COSMA: Cooperative Self-Management Tool for Adolescents with Autism

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ABSTRACT
Adolescence is a challenging period for individuals with autism because they undergo radical physical, emotional, and social transitions. We describe our setup to support the self-management of adolescents with autism for assisting adaptive transitions. We propose COSMA, an interactive mobile application that allows both individuals with autism and their caregivers to cooperatively manage, plan, reflect on, and improve behavior. COSMA is a self-management tool for adolescents with autism, including behavioral goal setting by means of the co-contract process, self-reporting while performing everyday tasks, and cooperative reflection to support their smooth transition to adulthood.

CCS Concepts
• Human-Centered Computing➝Interaction Design   • Social and professional topics➝User characteristics.

Keywords
Autism; adolescents; puberty; self-management; behavior change

1. INTRODUCTION
Individuals with autism present a variety of behavioral challenges derived from deficits in social interactions and restricted, repetitive patterns of behavior, interests, or activities [1]. While adolescence is a difficult time for most individuals, it is especially difficult for adolescents with autism. Such individuals struggle to understand rapid and often drastic physical and emotional changes as well as ever-changing social expectation [3]. Of the many strategies used to mitigate difficulties for individuals with autism and their caregivers, self-management is a popular approach to helping adolescents with autism learn skills for independence through the modification of problematic behaviors [2]. In recent years, there have been various assistive technologies using smart devices such as smartphones to help with the self-management of individuals with autism [4]. Our aim is to develop a prototype of an assistive mobile application that can support a smooth transition to adulthood for adolescents with autism. To do this, we conducted a semi-structured interview with five parents of Korean autistic youths and five autism specialists in Korea. We were able to identify day-to-day difficulties and challenging behaviors displayed by adolescents with autism that are described below. Drawing on the formative user research findings, we propose a prototype of COSMA, which is a cooperative self-management tool for adolescents with autism.

2. FORMATIVE USER RESEARCH

2.1 Participants and Method
Our caregiver participants had children diagnosed with autism spectrum disorder whose ages ranged from 10 to 16. All clinician participants were individuals who had regularly consulted with adolescents with autism and their parents as certified autism specialists. The interview questions for participants included the topics, challenges, and characteristic of adolescents with autism and their use of digital devices.

2.2 Findings
We gained a detailed understanding of the day-to-day difficulties of adolescents with autism and their challenging behaviors such as sexual inappropriateness, aggression, and noncompliance increased during puberty. We also identified the current practices and strategies that adolescents with autism and their caregivers use to collaboratively manage, plan, reflect upon, and improve the adolescents' behavior. To develop an intervening medium for successful transitions, we focused on identifying ways to support the self-management of behaviors.

2.2.1 Negotiating Behavioral Goals with Parents
The participating parents invested a great deal of effort in setting goals to change their children's behaviors. However, goals generated solely by parents were not persuasive, as parents' constant prompting to follow behavioral plans did not affect children's behavior. Parent–adolescent conflicts also take place when adolescents are given the initiative for determining their tasks or behaviors. However, our participants had attempted to resolve conflicts by encouraging both parents and children to add a negotiation process to their scheduling. Thus, we take the negotiation process into account when designing the self-management system.

2.2.2 Encouraging Self-Reflection in a Daily Context
According to the participants, adolescents with autism are expected to improve their behavior and, eventually, to better understand themselves. Reflecting upon past events helped a child understand the contexts and triggers of his problematic behavior. Therefore, to ensure successful behavior modification, it is imperative to collect the information about the targeted behavior. The parents and therapists, however, had limited access to the information. For instance, some of our adolescents with autism did not want to share their secrets or their innermost feelings with their parents. Thus, the adult caregivers (mostly parents) collected the information about their children through various channels, such as their children's school teachers, therapists, and peers, as well as those peers' mothers.

