



Data Designs for Self-Regulation in Sleep Delay among Youth

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Abstract

Background: Sleep problems are on the rise in Canada, particularly among youth, as over 60% of students get poor quality sleep (Wang & Bíró, 2021). With 75% of students considering themselves procrastinators (Steel, 2007), these combine into 'bedtime procrastination' (BtP), or avoiding going to sleep at intended times (Kroese et al., 2014), and may lead to sleep deprivation, stress, and mental health issues, increasing anxiety and depression (Clayborne et al., 2023). Studies show that at least 53% of young adults engage in bedtime procrastination, which ultimately affects both mental and physical health (Kroese et al., 2014). Data physicalization, an innovative approach of creating physical objects representing personal data, can help understand behavior patterns and affect procrastination through fostering self-reflection (Belakova & Mackay, 2021). Limited research has been conducted on developing data-driven interventions to address bedtime procrastination strategies among youth.

Methodology: This research combines design and psychology principles through several stages: a survey to understand students' BtP strategies and perceived effectiveness; and a participatory workshop to develop a data physicalization with awareness of users' lived experience (Wilkinson & De Angeli, 2014).

Ethical clearance was awarded from Carleton University's Ethics Board. The questionnaire uncovered current strategies and their perceived effectiveness, highlighting perceptive thinking and sleep mindset as the most common and most effective strategy, and strategy distraction and backfiring of digital tools as most common obstacles.

Using co-design, a process of engaging participants aimed at producing new knowledge through idea generation, user connection and output accessibility (Busciantella-Ricci & Scataglini, 2024), a data physicalization prototype was developed together with users. During the co-design session, participants (n=11) designed, built and evaluated data physicalization objects that would address the strategies uncovered by the questionnaire, and would fit into students' overall bedtime routines. They first created the design requirements based on literature findings and their own lived experience, and then evaluated their design ideas using data physicalization evaluation frameworks.

Results & Conclusion: The goal of this work is to utilize design approaches to develop a behavioral intervention together with participants, and test the effectiveness of interactive data design tools and their properties for applications in users' daily lives, and specifically, physical and mental health. By applying a new domain of tangible data to an increasing issue among Canadian youth, this work aims to contribute to both fields: through designing a data object to aid in sleep procrastination strategies, and creating guidelines for effective physicalization design to foster reflection and self-awareness in behavior change.

Keywords: Data Physicalization; Bedtime Procrastination; Self-Regulation; Sleep



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