

Preliminary Effects of Parent-Implemented Behavioural Interventions for Stereotypy:

Brief Report

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Abstract

Objective: The purpose of our study was to replicate and extend previous research on using multicomponent behavioural interventions designed to reduce engagement in stereotypy by examining their effects when implemented by parents over several months.

Methods: We used an alternating treatment design to examine the effects of the parent-implemented interventions on engagement in stereotypy and appropriate behaviour in 3 children with autism and other developmental disabilities.

Results: The parent-implemented multicomponent treatment reduced vocal stereotypy in all 3 participants and increased engagement in appropriate behaviour in 2 participants. These effects persisted up to 24 weeks following the parent training sessions.

Conclusions: Altogether, our preliminary results support (a) the involvement of parents as behaviour change agents to reduce engagement in stereotypy and (b) the scheduling of regular, but infrequent (i.e., weekly to monthly), follow-up meetings to monitor the effects of behavioural interventions in outpatient and home-based service delivery models.

Keywords: autism, behavioural intervention, behavioural skills training, parent training, service delivery, stereotypy

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Introduction

In a recent review on the treatment of stereotypy in children with autism spectrum disorders, DiGennaro Reed, Hirst, and Hyman [1] noted that multicomponent behavioural interventions were amongst the treatments that had amassed the most empirical support in the research literature. Multicomponent interventions involve the implementation of two or more treatment components simultaneously (e.g., antecedent manipulation with reinforcement, reinforcement with punishment), which make them particularly challenging to implement for parents. However, the results of the review indicated that no study published between 1980 and 2010 reported using parents as behaviour change agents for reducing stereotypy in children with autism. Moreover, no study has examined the effects of these interventions within outpatient or home-based service delivery models in which the practitioner provided follow-up support on a weekly to monthly basis. Researchers have shown that parents are able to implement behavioural interventions correctly when taught using behavioural skills training [2,3,4]. As such, behavioural skills training could be used to teach parents how to implement multicomponent treatments for stereotypy. Thus, the purpose of our study was to replicate and extend previous research on using multicomponent behavioural interventions designed to reduce engagement in stereotypy by examining their effects when implemented by parents over several months.

Method

Participants and Settings

Three child-parent dyads participated in the study. The children had previously participated in a large research project involving multiple studies on the assessment and

treatment of vocal stereotypy [5,6]. Greg was a 6-year-old boy diagnosed with autism who did not have a formal means of communication and never played functionally unless prompted to do so. Kyle was a 4-year-old boy diagnosed with autism who used three-word statements to make requests; he could complete short tasks independently (e.g., sorting, fine motor activities) but often required prompting to remain on task. Morgan was a 6-year-old boy with a global developmental delay and language disorder who communicated using three- to five-word sentences; he often emitted stereotypy when he should have been engaging in on-task behaviour. For Greg, the father implemented the procedures at home during free-play periods. The mothers conducted the sessions at home during independent task periods for Kyle and Morgan. We did not measure parental variables as part of the study (e.g., age, education level); that said, no parent reported having prior training in implementing behavioural interventions.

Data Collection and Interobserver Agreement

Trained research assistants videotaped each session and subsequently scored the continuous duration of vocal stereotypy and appropriate behaviour. We defined vocal stereotypy as acontextual sounds or words produced by the vocal apparatus, which was measured using a 2-s offset criterion. That is, we stopped scoring vocal stereotypy when it had not occurred for two consecutive seconds. We defined on-task behaviour as using task materials in a manner consistent with their intended function and functional play as using play materials in a manner consistent with their intended function. A second research assistant recorded the duration of each behaviour for a total of 32% of sessions. We calculated interobserver agreement (IOA) using the block-by-block method of agreement with 10-s intervals [7]. Mean IOA scores for vocal stereotypy and appropriate behaviour (i.e., on-task behaviour or functional play) were respectively 84% (range: 77%-95%) and 91% (range: 81%-100%) for Greg, 93% (range: 86%-

97%) and 86% (range: 82%-91%) for Kyle, and 90% (range: 88%-92%) and 82% (range: 80%-84%) for Morgan.

