Title: Training Therapists in Presession Pairing Skills to Increase Life Skill Acquisition Rates

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Conflict of Interest

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This study was carried out in Dublin, Ireland.

Abstract

Rapport is widely considered to be an essential component in the development of an effective therapeutic relationship between health-service professionals and their clients. Studies have shown that a positive rapport is associated with reduced rates of challenging behaviour among clients with developmental disabilities. However, to-date, there is limited research exploring whether therapeutic rapport affects client skill acquisition. Therefore, the current study aimed to systematically train four behavioural therapists in presession pairing techniques and evaluated the impact on life skill acquisition rates among a group of eight children with autism, using a multiple baseline across participants design. Improvement rate difference (IRD) was calculated for each participant and omnibus IRDs showed a modest impact of presession pairing on skill acquisition. Considering that systematic prompting and task analysis procedures were used across all phases of this study, these results are discussed in the context of highlighting the importance of upskilling, already skilled therapists, in rapport building techniques, to maximise client gains.

Keywords Rapport, presession pairing, staff training, life skills, autism

Introduction

Quality of life is defined as an individual's 'perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns' (The World Health Organization Quality of Life Group, 1995, p.1405). Level of adaptive functioning has been shown to be a significant predictor of quality of life, with individuals who display lower levels of adaptive skills achieving less personal outcomes than their peers with higher functioning levels (Maes et al., 2007; Schalock et al., 1994). However, when personalised supports, which foster growth, education, interests and well-being, are in place for an extended period, adaptive skills and quality of life can subsequently improve (Luckasson et al., 2003).

Weafer (2010) documented the views of relevant stakeholders on the potential for independence, community inclusion and enhanced quality of life for individuals with disabilities. Information was gathered through the provision of 15 focus groups, which included people with an intellectual disability and frontline staff within this sector. While the intellectual and developmental disability group covered a relatively broad spectrum of ability, all participants reported requiring some element of support to achieve their own personal ambitions and aspirations. However, this group listed limited assistance from frontline staff as one of the most important impediments to this goal (Weafer, 2010).

Despite recognising the need for progressive approaches within the intellectual and developmental disability sector (Weafer, 2010), many frontline staff fail to demonstrate an understanding that their own behaviour can have a significant impact on client outcomes and the overall standard of service provision (Campbell, 2010). This is in direct contrast to the widespread acceptance among the academic research community of the critical influence of frontline staff on the clients they support ((Finn et al., 2009; Jahr, 1998; Schepis et al., 2001).

The quality of their work dictates the overall standard of care within an organisation (Devereux et al., 2009; Salyers et al., 2015). Research has shown that compromised skill sets among staff can adversely affect staff-client relations (Finn et al., 2009), the learning opportunities available (Schepis et al., 2001) and quality of life outcomes for clients (Jahr, 1998). Furthermore, consistent positive staff-client interactions may be difficult to achieve, given that intervention settings for people with intellectual and developmental disabilities are repeatedly classified as stressful environments ((Hensel et al., 2012; Robertson et al., 2005; Rose et al., 2005)

With this in mind, it is unsurprising that rapport building is widely considered to be an essential component in the development of an effective and successful therapeutic relationship between frontline staff and the clients they support. McManus et al. (2011) found that positive experiences with people with intellectual disabilities consistently predicted better attitudes towards this group among the general population, as well as increased support for their private and civil rights, including their integration into educational environments. In contrast, low levels of rapport is linked to elevated frequencies of problem behaviour among people with intellectual and developmental disabilities (Kelly et al., 2015; Lugo et al., 2019; McLaughlin et al., 2005), which in turn inflates the risk of emotional exhaustion and depersonalisation among staff (Smyth et al., 2015).

