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RCT of mind reading as a component of a psychosocial treatment for high-functioning children with ASD

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ABSTRACT

This randomized controlled trial evaluated the efficacy of mind reading as a component of a comprehensive psychosocial treatment for 36 high-functioning children, ages 7–12 years with ASD (HFASD). All participants received the comprehensive 5-week summer treatment (summerMAX), with half randomly assigned to also receive mind reading (emotion-recognition) computer instruction as part of the treatment (summerMAX + MR). Primary analyses of proximal measures indicated significantly better performance on face emotion-recognition testing for the summerMAX + MR group (vs. summerMAX alone), and significant gains in voice emotion-recognition child testing and parent- and clinician-rated emotion recognition skills for the overall group, but no between-groups differences. Secondary analyses of distal measures indicated significant improvements on broader emotion-recognition child testing and parent and clinician ratings of program-targeted social/social-communication skills, broad social skills, and ASD-related symptoms for the overall group (summerMAX + MR and summerMAX combined) and no significant differences between the conditions (summerMAX + MR vs. summerMAX). Results suggested that mind reading may result in significant but narrow gains when included as part of this intensive psychosocial treatment for children with HFASD.

1. Introduction

Recent data indicated a 123% increase in the prevalence of autism spectrum disorder (ASD) between 2002 and 2010, with the most notable change in characteristics being the significant increase in those with average or above intellectual ability (32% in 2002–46% in 2010; Center for Disease Control and Prevention (CDC), 2014). Although these high-functioning children with ASD (HFASD) exhibit relative strengths in cognitive and language abilities, they manifest the hallmark symptoms of social impairments (social-interaction and social-communication) and circumscribed and repetitive behaviors and interests (American Psychiatric Association [APA], 2013). Social-communicative impairments range from deficits in basic interaction skills, to understanding non-literal abstract language, to more complex social understanding and problem-solving (APA, 2013; Harms, Martin, & Wallace, 2010; Safran, Safran, & Ellis, 2003). Restricted and repetitive behaviors and interests are also problematic as they can inhibit social reciprocity and development of social skills (Klin, Sparrow, Marans, Carter, & Volkmar, 2000).

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One feature that contributes to social-communicative impairment involves deficits in non-verbal communication (APA, 2013). Nonverbal behaviors including facial expressions and prosody provide valuable information about the internal/emotional state of others (Doi et al., 2013) and a number of studies have examined the ability of individuals with HFASD to decode emotions (emotion recognition; ER). Harms et al. (2010) reviewed facial ER studies for individuals with ASD and found that abnormalities were consistently reported in eye-tracking and neuroimaging studies suggesting less automatic and more attention-demanding processing. Results of behavioral studies were mixed for basic emotions but supported a deficit for complex emotions. Harms et al. concluded that the evidence supported a face ER deficit in ASD and that contradictory evidence in some behavioral studies may have been due to the use of compensatory strategies (e.g., feature-based processing instead of configural processing). These strategies, however, require more attention and effort (Harms et al.) and they may interfere with the ability to simultaneously process other important social information (Serra et al., 2003). Poor attention to facial expressions may also contribute to the impairments (Ploog, Scharf, Nelson, & Brooks, 2013). Although studies of ER in prosody are far less prevalent, findings have indicated a deficit for individuals with HFASD (Doi et al., 2013; Lindner & Rosen, 2006; Mazefsky & Oswald, 2007).

Given the contribution of ER deficits to the social impairments of children with HFASD, effective ER treatments are needed. Treatments that improve face and voice ER skills may increase social functioning (LaCava, Golan, Baron-Cohen, & Myles, 2007; Lindner & Rosen, 2006), interest, and interactions, and reduce social confusion for children with HFASD (Hopkins et al., 2011). Enhancing ER skills may have additional benefits as better ER skills have been associated with lower levels of ASD symptoms (post-treatment) in children with HFASD (Thomeer et al., 2011). One of the most common approaches for increasing social competence of children with HFASD is social skills interventions. A review by Reichow, Steiner, and Volkmar (2012) concluded that social skills groups were a promising treatment approach for increasing some aspects of social competence for children with HFASD however they had a minimal effect on ER skills. Results also indicated significant methodological limitations in the studies reviewed including few randomized controlled trials and highly variable intervention dosage.

