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Shakespeare and autism: an exploratory evaluation of the Hunter Heartbeat Method

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ABSTRACT

This preliminary report describes the Hunter Heartbeat Method, a drama-based social skills intervention designed to improve the social interaction, pragmatic language, and facial-emotion recognition skills of individuals with autism spectrum disorder. Fourteen children with autism spectrum disorder were recruited for the first-ever systematic implementation of this drama-based intervention. Piloting of post-test measures indicated that the participants' scores increased across time on measures of social skills, communication, and pragmatic language. Furthermore, the Penn Facial Recognition's facial emotion recognition task, a computer-based facial emotion task, detected change in skill across time. Importantly, the intervention was acceptable to participants and parents and feasible to implement. The preliminary results need to be replicated with a larger number of participants and within a more controlled design. However, these findings indicate that Hunter Heartbeat Method shows promise in improving the social and communicative functioning of children with autism spectrum disorder.

ARTICLE HISTORY

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KEYWORDS

autism; autism spectrum disorder; social skills intervention; drama; theatre; pragmatic language; facial emotion recognition

People with autism spectrum disorder characteristically have difficulties with understanding non-verbal behaviour in social interactions, establishing and maintaining peer relationships, sharing enjoyment of interests with others, and social or emotional reciprocity (American Psychiatric Association, 2013). Additionally, they are likely to have deficits in pragmatic language that impact on their social functioning (Eigsti, de Marchena, Schuh, & Kelley, 2011; Lord, 1996; Tager-Flusberg & Anderson, 1991).

Teaching social skills has been shown to be an effective intervention for children with autism spectrum disorder (Chung et al., 2007; Matson, Matson, & Rivet, 2007). For children with autism spectrum disorder, social skills training often includes group interventions (Soloman, Goodlin-Jones, & Anders, 2004), social stories (Hutchins & Prelock, 2006), pivotal response training (Koegel & Frea, 1993), and social problem solving (Bauminger, 2007). Social skills interventions are predominately directive in nature and rely on explicit instruction, visual structure, and predictable organisation to minimise stress

and maximise skill acquisition (e.g., early intensive behavioural intervention or applied behavioural analysis; the TEACCH® approach, Schopler & Olley, 1982). This type of highly structured approach may be less optimal for teaching some social-emotional and play skills (Sherratt & Peter, 2002). Play, especially socio-dramatic play, is an important means by which children develop the ability to acknowledge and understand the perspective of others, practise communicative competence through scripting events, and develop understanding of social norms through role playing and narrative development (Sachs, Goldman, & Chaille, 1985; Sherratt & Peter, 2002; Vygotsky, 1978). Socio-dramatic play offers an opportunity for children with autism spectrum disorder to re-engage in social narrative in a less threatening, intrinsically motivating, and reinforcing context (Sherratt & Peter, 2002).

Drama-based intervention

Drama-based interventions offer opportunities for children with autism spectrum disorder to develop social skills including awareness of others; empathy; perspective taking; turn-taking; balance between listening and responding; gaining, maintaining, and directing the attention of others; adopting different roles appropriate to the setting; recognising rules and conventions of different groups; and recognising the facial expression of emotion (Sherratt & Peter, 2002). Drama intervention geared to children with autism spectrum disorder offers a structured approach to enabling and motivating hard-to-reach children to participate more meaningfully in a social world (Peter, 2003).

Research on drama-based interventions includes the work of Guli, Semrud-Clikeman, Lerner, and Britton (2013), who compared 18 participants diagnosed with autism spectrum disorder, non-verbal learning disability or attention deficit hyperactivity disorder, or both, to a clinical control group after participation in the Social Competence Intervention Program. Results indicated improvement in key domains of observed social behaviour in a natural setting compared to the clinical control group (Guli et al., 2013).

