Design, Development and Evaluation of an mHealth Application to Improve Adolescent Sleep Behaviour

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Abstract

Adolescents are recommended to achieve 9 hours of sleep every night; however studies show most adolescents only average 7.2 hours of sleep per night. Currently, smartphone applications do not exist that are specifically targeted towards adolescents and use goal-setting behaviours to improve sleep habits. Using the user centered design approach, an agile development methodology, and features driven by behaviour change mechanisms, the iPhone application SOMNI was developed to be used in conjunction with a Bluetooth enabled wearable activity tracker. The usability results (n=8) indicated that the design and features of the application were effective and user satisfaction was high. Deploying the intervention in a feasibility study (n=9) demonstrated the feasibility of the application in a user's natural environment, and found that the application was generally accepted by the participants. The wearable activity tracker showed an accuracy of 96% compared to actigraphy, with a sensitivity of 99% and a specificity of 27% across 23 nights of sleep data. On average, the activity tracker overestimated the actigraph device for sleep efficiency by 1.17% and total sleep time by 5.35 minutes. Results of the feasibility study highlighted areas for improvement and future work.