Another treatment modality for increasing social competence including ER is computer-based intervention (CBI) and there has been a dramatic increase in its use with this population (Ploog et al., 2013). CBI may be especially applicable for children with HFASD who are hyperattentive to details and exhibit a tendency to "analyze or build systems, to understand and predict the behavior of nonagentive events in terms of underlying rules and regularities" (i.e., systemizing; Golan & Baron-Cohen, 2006; p. 593). By learning and establishing links between facial expressions and prosody and underlying emotions, children with HFASD may be able to compensate for their ER deficits (Golan & Baron-Cohen, 2006). CBIs that use explicit instruction may be particularly effective (Harms et al., 2010). Recent reviews determined that CBIs for ER for ASD were promising but conclusions regarding efficacy were precluded due to study limitations (e.g., lack of randomized designs; Ploog et al., 2013; Ramdoss et al., 2012).

One CBI developed to increase ER skills and exploit the systemizing strengths of individuals with HFASD is mind reading (i.e., MR; Baron-Cohen, Golan, Wheelwright, & Hill, 2004). The interactive software uses visual and auditory lessons and stimuli, practice trials, and reinforcement to teach facial expression and prosody decoding. Small-scale uncontrolled trials of MR with children with HFASD suggested that use of the software was associated with ER gains on tasks derived mainly from the software however gains were often not associated with broader improvements in social functioning (e.g., LaCava et al., 2007; LaCava, Rankin, Mahlios, Cook, & Simpson, 2010). In the only identified randomized controlled trial (RCT) of MR for children with HFASD, Thomeer et al. (2015) evaluated the software when combined with in vivo rehearsal and reinforcement. Following 24 (90-min) sessions implemented by staff over 12 weeks, children with HFASD in treatment demonstrated significantly better post-treatment ER and emotion expression skills and significantly lower ASD symptoms compared to children with HFASD in the control. Although the treatment group also demonstrated better post-treatment social skills than the control group, the difference was not statistically significant. Despite the significant improvements for children in treatment, the lack of broader social gains prompted Thomeer et al. (2015) to suggest that MR be evaluated as part of a comprehensive treatment package that contained other treatment elements (e.g., instruction on how to respond to expressions by others) to help generalize the ER gains to broader social skills and/or complement the treatment package. This recommendation is consistent with others who also noted the need for CBIs targeting ER to include structured practice opportunities in real-life interactions to improve broader social skills (Hopkins et al., 2011; Ploog et al., 2013; Ramdoss et al., 2012).

Attempts to remediate the ER deficits using comprehensive treatments have yielded mixed results. For example, Stichter, O'Connor, Herzog, Lierheimer, and McGhee (2012) evaluated the efficacy of a 10-week (two 60-min sessions per week) multi-component psychosocial intervention involving explicit instruction, modeling, practice, and reinforcement for children with HFASD. No significant improvements were found on child testing of ER. Lerner, Mikami, and Levine (2011) evaluated a 6-week (5 h per day, 5 days per week) summer program for adolescents with HFASD that targeted social and emotional functioning using affective engagement, in vivo rehearsal, and social reinforcement. Results indicated that those in treatment performed significantly better than the comparison group for ER in adult voices, but did not differ for ER in adult or child faces or child voices.

Another comprehensive summer treatment for children with HFASD, summerMAX, has also yielded mixed results for ER (Lopata, Thomeer, Volker, & Lee, 2013). The summerMAX protocol targets core features of children with HFASD including social/social-communication skills, face-emotion recognition skills, interpretation of non-literal language skills, and interest expansion using direct instruction, modeling, role-play, and performance feedback. A response-cost system and daily note