Experimental Design and Procedures

Preliminary assessments. Prior to their inclusion in the study, the children participated in a functional assessment to confirm that vocal stereotypy was maintained by non-social reinforcement [8]. Specifically, we conducted a series of 9 to 21, 5-min no-interaction conditions during which the child was placed in the setting in which the intervention would take place and we provided no social consequences for engaging in stereotypy or appropriate behaviour. We also conducted paired-choice preference assessments for edibles, music, or both in order to identify potential reinforcers [9,10].

Parent training. Before conducting the probes, we taught the parents how to implement the multicomponent treatment procedures using behavioural skills training [2,3,4]. During the 30- to 90-min training sessions, the research assistant provided written and oral instructions, modeled the expected interventions, observed the parent implementing the procedures with the child, and provided feedback. Behavioural skills training ended when the parent delivered the correct consequences at least 80% of the time during brief 5- to 10-min practice sessions with the child. If the parent did not master the skill during the initial training session, additional training sessions were scheduled until he or she met the criterion.

The multicomponent treatment selected for each child was based on the results of his participation in our larger research project on the assessment and treatment of vocal stereotypy. Each treatment was specifically designed to replace vocal stereotypy with a more socially acceptable form of auditory stimulation (i.e., music) and to strengthen an alternative appropriate behaviour. For Greg, the multicomponent treatment involved a combination of noncontingent

music, differential reinforcement, and prompting to increase functional play. Preferred music was played during the entire duration of the intervention probes and the father wore a small pager that vibrated every 15 s. When the pager vibrated, the father provided an edible reinforcer if the child was engaged in functional play (regardless of whether he was also engaging in vocal stereotypy) or a physical prompt to engage in functional play otherwise.

For Kyle, the multicomponent treatment involved preferred music continuously playing in the background and the implementation of a three-step prompting procedure to engage in on-task behaviour contingent on the occurrence of targeted disruptive behaviour (e.g., playing with materials, standing up). During the prompting sequence, the parent began with a vocal prompt. If the child did not comply with the vocal prompt within 5 s, the parent added a gestural prompt. If the child still did not comply, the parent subsequently added a physical prompt. Morgan's mother applied a two-step prompting procedure to engage in on-task behaviour contingent on targeted disruptive behaviour. She began with a vocal prompt, but presented a vocal plus physical prompt (i.e., no gestural prompt) if he did not comply within 5 s. Morgan's multicomponent treatment also involved a 30-s variable-interval reinforcement schedule for on-task behaviour. His mother provided an edible reinforcer if he was engaged in on-task behaviour at the end of each interval, which was signaled by a vibrating pager. If he was not engaged in on-task behaviour, she provided the reinforcer contingent on the first subsequent occurrence of the behaviour. We did not include a music component in Morgan's intervention as his prior results indicated that differential reinforcement produced larger reductions in vocal stereotypy [6].

Treatment assessment. We used an alternating-treatment design to assess changes in stereotypy and appropriate behaviour over several months. To emulate the type of services that may be available in the community, the research assistant conducted 30-min follow-up visits

once every one to three weeks with the child and parent. During each visit, the research assistant videotaped one 10-min no-treatment probe and one 10-min multicomponent treatment probe. For Greg, the father conducted the probe sessions during play periods during which the child had access to toys (i.e., dinosaurs, blocks, and cars). During the probes, Kyle and Morgan had to complete a series of tasks involving sorting, categorizing, and fine motor movements such as putting pegs on a board, stringing beads, screwing plastic bolts, clipping clothespins to a bowl, and completing puzzles. If the child completed the series of tasks before the end of the 10 min, the probe was terminated. To minimize practice effects, the task materials varied across the two probes. During the no-treatment probe, the parent began the session by asking the child to play or to complete his tasks, but provided no other social consequences. During the multicomponent treatment, the parent implemented the child's behavioural interventions (as described above). Following the multicomponent treatment probe, the research assistant provided positive and corrective feedback to the parent regarding the implementation of the intervention.

To control for order and carryover effects, the research assistant counterbalanced the order in which the probes were conducted during each visit. However, the order of tasks did not vary so that each task was presented in the same number of no-treatment and multicomponent treatment probes. Although visits were far apart, the research assistant instructed the parents to implement the behavioural interventions on their own between visits. Parents reported implementing the interventions approximately two to five times per week. During multicomponent treatment probes, the research assistant also measured each parent's number of correctly and incorrectly delivered prompts and reinforcers. A correct delivery was scored when the parent delivered the appropriate prompt or reinforcer within 3 s of the target event or within 2 s if it was the second or third prompt within a sequence. An incorrect delivery was scored when

the prompt or reinforcer was either delivered at times that did not meet the definition of correct delivery or not delivered when it should have been. To calculate treatment integrity, we divided the number of correct deliveries by total number of correct and incorrect deliveries and multiplied the result by 100%.