Corbett et al. (2011) conducted a pilot study investigating Social Emotional NeuroScience Endocrinology Theatre, a drama-based intervention designed to improve socio-emotional functioning and reduce stress in children with autism spectrum disorder. To assess treatment gains, neuropsychological (see Korkman, Kirk, & Kemp, 2007), biological (cortisol and oxytocin), and behavioural measures (Social Responsiveness Scale, Constantino & Gruber, 2005; Adaptive Behavior Assessment System, Harrison & Oakland, 2000) as well a measure of stress (The Stress Survey Schedule for Persons with Autism and Other Developmental Delays; Groden et al., 2001) and sensory processing (Short Sensory Profile; Dunn, 1999) were assessed in a pretest–posttest design. Results suggested that the Social Emotional NeuroScience Endocrinology Theatre participants showed some improvement in face identification and theory of mind skills (Corbett et al., 2011). Although this study had a small sample (8 participants) and did not use a control group, results indicate improvement in the socio-emotional functioning in children with autism spectrum disorder through participation in a community-based theatrical setting.

Corbett et al. (2014) also assessed a 2-week summer camp model of the Social Emotional NeuroScience Endocrinology Theatre program in participants ages 8–17 years. Outcome measures for this pilot study included the NEPSY, the Parenting Stress Index (Abidin, 2003), the Adaptive Behavior Assessment System, the Social Responsiveness

Scale, the Companionship Scale (Bauminger, 2007), and cortisol sampling. Pre-post test results suggested improvement in face processing, social awareness, and social cognition. Furthermore, duration of interaction with familiar peers increased significantly over the course of treatment, while engagement with novel peers outside the treatment setting remained stable (Corbett et al., 2014). However, the significance of these findings is affected by the lack of a control group.

The latest Corbett, Blain, Ioannou, and Balser (2016) study examined the impact of the Social Emotional Neuroscience Endocrinology Theatre program on anxiety and stress associated with social challenges in children with autism spectrum disorder. Participants included 30 children ages 8–14 who were randomly assigned to either the Social Emotional Neuroscience Endocrinology Theatre program ($n = 17$) or a waitlist control condition ($n = 13$). Biological (salivary cortisol) and behavioural measures indicated that the theatre-based peer mediated intervention contributed to improvements in social competence and in trait anxiety relative to a waitlist control.

Further work on drama-based interventions comes from Lerner and colleagues in their examination of the effectiveness of “socio-dramatic affective-relational intervention” (Lerner, Mikami, & Levine, 2011). Socio-dramatic affective-relational intervention participants ($N = 9$) received 145 hours of group treatment over 29 sessions (5 hours per day over 6 weeks). Measures were taken at 3-week intervals beginning 6 weeks before and continuing for 6 weeks after treatment. Findings indicated that participants made gains in social skills from baseline to the end of the program relative to age, sex, and diagnosis-matched control group peers who did not receive the socio-dramatic affective-relational intervention. Improvements were significant and maintained post-treatment.

The Hunter Heartbeat Method

The Hunter Heartbeat Method (hereafter referred to as the Heartbeat Method) is a drama-based intervention intended to improve social communication skills in children with autism spectrum disorder (Hunter, 2014). In this intervention, games based on Shakespeare’s play *The Tempest* are introduced to the children allowing them to progress through the basic plot of *The Tempest* while emphasising the themes of the eyes, the mind, and the heart. Games target skills including eye contact, turn-taking, facial emotion recognition, imitation, improvisation, humour, and communication using a play-tutoring approach as opposed to explicit instruction. Through this approach, games can be spontaneously adapted to the child’s ability level. Children learn the games while seated in a large group circle through imitation and observation rather than explicit instruction, have an opportunity to play the games one-on-one with a facilitator, and then have an opportunity to enter the middle of the circle and show their interpretation of the game to their peers. The Heartbeat Method emphasises the low facilitator to child ratio (ranging from 1:3 to 1:1) so children receive individual attention, feedback, and interaction as they play the games and develop core social skills. The Heartbeat Method is described in more detail in a published manual describing this intervention (see Hunter, 2014).

The Heartbeat Method uses well-established components of evidence-based social skills training, such as modelling by a competent role model, practice, and role-playing with feedback. Reinforcement in the Heartbeat Method is intrinsic due to the playful and humorous nature of the games. In the Heartbeat Method, children participate in social

games that, while creating the opportunity for the development of core social skills, are still games. Children work collaboratively with actors imitating and practicing the give-and-take of social interaction, turn-taking, and leading and following. This intervention, to the untrained eye, appears no different from a drama class or after-school activity in which a typically developing peer would participate. Thus, the Heartbeat Method allows children with autism spectrum disorder to learn social skills in an ecologically valid environment that mirrors other extra-curricular activities of typically developing peers.

