

Exploring caregivers' perception of children with autism spectrum disorder's experience using a smart toothbrush

Poster No.



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Introduction

Sensory processing differences in children with Autism Spectrum Disorder (ASD) can negatively impact toothbrushing compliance, technique, and cooperation. Specifically, difficulty tolerating home and professional oral care, uncooperative behaviors, communication impairments, as well as challenges finding and accessing professional oral care services are all factors that contribute to poor oral health in children with ASD. Despite these impairments, children with ASD are generally able to learn and process visual and audible information.¹ Many previous studies have shown that using visual aids such as visual pedagogy, picture exchange communication systems, and video modeling systems can improve oral hygiene of children with ASD.^{1,3,4,5} However, little is known about whether these aids can serve as "successful assistance" for children with ASD in pursuit of better oral health as judged by their caregivers.

The objective of this study is to examine caregiver reactions to the use of the hum by Colgate Smart Kids Toothbrush and associated app by children with ASD. The hum by Colgate Smart Kids Toothbrush is a smart toothbrush that uses augmented reality to engage children during toothbrushing through the use of games and provides guidance on brushing technique. This study aims to capture caregiver reactions such as how easy and enjoyable the use of the toothbrush and app seem to be for the child with ASD and how useful the caregiver found the connected toothbrush to be. These insights will explore the value of utilizing 'smart' toothbrush technologies with ASD in oral hygiene through the perspective of the caregiver.

Materials and Methods

Methods: This is a single-center, non-randomized clinical study in which children ages 5-12 years with ASD (type 1 or 2) and their primary caregivers participated in a 4-week study. At the Baseline Visit, caregivers were asked to complete a questionnaire. Participants were then instructed to brush twice daily for four weeks with the hum by Colgate Smart Kids Toothbrush and the associated app. 1 week after the Baseline visit, caregivers were asked to complete a perceptions of toothbrushing questionnaire remotely and at the end of the 4th week, caregivers were asked to complete the perceptions of toothbrushing questionnaire again. At the final study visit, caregivers were asked about the preceding 4 weeks on topics such as patients' experiences including thoughts, feelings, intentions, observations, and behaviors related to the use of a connected toothbrush and related smartphone app.

Baseline characteristics for caregivers and children were summarized with descriptive statistics. Two-sided non-parametric paired tests were utilized to assess changes in median scores from the answers to the perceptions of toothbrushing questionnaire from baseline to week 4.

Results

15 boys and 2 girls average 8.47 years old recruited mainly from the Philadelphia region for this study. In general, the majority of the children went to a dentist twice a year. After the 4-week study, parental interviews indicated that they thought that use of the hum by Colgate Smart Kids Toothbrush gave their children increased autonomy in toothbrushing and increase in children's brushing frequency. Many caregivers reported that the brushing process had become easier, of better quality, and more fun. Additionally, they noticed that the children had become more independent and motivated, and that level of struggles had decreased. When comparing responses at Baseline, Week 1, and Week 4, caregivers reported overall improvement on enjoyment, motivation, and focus when brushing their teeth (Figure. 2). Additionally, caregivers felt slightly less frustrated, slightly more satisfied, and provided less assistance to their children while brushing their teeth when compared to Baseline (Figure. 3).



Figure 1. The hum by Colgate Smart Manual Toothbrush uses associated app to engage children with ASD during toothbrushing through the use of games.