Results and Discussion

During the functional assessment, the vocal stereotypy of each participant persisted across the series of no-interaction conditions, indicating that the behaviour was at least partly maintained by non-social reinforcement [8]. That is, the results suggested that each child engaged in vocal stereotypy because it generated reinforcing sensory stimulation. During the preference assessments for music, Greg and Kyle respectively selected a Shakira song and a Lion King song the most often. For edibles, Greg selected chips most often and Morgan chose candies and cereals most often. The detailed results of these assessments have been previously published for Greg [5] and are available from the first author for Kyle and Morgan.

Figure 1 presents the percentage of time each participant engaged in stereotypy and appropriate behaviour across no-treatment and multicomponent treatment probes. For Greg, the multicomponent treatment reduced vocal stereotypy and increased functional play. Greg's father maintained modest and variable levels of treatment integrity throughout the follow-up probes ($M = 71\%$, range: 48%-83%). For Kyle and Morgan, we analysed the data for on-task behaviour separately based on the order of presentation of the tasks as the level of difficulty may have inadvertently varied. Kyle's multicomponent treatment resulted in lower levels of vocal stereotypy than no treatment. When Kyle completed the first tasks, levels of on-task behaviour remained similar across probes. In contrast, Kyle spent more time engaging in the second tasks during the multicomponent treatment than during the no-treatment probes. Kyle's mother

generally maintained acceptable levels of treatment integrity ($M = 86\%$, range: 65%-100%).

Morgan engaged in lower levels of vocal stereotypy during the multicomponent treatment probes, but levels of on-task behaviour remained similar regardless of the condition or tasks. His mother's treatment integrity remained consistently high across sessions ($M = 92\%$, range: 83%-100%).

Insert figure 1 about here

Overall, the parent-implemented multicomponent behavioural interventions reduced vocal stereotypy in all three participants and increased engagement in an appropriate behaviour in two participants. These effects persisted up to 24 weeks following the parent training sessions. Thus, our preliminary results support (a) the involvement of parents as behaviour change agents to reduce engagement in stereotypy and (b) the scheduling of regular, but infrequent (i.e., weekly to monthly), follow-up meetings to monitor the effects of interventions in outpatient or home-based service delivery models. Our study extends the results of previous research by showing that parent-implemented multicomponent behavioural interventions may be effective at reducing engagement in stereotypy [1]. Second, we extended previous studies insofar as our results indicated that the effects of these interventions may persist over periods of three to six months. These results are even more encouraging when we consider that the participants had also been subjected to similar interventions as part of another study for several weeks beforehand [5,6]. Third, our results also provide further support for the use of behavioural skills training when teaching parents to implement multicomponent interventions. Despite marginal improvements over the course of the study, we noted that parental treatment integrity sometimes decreased from one session to another, suggesting that conducting follow-up sessions may be important.

The main limitation of the study is that the interventions were relatively intensive to

implement and maintain for parents. That said, behavioural interventions may need to be initially intensive to produce the desired treatment outcomes. Furthermore, our no-treatment data also show that the effects of the interventions may not generalize outside treatment sessions. To this end, fading the procedures could be a solution to both these limitations. For example, gradually thinning the reinforcement and prompting schedules would have made the interventions more manageable for long-term implementation while simultaneously promoting generalization. Similarly, our study is limited insofar as we did not formally measure the social validity of the observed behaviour changes. For example, the intervention reduced stereotypy by more than 30% for Morgan, but the target behaviour still persisted approximately 50% of the time. Did this 30% reduction have an impact on the child and his family? Finally, we only measured the effects of the treatment components together, which prevents us from determining the individual contribution of each component. Although all these issues should be thoroughly addressed in future research, our study clearly met its primary purpose by demonstrating that parents could effectively implement interventions to reduce stereotypy within the natural context of consultation.

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Declaration of Interest

The authors report no declarations of interest.