The Heartbeat Method is distinct from other drama-based inventions in several regards. First, rather than involving participation in a theatre production or play, the Heartbeat Method exclusively uses drama-based games that never culminate into a full production or performance. However, unlike the socio-dramatic affective-relational intervention, which also uses a game-based approach, the Heartbeat Method games string together following a storyline (*The Tempest*). Rather than learning one role and rehearsing that role in a community theatre setting (like the Social Emotional Neuroscience Endocrinology Theatre approach), children have the opportunity to play multiple roles within the context of a single game. There is no rehearsing or perfecting the portrayal of a single character; rather, the focus of the games is on “trying on” various social roles, emotions, and responses to build flexibility and spontaneity into the structure of the games. Due to this flexibility, the Heartbeat Method also differs from other drama-based interventions in that it can be adapted to children of all levels of functioning including non-verbal participants (Hunter, 2014). Finally, a critical difference between the Heartbeat Method and other drama-based interventions is that the Heartbeat Method specifically relies on the work of Shakespeare to create the social and emotional contexts for practising social skills and exploring various narrative, emotional, and behavioural choices in the context of socio-dramatic play.

Aims

The purpose of this article is to highlight the potential usefulness of drama-based interventions broadly, and, specifically, the Heartbeat Method, through description of the first systematic implementation of the Heartbeat Method as a potential emerging treatment for social deficits associated with autism spectrum disorder. This “exploratory pilot study” was designed to pioneer collaboration with the university departments of Psychology and Theatre, to evaluate the feasibility of systematic implementation, pilot potential outcome measures, and to establish preliminary evidence that this intervention has the potential to improve core social and communication difficulties associated with autism spectrum disorder to determine if further exploration is warranted.

Methods

Participants

Participants included 14 children with autism spectrum disorder (64% were boys and 36% were girls; mean age = 12 years, 5 months; age range = 10 years, 6 months to 13 years, 10 months) recruited through local area public schools in Columbus, Ohio, USA. Students

invited to participate were those who were being served by the school district under an autism education classification and had a confirmed autism spectrum disorder diagnosis. Facilitators were actors selected from a master's of fine arts program who received training in the Heartbeat Method as well as basic education in autism spectrum disorder.

Procedure

This study was approved by Ohio State University's Institutional Review Board. Participants were recruited through the director of special education services of a local public school district. Eligibility criteria included age 10 to 14 years, diagnosis of an autism spectrum disorder, and no major challenging behaviours.

Pre-test assessments were conducted in the school setting by research personnel to confirm the participants' autism spectrum disorder diagnosis and obtain baseline information for each child. All children received the Heartbeat Method and were divided into two groups ($n = 8$ and $n = 6$) based on their scheduling needs and to allow for low facilitator to student ratios (approximately 1:1) during the intervention. Children participated in the Heartbeat Method for approximately 1 hour per week after school for 10 weeks. The intervention was carried out on the stage of the auditorium at one of the local schools in the school district. The participants' parents or direct support staff were responsible for making arrangements for transportation to and from the intervention session.

At the end of the 10-week intervention period, post-test assessments were conducted. Research personnel also carried out post-testing at each student's respective school. Parents and participants were also asked to complete a brief "social validity" questionnaire regarding their impression of the intervention.

