

# Chapter 4

## Changelt: Toward an App to Help Children With Autism Cope With Changes

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### ABSTRACT

*The use of technology-based interventions for ameliorating ASD core deficits has been growing in popularity. However, limited technologies are available that can help children with autism (aged 6 to 11) cope with changes, and these do not typically incorporate the methods used or recommended by practitioners. This project addressed this gap through the design, development and evaluation of a prototype app to support children with ASD overcome their difficulties with changes. The researchers report on preliminary work in developing this app, in which they decided not to involve children with ASD before getting some evidence that the app may be useful and suitable for them. Therefore, the design at this stage was informed by the research literature and design studies involving typically developing (TD) children, practitioners and researchers. The evaluation studies revealed that: 1) the app is easy to use; 2) the activities are perceived as fun and engaging; 3) the app may be suitable for children with ASD.*

### INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social interaction and communication combined with repetitive patterns of behaviour and interests, including resistance to change (APA, 2013). In spite of progresses in early diagnosis and interventions, ASD is typically lifelong (Hourcade et al., 2012; Knapp, 2009), impacting both individuals with ASD and their

DOI: 10.4018/978-1-7998-2637-8.ch004

families. A person's employment, social and personal functioning, standard of living and quality of life are some of the domains which can be affected by autism. In turn, services and support for individuals with autism are also seriously impacted. For example, the total cost of supporting individuals with ASD in the UK is estimated to exceed £28 billion per year.

For individuals on the spectrum, the world seems frightening due to its unpredictability (Turner, 1999). For children with ASD, changes can be particularly challenging and even small ones, such as taking a different route to school, can cause distress (APA, 2013). The stereotypical reaction is to attempt to gain control and security by creating rigid rules. Many individuals with autism have obsessive desire for sameness and routine. Often, they create routines and rituals that they strictly follow and therefore they struggle to alter their routine when changes appear, both expected and unexpected.

The difficulties in tolerating changes, as well as the strict adherence to routines and sameness, have been associated with anxiety since the earliest descriptions of the autism (Kanner, 1943). Anxiety in children with ASD leads to negative life experiences (Farrugia and Hudson, 2006) and deficits in social skills (Bellini, 2004).

Researchers and practitioners clearly highlight a stringent need for more effective interventions targeting individuals with ASD (Parsons et al., 2009). The use of technology in interventions with people with ASD has become very popular. A variety of technologies such as mobile computing, virtual reality or robotics have been introduced to improve social communication skills and support practitioners' work (Grynszpan et. al, 2014, Morin et al. 2018). Recently, a call for new technological tools to help professionals and families was launched at the ITASD (Innovative Technology for Autism Spectrum Disorders), Paris, France (ITASD, 2014).

However, the current methods applied for supporting children with ASD cope with changes mentioned in the literature are either non-technological, or do not combine all the recommended methods including Activity Schedules, Social Stories™ or coping strategies typically used by the practitioners (e.g. counting). Our work is the first attempt to design a technology that can provide support to practitioners in applying all these methods with children with ASD in an easy, friendly and interactive way.

## **BACKGROUND**

Individuals on the spectrum do not differ in terms of outer appearance from the typically developing individuals, but they show peculiarities in terms of social interaction, behaviour and communication. Children on the spectrum find it very difficult to develop social skills and they usually isolate themselves (APA, 2013). The relationships with others are limited or absent and they demonstrate deficiency to engage in activities with peers (Schopler & Mesibov, 2013). They may also have communication difficulties which can range from those involving non-verbal communication to language impairments (APA, 2013). In general, autistic people may struggle to initiate and sustain a conversation and language subtleties, such as verbal expressions or jokes, are not easily understood (Spence et. al., 2004). Many individuals with autism demonstrate repetitive patterns of behaviour and interests, such as stereotyped body movements, repetitive speech, continuous use of parts of objects (i.e. spinning the wheels of a toy car), rigid and atypical interests and strong attachment to routines (APA, 2013). As a result, if changes occur, they may cause challenging behaviours such as aggression, self-injurious behavior, tantrums, or non-compliance (APA, 2013).

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