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Title of project: The importance of sleep for diabetes associated tasks and outcomes

ABSTRACT
Sleep disturbances is increasing in the population. Adolescents with type 1 diabetes (T1D) experiences more disturbed sleep and less time spent in deep sleep compared to their healthy peers, potentially impacting diabetes management. We aim to improve diabetes management through improved sleep for individuals with T1D. The first step is to understand the size of the problem using a new developed questionnaire and new objective tools for estimating sleep duration and sleep quality. The second step is to test an intervention with sleep coaching. Disturbed sleep may adversely affect the diabetes management that requires day-to-day decision making, emotional and behavioral regulation, attention and planning. More than 50% of adolescents do not reach glycemic target. Diabetes management including blood glucose monitoring, plays an important role for reaching this goal. For approximately 4000 children and adolescents in Denmark living with T1D, sleep problems may account for short and long-term diabetes complications. The use of technology in T1D treatment has increased dramatically, but without a clear sign of improved glycemic control. This may, in part, be explained by additional disturbances from alarms and difficulties in initiating sleep due to itching or irritation from having devices attached to the body. Disturbed sleep may contribute to the 40% increased risk of psychiatric disease associated with childhood diabetes. Based on data from participants (n=45, age-range: 6–17 years) in our validation study, less than 4% get on average enough sleep according to international guidelines. Importantly, we demonstrate a positively and clinically relevant association between poor/insufficient perceived and objective sleep and glycemic outcome in 19 out of the 45 participants with T1D. These preliminary findings are supported by similar results from 2017, where we also found a positive association between poor perceived sleep and higher HbA1c levels. The study will fill out important knowledge gaps regarding: 1) prevalence of different types of disturbed sleep in our population; 2) the association between sleep and diabetes management on a day-today basis; and 3) the effects of sleep coaching on sleep duration and sleep quality as well as diabetes management and glycemic outcome. Furthermore, our results may help advancing the research field in designing more sophisticated multi-disciplinary interventions aiming at improving both sleep and metabolic outcome and a positive effect may be increased resilience and self-compassion known to prevent the development of anxiety and depression. Sleep coaching can quickly and easily be implemented into clinical practice.