Structure of the Hunter Heartbeat Method

Each session of the Heartbeat Method follows a similar format, beginning with children seated in a circle on the floor making a "Hello Heartbeat". This exercise allows the participants time to adapt to the environment and signifies the transition into the session. Following the "Hello Heartbeat", children are led by the facilitators through a series of games based on the plot of Shakespeare's *The Tempest*, focused on skills such as facial emotion recognition, eye contact, gross motor imitation, affective imitation, pragmatics of dialogue exchange, personal space, turn-taking, affective expression, humour, and social improvisation. Initially, two facilitators model the game in the centre of the circle; subsequently, facilitators and children break off into dyads for 1:1 repeated practice and retroactive feedback of the game. Following practice, children and facilitators return to the circle, where they take turns "performing" the game for the other participants. Following 5–7 games, which vary across sessions and ultimately reflect the plot progression of *The Tempest*, the Heartbeat Method session is brought to a close with a "Goodbye Heartbeat". Critical elements of the Heartbeat Method include predictable format, quiet environment, modelling, role playing, 1:1 practice involving feedback on performance, and execution/performance of the practised skill; these elements do not differ significantly from critical elements of other empirically validated interventions teaching social skills; however, they are delivered in a playful and highly ecologically valid manner. More specific detail regarding the games

Table 1. Autism Diagnostic Observation Schedule scores by participant.

	Module	Communication	Reciprocal social interaction	Restricted and repetitive behaviours	Total score	Autism spectrum disorder cut-off	Autism-specific cut-off
Ss1	3	2	10	2	14	Yes	Yes
Ss2	3	0	8	1	9	Yes	Yes
Ss3	2	7	6	2	15	Yes	Yes
Ss4	3	4	9	0	13	Yes	Yes
Ss5	3	1	6	1	8	Yes	No
Ss6	3	2	8	1	11	Yes	Yes
Ss7	3	2	7	1	10	Yes	Yes
Ss8	2	8	2	1	11	Yes	Yes
Ss9	3	1	11	1	13	Yes	Yes
Ss10	3	1	6	4	11	Yes	Yes
Ss11	3	3	11	4	18	Yes	Yes
Ss12	3	0	3	2	5	No	No
Ss13	4	0	5	2	7	Yes	No
Ss14	4	5	9	3	17	Yes	Yes

Note: Autism Diagnostic Observation Schedule results by participant including module administered, sub-scale totals, total score, and Autism Diagnostic Observation Schedule diagnostic algorithm results regarding whether or not the participant met the autism spectrum disorder or autism-specific cut-off score.

played as part of the Heartbeat Method intervention can be found in the treatment manual (Hunter, 2014).

Measures

The Autism Diagnostic Observation Schedule (Gotham, Risi, Pickles, & Lord, 2007; Lord et al., 1989) was used in the pre-intervention assessment to validate the children's autism spectrum disorder diagnosis. Table 1 presents Autism Diagnostic Observation Schedule results for all participants.

A parent-reported measurement of change in skill level was obtained using the Vineland Adaptive Behavior Rating Scale (Second Edition): Parent/Caregiver Report Form (Vineland II; Sparrow, Cicchetti, & Balla, 2005). Direct assessment of changes to the core features of autism spectrum disorder were assessed through the pre- and post-intervention administration of the following standardised assessments: Penn Facial Recognition (Gur et al., 2001; Gur et al., 2002) and the Test of Pragmatic Language (Second Edition; Phelps-Terasaki & Phelps-Gunn, 2007). Additionally, a brief "social validity" questionnaire was included for parents and participants to provide qualitative feedback on the intervention and possible collateral benefits (e.g., increased social interactions with peers, increased interest in social activities).

Analyses

Analyses were conducted using SPSS Version 20 (IBM, 2011). Analyses included descriptive statistic and within group pre-post test comparisons for scores on the Vineland-II, the Penn Facial Recognition, and the Test of Pragmatic Language. The Wilcoxon Signed Ranks Test was used to conduct within-group comparison between pre- and post-test scores to determine if the intervention effected statistically significant change. The Wilcoxon Signed Ranks test (Wilcoxon, 1945) is the non-parametric analogue to the dependent samples t-test (Woolson, 1998). Effects sizes for the Wilcoxon Signed Ranks test were calculated using the formula $r = z/\sqrt{N}$ (Rosenthal, 1994).