3. THE DESIGN OF COSMA
To support cooperative goal setting and self-reflection in a daily context, we have developed a system called COSMA. It is a mobile-based cooperative self-management application for
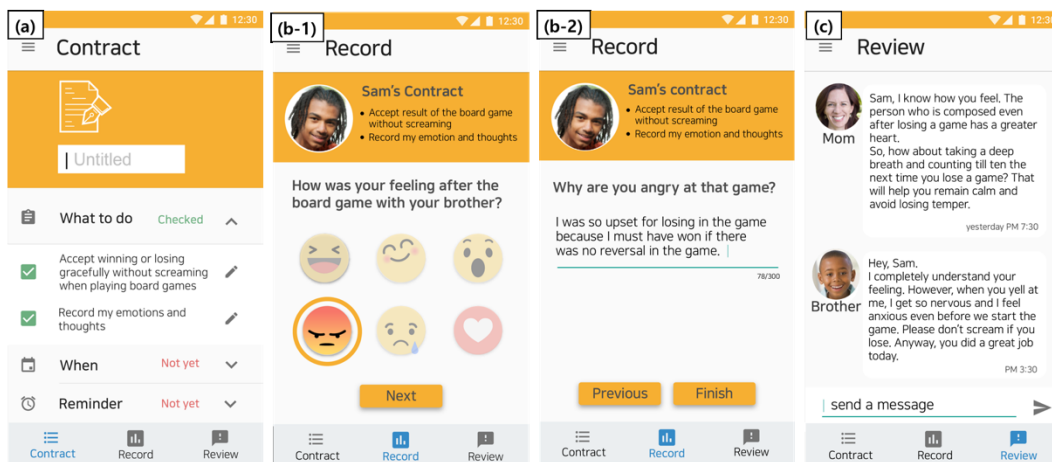
Figure 1. Three stages of COSMA : (a) Contract: Create a new contract, (b-1) Record: Rate mood, (b-2) Record: Describe a reason for the mood rated, (c) Review: Check reviews of behaviors over the contract period.

adolescents with autism, including behavioral goal setting by means of making co-contract between adolescents and their caregivers, self-reporting while performing everyday tasks, and cooperative reflection.

3.1 COSMA Feature Description

In general, COSMA functions under three stages of self-management activities. We will explain each stage using a concrete scenario about Sam, a teenager who enjoys playing board games with his younger brother, as an example.

3.1.1 Co-Contract for Plausible Goal Setting

This stage seeks to build consensus for plausible behavioral goal setting between adolescents with autism and caregivers. This contract includes target behaviors, rewards, the duration of the contract, and the detailed condition of reminder. In the case of Sam, he has the problem of screaming in anger every time he is defeated in a game. To correct this behavior, Sam's mother would like to propose a contract for two things: 1) accept winning or losing gracefully without screaming when playing board games; and 2) record emotions and thoughts through COSMA immediately after playing the game. After writing a contract with target behaviors, the duration of the contract, and the reward for the target behavior, she sends the contract to her son. Sam reads the contract sent by his mother through COSMA, writes the feedback on the contract and sends it back to his mother (Figure 1.a).

3.1.2 Self-Monitoring of Everyday Tasks

As expressed in the findings above, adolescents are expected to improve their behaviors by reflecting upon past activities; therefore, the self-monitoring of activities throughout the day is critical. For instance, whenever Sam loses in a board game while playing with his brother on the weekend, he first comes out of the room yelling at his brother. However, as soon as Sam comes up with the contract, he takes out his cell phone and starts to record his feelings through COSMA. On COSMA, Sam checks the "angry" icon to answer the question asking his emotion status(Figure 1.b-1). Additionally, he answers the question "Why are you angry?" with "I was so upset for losing in the game because I must have won if there was no reversal in the game." (Figure 1.b-2). After writing his feelings on COSMA, he feels more relaxed and begins to reflect his behaviors.

3.1.3 Cooperative Reflection

The last stage we designed is the cooperative reflection, in which adolescents with autism reflect their behavior by receiving feedback from their caregivers and therapists based on the collected data. For example, Sam's mother and younger brother check the data that Sam has recorded and write a review for him. In the review, Sam's mother expresses sympathy for his feelings first and then suggests an alternative method, such as taking a deep breath and counting to ten instead of screaming in a similar situation. In his brother's review, he asks Sam not to yell at him even if he loses in a game because he becomes nervous when Sam screams and gets anxious even before starting a game with him in the next time. After checking the reviews, Sam begins to think about his brother's feelings and decides to follow his mother's advice instead of screaming next time (Figure 1.c).

4. CONCLUSION AND FUTURE WORK

Much like other adolescents, adolescents with autism experience problems caused from their puberty, and because of their autistic characteristics, they experience much more difficulties. The key to decrease their difficulties is to help them reflect themselves and smoothly communicate with their caregivers. Based on formative findings, we suggest COSMA, which is a mobile-based application for self-behavioral management. In the near future, we will evaluate the working prototype with adolescents with autism, their caregivers, and therapists in a field setting.

5. REFERENCE

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