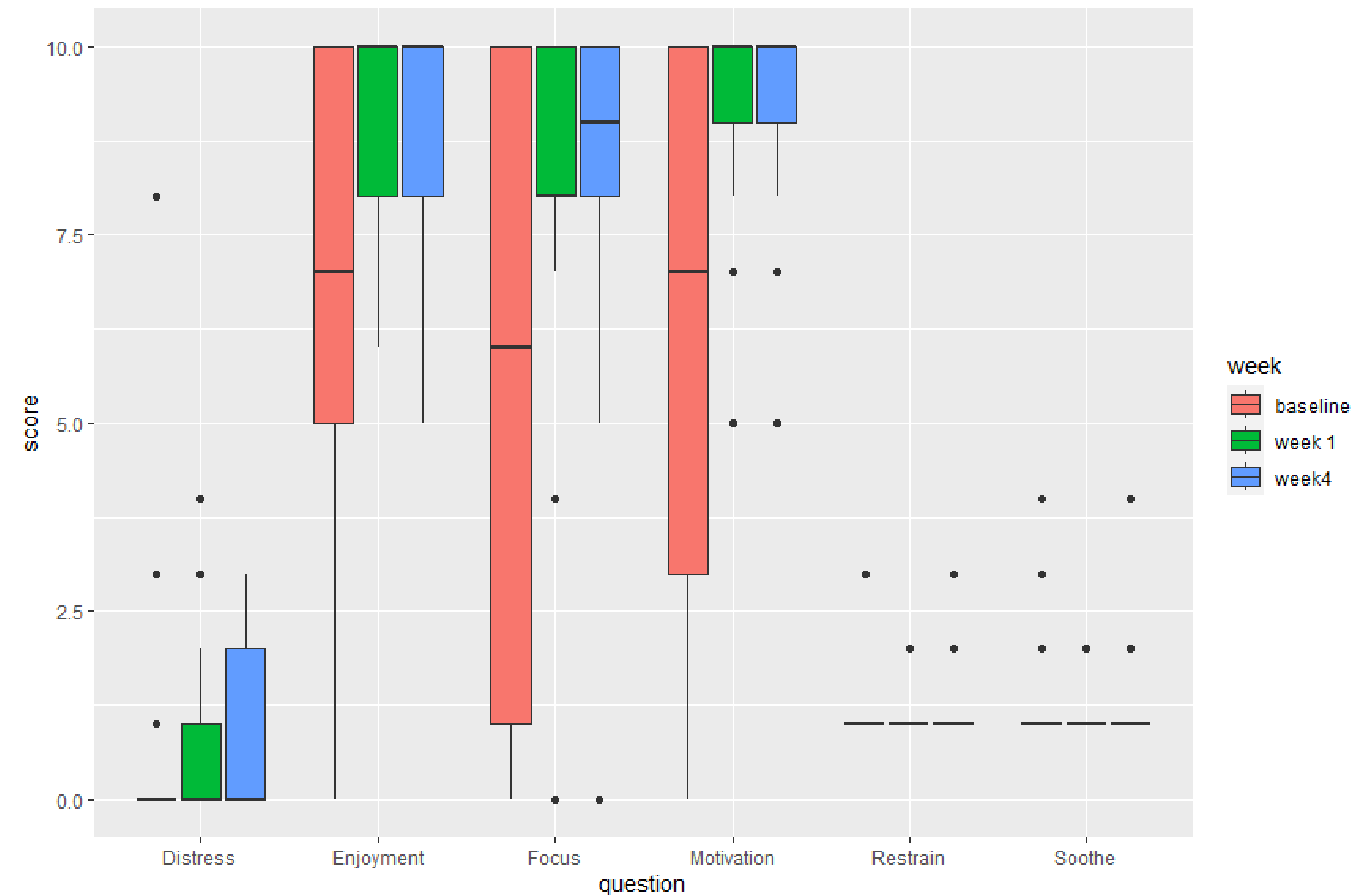


Figure 2. Baseline, Week 1, and Week 4 questionnaire toothbrush experiences

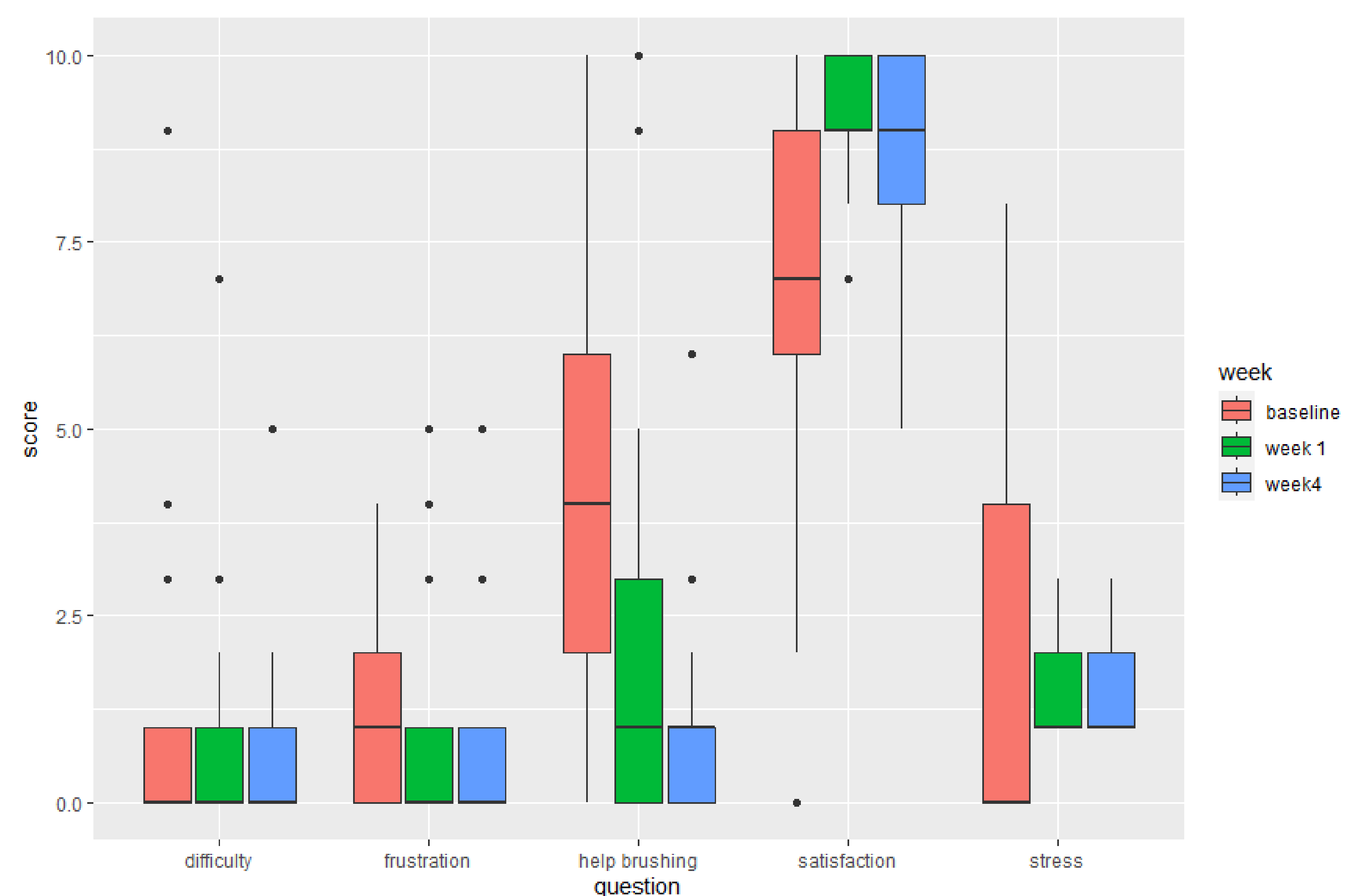


Figure 3. Baseline, Week 1, and Week 4 questionnaire caregivers' experience and perceptions

Discussion

One possible explanation for improvement of autonomy and enjoyment is that the app served as a desensitizing instrument acting as a visual tool for the study subjects that promoted engagement in activities and reduced distress and confusion for the children.² However, the innovation with the smart toothbrush and associated app was the reward system for the children. The app was presented to the children as a form of game; designed to have the children follow a character in the game and brush every section of the teeth. The gamification of toothbrush likely incentivized our study subjects to improve their brushing skills. Our study demonstrated that receiving a reward for brushing in the form of a game can potentially serve as a tool to improve and maintain oral health for children with sensory processing differences, such as ASD. Moreover, parental buy in of this experience further supports the use of this innovation to improve home oral care and promote autonomy in children with ASD. One limitation of our study was the relatively small sample size. Future studies can investigate the oral hygiene status of children after using Colgate app and the hum by Colgate Smart Kids Toothbrush.

Conclusions

Use of the hum by Colgate Smart Kids toothbrush and the associate app allowed for parental perceptions of improved autonomy in children with ASD. The positive results presented in this study will help inform new ways for children with ASD to become more focused, motivated, and independent.

References

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