Results

Piloting of outcome measures

Vineland Adaptive Behavior Scale (Second Edition)

Significant differences between pre- and post-test measures were found for the following Vineland-II domain and subdomain scores: Composite Score ($z = 2.37, p = 0.02$), Daily Living Skills ($z = 2.53, p = 0.01$), and Socialisation ($z = 2.20, p = 0.03$) domains; the Expressive Language ($z = 2.45, p = 0.01$), Personal ($z = 2.03, p = 0.04$), Domestic ($z = 2.05, p = 0.04$), Community ($z = 2.34, p = 0.02$), and Relationships ($z = 2.44, p = 0.02$) subdomains. (See Table 2 for Vineland-II sub-domain scores; Table 3 for domain and composite; and Table 4 for Wilcoxon signed ranks test results for Vineland-II comparisons.)

Table 2. Vineland Adaptive Behavior Scale (Second Edition) select subdomain scores by participant.

	Pre-intervention						Post-intervention					
	Communication			Social			Communication			Social		
	Rec	Exp	Wri	Int	Pla	Cop	Rec	Exp	Wri	Int	Pla	Cop
Ss1	12	11	12	10	8	12	11	11	12	12	7	12
Ss2	12	9	9	4	9	12	7	10	12	7	14	13
Ss3	10	8	10	6	4	10	9	7	8	5	6	9
Ss4	11	9	10	8	7	9	—	—	—	—	—	—
Ss5	3	3	—	5	7	10	9	12	11	7	12	13
Ss6	10	10	13	7	7	10	—	—	—	—	—	—
Ss7	9	7	10	5	2	9	10	9	10	5	3	7
Ss8	5	7	8	6	4	9	—	—	—	—	—	—
Ss9	11	7	11	8	10	8	10	9	10	8	11	11
Ss10	10	9	10	5	6	11	11	17	13	9	11	16
Ss11	11	9	9	8	—	10	14	11	9	10	7	10
Ss12	11	9	11	9	10	12	11	10	12	11	8	12
Ss13	10	9	12	9	8	11	11	15	16	11	10	11
Ss14	12	14	11	14	11	12	—	—	—	—	—	—

Note: Vineland Adaptive Behavior Scale (Second Edition) sub-domain scores for Communication (Receptive, Expressive, Written, and Composite) and Social (Interpersonal relationships, Play, and Leisure, Coping skills, and Composite) domains pre-and post-intervention by participant.

Table 3. Vineland Adaptive Behavior Scale (Second Edition) and Test of Pragmatic Language (Second Edition) scores by participant.

	Vineland Adaptive Behavior Scale (Second Edition)								Test of Pragmatic Language (Second Edition)	
	PRE-intervention				POST-intervention				Pre	Post
	COM	DLS	SOC	COMP	COM	DLS	SOC	COMP		
Ss1	81	73	73	74	79	81	75	76	106	118
Ss2	72	66	64	66	70	79	80	74	87	114
Ss3	69	—	57	—	63	62	57	60	57	55
Ss4	72	66	62	65	—	—	—	—	90	109
Ss5	—	57	59	—	75	76	76	74	82	100
Ss6	77	71	62	68	—	—	—	—	83	106
Ss7	65	61	48	57	70	63	47	59	79	100
Ss8	56	54	53	54	—	—	—	—	63	61
Ss9	70	69	66	67	70	78	73	72	70	67
Ss10	70	69	59	64	92	102	83	91	112	112
Ss11	69	83	—	—	79	79	68	73	59	—
Ss12	74	62	75	68	77	81	75	75	92	117
Ss13	74	74	69	70	94	76	76	80	91	118
Ss14	84	91	85	85	—	—	—	—	89	89

Note: Vineland Adaptive Behavior Scale (Second Edition) Domain (Communication, Daily living skills, Social, and Composite) scores pre- and post-intervention and Test of Pragmatic Language (Second Edition) total scores pre- and post-intervention.

Table 4. Results of Wilcoxon Signed Rank Test.