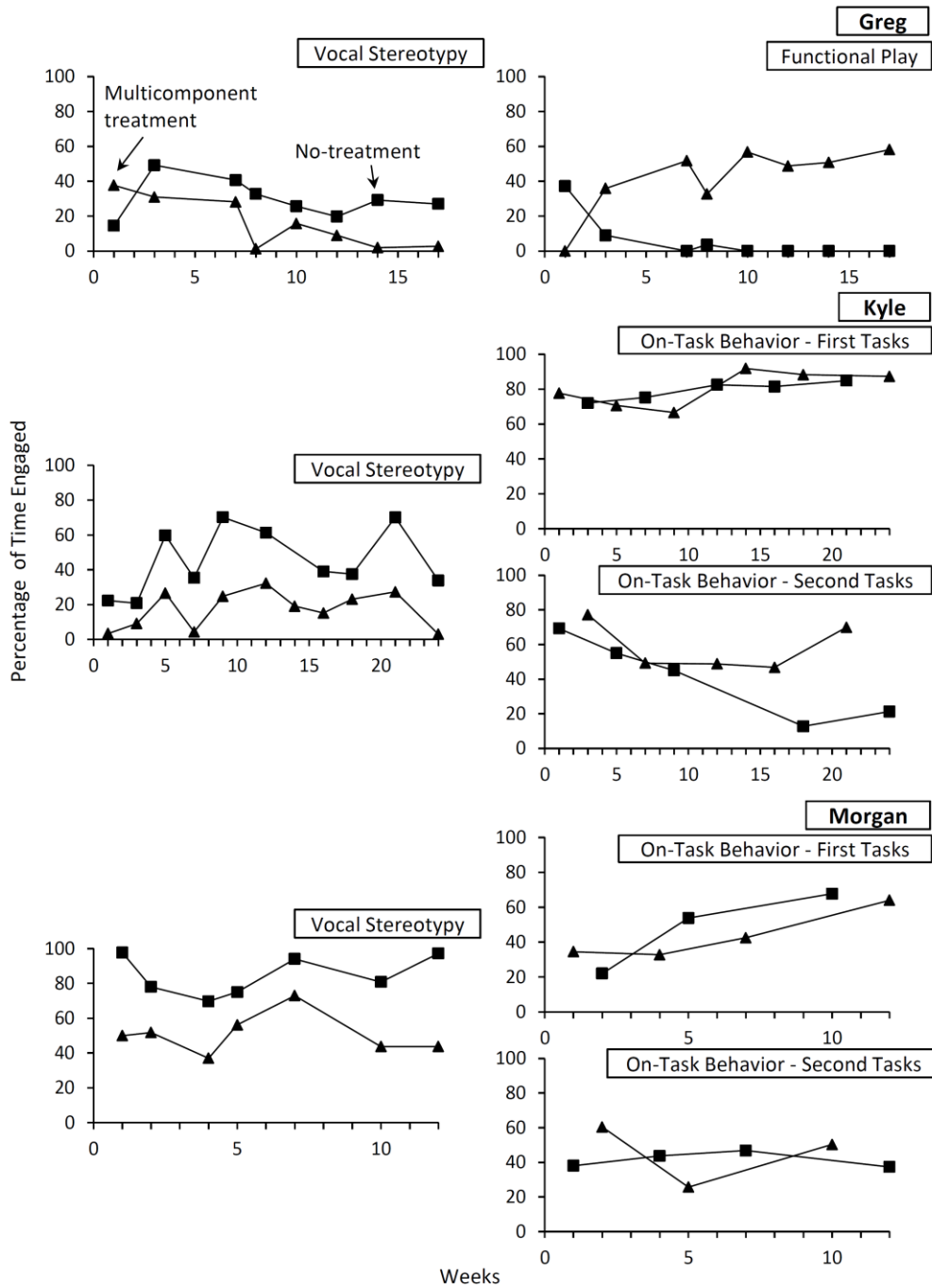


Figure 1. Percentage of time Greg (two upper panels), Kyle (three middle panels), and Morgan (three lower panels) engaged in stereotypy and appropriate behaviour during no-treatment and multicomponent treatment probes. Kyle’s no-treatment probe data for week 14 are missing due to the recording equipment’s malfunction.