्वारा चार आयामों (संबंध, लक्ष्य, दृष्टिकोण, समग्र अनुभव) पर औसतन 10 में से 9.6 से अधिक अंक प्राप्त हुए। RCAD-47 (Chorpita et al., 2000) और CORS (Miller et al., 2003) से प्राप्त आंकड़ों ने कार्यक्रम की प्रभावशीलता को दर्शाया, जहाँ इंटरवेंशन समूह में चिंता और अवसाद के सभी उप-मानों में महत्वपूर्ण कमी देखी गई ($p < .001$), जबकि नियंत्रण समूह में कोई महत्वपूर्ण परिवर्तन नहीं आया ($p = 0.52$)। इंटरवेंशन के बाद परसिव्ड वेल-बीइंग CORS (Miller et al., 2003) के सभी मापित आयामों के स्कोर में भी सुधार देखा गया ($p < .01$)। प्रतिभागियों ने अपने व्यक्तिगत जीवन, परिवार और मित्रों जैसे घनिष्ठ पारस्परिक संबंधों, सामाजिक संबंधों और स्कूल के अनुभवों तथा समग्र वेल-बीइंग की भावना के बारे में बताया।

हमने पाया कि सीरियस गेम ने मानसिक स्वास्थ्य संबंधी चिंताओं को कम करने में सकारात्मक प्रभाव डाला। यद्यपि कुल सहभागिता दर 68% थी, कई प्रतिभागी व्यक्तिगत कारणों से स्कूल न आ पाने के कारण कार्यक्रम के शुरुआती चरण में ही बाहर हो गए। कुल मिलाकर 70 प्रतिभागियों ने अध्ययन पूरा किया, जिससे समग्र प्रतिधारण दर लगभग 62.5% रही। स्कूल को गेम-आधारित इंटरवेंशन्स के लिए उपयोग

करना व्यवहारिक रूप से मध्यम रूप से सफल रहा क्योंकि ये ऐसी सेवाएं प्रदान करते हैं जो मानसिक स्वास्थ्य को सुगम बना सकते हैं और लागत-प्रभावी तरीके से किशोरों तक पहुँचने का अवसर प्रदान करते हैं।

अध्ययन 3 में, पिछले दो अध्ययनों और कुछ सीमित फोकस समूह चर्चाओं के आधार पर एक सीरियस गेम के लिए प्रोटोटाइप प्रस्तावित किया गया। चार फोकस ग्रुप चर्चाएं (N = 18) स्कूल काउंसलर्स के साथ आयोजित की गईं, जहाँ उन्होंने अध्ययन 2 में प्रयुक्त सीरियस गेम की समीक्षा की। इसके माध्यम से उन्होंने डिजिटल इंटरवेंशन की उपयुक्तता, गोपनीयता और डेटा सुरक्षा, मूल्यांकन की भूमिका और लेबलिंग से जुड़ी चिंताओं, रिलैक्सेशन और माइंडफुलनेस कौशल की शिक्षा, काउंसलर-असिस्टेड दृष्टिकोण, समावेशिता और पहुँच संबंधी मामलों, और कौशल निर्माण के माध्यम से सशक्तिकरण जैसे पहलुओं पर अपने विचार साझा किए।

भारतीय जनसांख्यिकी के संदर्भ में, भारतीय स्कूल जाने वाले किशोरों के लिए संभावित मानसिक स्वास्थ्य उपकरण के रूप को ध्यान में रखते हुए एक नए सीरियस गेम का प्रोटोटाइप तैयार किया गया। इस डिज़ाइन प्रक्रिया में तीन बीटेक छात्र (IIT दिल्ली) जिनके पास गेम डिज़ाइन और विकास का पूर्व अनुभव और ज्ञान था, और मुख्य शोधकर्ता (एक मनोवैज्ञानिक) शामिल थे। नए गेम का सेटिंग, डिज़ाइन और यांत्रिकी को इस थीसिस में पिछले सभी अध्ययनों, गेम डेवलपर्स और मानसिक स्वास्थ्य पेशेवरों के डोमेन ज्ञान से प्राप्त संचयी समझ के माध्यम से उन्नत किया गया।

कुल मिलाकर, इस थीसिस में तीन अध्ययनों के निष्कर्ष भारत में स्कूल मानसिक स्वास्थ्य सेवाओं को आगे बढ़ाने के लिए सहायक उपकरण के रूप मे सीरियस गेम जैसे डिजिटल मानसिक स्वास्थ्य इंटरवेंशन्स के उपयोग की आवश्यकता, उपयुक्तता, प्रभाव और उपयोगिता को प्रदर्शित करते हैं।

कीवर्ड्स : डिजिटल मानसिक स्वास्थ्य इंटरवेंशन, सीरियस गेम्स, स्कूल-आधारित मानसिक स्वास्थ्य कार्यक्रम, मानसिक स्वास्थ्य संवर्धन, संज्ञानात्मक व्यवहार थेरेपी, कोविड-19, भारतीय किशोर, चिंता, अवसाद

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List of Abbreviations

ASCA- American School Counsellor Association

CAMHS- Child and Adolescent Mental Health Services

CASEL- Collaborative for Academic, Social and Emotional Learning

CBSE- Central Board of Secondary Education

CBT- Cognitive Behavior Therapy

cCBT- Computerised Cognitive Behavior Therapy

CI-Cambridge International

CORS- Child Outcome Rating Scale

COVID-19- Coronavirus Disease of 2019

CSRS- Child Session Rating Scale

DALYs- Disability-Adjusted Life Years

DHI- Digital Health Intervention

DHMI- Digital Mental Health Intervention

GAD- Generalised Anxiety Disorder

IB- International Baccalaureate

ICMR- Indian Council of Medical Research

ICSE- Indian Certificate of Secondary Education

IGCSE- International General Certificate of Secondary Education

ISC- Indian School Certificate

LMIC- Low and middle-income country

LSE- Life Skills Education

MTSS- Multi-Tiered System of Support

MVP- Minimal Viable Product

NHM- The National Health Mission

NMHP- The National Mental Health Program

OCD- Obsessive Compulsive Disorder

PD- Panic Disorder

PTSD- Post Traumatic Stress Disorder

PWBS- Psychological Well-Being Scale

RCADS- Revised Children's Anxiety and Depression Scale

RCMAS- Revised Children's Manifest Anxiety Scale

RCT- Randomized Controlled Trials

RKSK- Rashtriya Kishor Swasthya Karyakram

SA- Separation Anxiety

SB- State Government Board

SBMH- School-Based Mental Health

SBMHS- School-Based Mental Health Services

SBMHP- School-Based Mental Health Professional

SEL- Social Emotional Learning

SP- Social Phobia

SPARX- Smart, Positive, Active, Realistic, Xfactor thoughts

UNESCO- United Nations Educational, Scientific and Cultural Organisation

WBT- Well-being Therapy

WHO- World Health Organisation

WSCA- Washington School Counsellor Association

YLL- Years of life lost