Assessment	(Sub)Domain	Z Score	P Value	Effect size $r (Z/\sqrt{N})$
Vineland Adaptive Behaviour Scale (Second Edition)	Receptive	0.489	0.625	.13
	Expressive*	2.446	0.014*	.65
	Written	1.265	0.206	.34
	COMMUNICATION	1.016	0.310	.27
	Personal*	2.025	0.043*	.54
	Domestic*	2.047	0.041*	.55
	Community	2.336	0.019	.62
	DAILY LIVING*	2.527	0.012*	.68
	Interpersonal relationships*	2.441	0.015*	.65
	Play	1.856	0.063	.50
	Coping	1.265	0.206	.34
	SOCIALIZATION*	2.201	0.028*	.59
	COMPOSITE*	2.371	0.018*	.63
	Test of Pragmatic Language (Second Edition)	COMPOSITE*	2.403	0.016*
Penn Facial Recognition Task	COMPOSITE	0.861	0.389	.23
	COMPOSITE ¹	1.445	0.149	.39

Note: Results of Wilcoxon Signed Rank Test for the Vineland Adaptive Behavior Scale (Second Edition), Test of Pragmatic Language (Second Edition), and Penn Facial Emotion Recognition Task.

*Scores Significant at $p = 0.05$.

¹Secondary post-hoc analysis was conducted excluding the 7 individuals performing above 85% at baseline.

Test of Pragmatic Language (Second Edition)

Significant differences between pre- and post-test measures were found for the Test of Pragmatic Language Composite Score ($z = 2.40$, $p = 0.02$) indicating significant improvement in a direct measure of pragmatic language. (See Table 3 for Test of Pragmatic Language scores; Table 4 for Wilcoxon signed ranks test for Test of Pragmatic Language comparison.)

Penn Facial Emotion Recognition Task

No significant differences were found between pre and post-test measures for the Penn Facial Recognition total scores ($z = 0.86$, $p = 0.38$); however, 7 of the 14 participants obtained higher than 85% at baseline and thus had minimal room for significant improvement on this task. As illustrated in Figure 1, of the 7 participants not performing at or near ceiling on pre-test measures, 6 participants had increased scores at post-test with 4 showing marked improvement. Thus, a secondary post hoc analysis was conducted excluding the 7 individuals performing above 85% at baseline. This analysis did not yield significant results ($n = 7$; $z = 1.445$, $p = 0.15$); however, due to the very small sample size, it offers promise that the Heartbeat Method may improve facial emotion recognition in some participants. (See Table 4 for Wilcoxon signed rank test results of Penn Facial Recognition comparisons; Figure 1 for Penn Facial Recognition scores participants.)

Discussion

Feasibility

This exploratory evaluation represents the first, systematic implementation of the Heartbeat Method. Until this point, its creator, Kelly Hunter, had implemented the Heartbeat Method informally, with various groups of children with autism spectrum disorder for various durations of time.

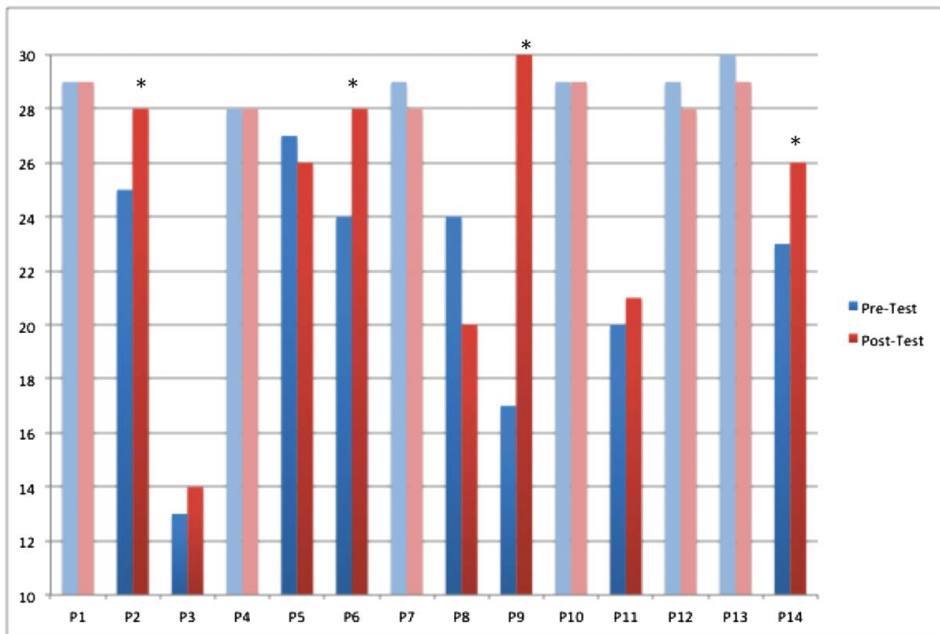


Figure 1. Figure 1 presents the results (number correct on the Penn Facial Recognition; y axis) for each participant (x axis). Participants scoring below 85% (26/30 correct) on pre-test evaluations are highlighted. *indicates participants who made marked improvement from pre- to post-test.

Masters of fine arts actors were trained on the intervention by Kelly Hunter and were provided with basic autism education by the authors of this article. Approximately one academic semester of training in the Heartbeat Method proved sufficient for implementation of the games in a manner that fidelity checks found to be in keeping with the elements believed to be essential to the Heartbeat Method implementation (detailed in Hunter, 2014).

With regard to participant characteristics, the Heartbeat Method participation proved feasible for children aged 10–14 years. Additionally, highly verbal children as well as children with a very limited verbal repertoire (one- to two-word phrases) were able to successfully and meaningfully participate in the groups. Furthermore, one participant had a 1:1 aide who was able to successfully and appropriately facilitate the child's participation in the intervention and slowly fade prompting across sessions.

Optimal timing and accessibility of group interventions are critical for maximising skill gains in participants as if the group location or timing is precarious/inconvenient absenteeism will impact skill acquisition. Through consultation with local area schools, an after-school format was chosen as the optimal time of intervention and groups were held at one of the schools that served as a recruitment site. Staying after school represented an unforeseen anxiety-provoking arrangement for several of our participants who had never before stayed after school for an activity. We relied on participants' parents to transport their child from their school to the intervention site. Ultimately, this proved to be a barrier in some cases and the after-school time was a challenge for some families.

With regard to assessment measures and assessment logistics, emergent barriers included working with the schools to have participants leave their class to be assessed pre-

and post-intervention. Furthermore, because interactions with parents were limited, difficulty emerged in obtaining parent rating scales as parents were asked to take rating scales home and return them completed.

Social validity questionnaire

Parent and child feedback on the acceptability of the intervention was resoundingly positive. Informally, it was readily observable that children enjoyed participating in the group. Upon completion of the intervention, child “social validity” questionnaires revealed that a significant majority of the child participants would be willing to participate in the group again if they had the chance. Additionally, nearly all the participants reported that they had fun during the groups. Parent-completed social validity questionnaires revealed that, overall, parents perceived that children enjoyed participating in the groups, left groups happy, and spoke positively of groups in between sessions. Many parents also reported anecdotally that they noted improvements in their child’s mood and social engagement at home.

Parent quotes from the social validity questionnaire included:

I ... heard his laughter and knew that he was enamored ... He was engaged and soaking up the energy and even participated as part of a group and that is uncommon.

[My son] usually wants to do nothing but solitary computer and video games and for him to enjoy being in a social setting was great. At one point he even said he wanted to be an actor.

My daughter LOVED the class. She left happy and excited every time. She loved feeling included and part of a group. We noticed that she was trying harder at school to make friends.

[At first] I thought, it’s another research project, but when I finally saw it in practice, I thought Wow! They’ve really got something there ... I see great potential for this type of program as far as learning emotions, expressions, thinking outside of one’s self, imagination, and following direction. Watching my daughter follow the actor’s lead in “pretending” was remarkable.

Outcome measures

Selection of appropriate outcome assessments is critical for evaluating intervention gains. Outcome measures must be sensitive enough to detect change in the skills the intervention targets, given the relatively short duration and minimal treatment dose of this once-weekly intervention. The Vineland-II was selected as it provides subscale scores in the domains of Socialisation and Communication. A parent-completed Vineland-II offers insight into skill improvement generalised to “real life” outside the context of the intervention itself or a contrived testing environment. However, the Vineland-II is a parent-completed rating scale and thus is subject to bias based on expected intervention gains.

The Test of Pragmatic Language and the Penn Facial Recognition Facial Emotion Recognition Task are assessments administered directly to the child, and thus are not impacted by expectancy effects. However, they are administered in a standardised setting and inform us about change in an isolated skill, but do not provide us with an assessment of change in the child’s use of pragmatic language in real-life situations.

The assessment goals in this initial study are primarily concerned with piloting measures for ease of completion, sensitivity to change in skills given our treatment dose and duration, and establishing general appropriateness of each measure in this context; that is, does the measure capture change in a skill that we have reason to believe is a skill that is impacted by the Heartbeat Method intervention?

Our findings indicated that both the Vineland-II and the Test of Pragmatic Language-2 were sensitive to change in skill across 10 weeks of treatment. Furthermore, that change in skill was in the expected direction (improvement) and in skill domains that were explicitly targeted during the Heartbeat Method intervention. The Penn Facial Recognition Facial Emotion Recognition Task was not sensitive enough to detect statistically significant improvement in participant skill across the 10-week intervention. This may be due in part to the fact that many participants had near-perfect performance on this assessment at baseline. This is not necessarily an indication that these participants do not have deficits in facial emotion recognition, but it may be that the facial expressions used in our administered assessment may have been too obvious or easy to capture deficits that emerge in real-life interactions where facial expressions are more nuanced. This possibility warrants further exploration. Alternatively, it is also possible that although these participants may have difficulty identifying facial expression of emotion in real life, they may not have difficulty in a contrived testing situation when competing cognitive demands (such as processing aspects of conversation and context) are removed from the task.

Trends noted in skill acquisition

Consistent with our hypotheses, we found statistically significant improvement in the Socialisation domain of the Vineland-II and the Personal and Relationships and Expressive Language subdomains. On the Test of Pragmatic Language, a direct child measure of pragmatic language, statistically significant improvement in scores were noted, consistent with expectations as the Heartbeat Method specifically and repeatedly targets the social use of language. Although it is impossible to disentangle the impact of maturation versus the impact of the treatment itself, these findings are certainly promising and warrant further exploration in future research.

On the Penn Facial Recognition Facial Emotion Recognition Task, a subset of participants who were poorer performers on this task when assessed pre-intervention made notable gains in this skill area after the intervention. However, some participants demonstrated near-perfect performance on this task at baseline. Further exploration of alternative means by which to measure facial emotion recognition capacity as well as characteristics of intervention responders/non-responders in this skill domain is warranted.

Limitations

The results of this study are limited to the characteristics of the sample and may not be generalisable to older or younger children with autism spectrum disorder or children who have more severe core features of autism spectrum disorder and/or more limited language skills. This study was a preliminary exploration of the feasibility and acceptability of this intervention using a simple pre/post assessment of a one-group intervention model. It included a small sample ($N = 14$) of children who comprised a single group treatment

condition with no control group. As a result, it was not possible to disentangle the effects of the Heartbeat Method from those of maturation. We did not have detailed information on the participants' history or experience of social skills intervention. Previous participation in a structured social skills intervention may have affected a participant's response in this intervention. A weakness associated with the selected measures is that improvement in social functioning (a primary anticipated outcome) was only measured subjectively via parent report on the Vineland-II.

Future directions

Results from this pilot study offer valuable information regarding the feasibility and acceptability of the Heartbeat Method and its potential benefit in addressing social and communication deficits associated with autism spectrum disorder. The Heartbeat Method was easy to implement and participants and parents responded favourably to the intervention. Some outcome measures were sensitive in detecting change in functioning (e.g., Vineland-II and Test of Pragmatic Language); however, the Penn Facial Recognition Facial Emotion Recognition Task only captured change in functioning in a subset of participants. The Heartbeat Method appears to have the potential to impact core features of autism spectrum disorder including social skills and communication skills as measured by the Vineland-II and pragmatic language as measured by the Test of Pragmatic Language. Additionally, this intervention shows promise in improving facial emotion recognition in some participants who had deficits in this area. Clearly, these results need to be replicated using a more robust research design with a control group, random assignment, and broader independent assessment of participant gains pre- and post-intervention. It may also be useful to include in future research investigations of this intervention a comparison treatment group receiving an evidence-based social skills intervention. Overall, the Heartbeat Method shows promise regarding the improvement of core deficits associated with autism spectrum disorder, its ease of administration, and accessibility.

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