Although establishing positive rapport with children and adults with autism and other intellectual and developmental disabilities can be challenging, research shows that, with the correct supports, it is possible (McKenzie et al., 2017; Siller et al., 2002). Presession pairing, a behaviour analytic practice, is a well-documented resource for developing positive rapport between staff and client, as well as a positive therapeutic environment (Carbone et al., 2007; Kelly et al., 2015; Lugo et al., 2019; Shillingsburg et al., 2019). Presession pairing, also known as pairing, is an antecedent-based strategy that reduces the aversive motivating

operations linked to a particular therapeutic context, by associating the context (i.e., staff, physical environment, therapeutic materials) with preferred items and activities. A number of recent studies have successfully used this strategy to build rapport and achieve successful therapeutic outcomes (e.g., Kelly et al., 2015; Lugo et al., 2019; Shillingsburg et al., 2019).

For instance, Shillingsburg et al. (2019) employed presession pairing to reduce the occurrence of problem behaviour among four children with autism during intensive instruction. Results showed increased acceptance of therapist prompts without resistance following the introduction of the rapport building procedures. However, the study did not focus on the impact of rapport building on the acquisition of the skills targeted during the intensive instruction sessions. Kelly et al. (2015) also used a presession pairing protocol to examine the impact of rapport building on the challenging behaviour and academic responding of three children with autism. For all three children, interactive engagement between the therapist and child, in the context of a highly preferred activity, led to a rapid and sustained reduction in challenging behaviour and modest effects on academic responding.

Although evidence supports the use of rapport building strategies to optimise therapeutic outcomes, many frontline staff supporting children with developmental disabilities may not have the skills necessary to effectively and efficiently engage in rapport building strategies, such as presession pairing (Lugo et al., 2017). As a result, Lugo et al. (2017) operationally defined the therapist behaviours that they proposed were essential to successful pairing with children with developmental disabilities. Seven skills, in total, were defined and included praising the child for appropriate play, imitating the child's play and vocalisations, as well as staying in close proximity to the child during the pairing period.

In a subsequent study, Lugo et al. (2019) tested the social validity of their presession pairing protocol. Using concurrent-chain arrangements, they compared the differential impact of

presession pairing, free play or immediate onset of instruction on the challenging behaviour displayed by a 4-year old with autism during discrete trial instruction (DTI). They also assessed preference for these three antecedent conditions. Although negative vocalisations were observed to decrease across all conditions, results indicated a relative preference for presession pairing across multiple therapists. However, caution must be exercised as the generalisability of the latter finding is limited; there was only one participant in the study.

While previous rapport building studies have successfully trained therapists to carry out presession pairing, the primary focus of these studies has been the reduction of challenging behaviour associated with instruction delivery. In contrast, the impact on academic performance has received relatively little attention. Furthermore, the wider training literature typically focuses on staff outcomes, rather than client outcomes (Gormley et al., 2019; Maffei-Almodovar et al., 2018). With these limitations in mind, the current study set out to train behavioural therapists in the Lugo et al. (2017) presession pairing protocol and evaluate the resulting impact on life skill acquisition rates among a group of children with autism. We were also interested in investigating the extent to which pairing skills trained in the context of one child, would generalise to therapeutic work with another child, and differentially impact life skill acquisition for the second child.

Method

Participants and Setting

Eight children (seven boys, one girl) diagnosed with autism by an independent, qualified professional participated. All children attended the same early intervention preschool setting designated for individuals with autism spectrum disorder. Selection was based on informal and formal observations in the classroom, which indicated limitations in their daily life skills repertoire. Table 1 provides demographic information for each child, including name,

ethnicity, age diagnoses, skill strengths (Assessment of Basic Language and Learning Skills - ABLLS-R), skill weaknesses (ABLLS-R), target daily life skill for current study and experimental condition assignment.

Four behavioural therapists employed in the early intervention setting from which the eight children were recruited, also participated. During baseline, all four therapists scored below 80% on our Presession Pairing Checklist (see Table 2 for checklist), which is adapted from the protocol developed by Lugo, King, Lamphere, and McArdle (2017). None of the therapists were Board Certified Behaviour Analysts®, Board Certified Assistant Behaviour Analysts® or Registered Behaviour Technicians®. One of the therapists had begun graduate level coursework in Applied Behaviour Analysis (ABA) as the study commenced, and all therapists had received standard induction training provided by the preschool. This included modules on reinforcement, systematic prompting, functional communication training, and task analysis and chaining procedures. All modules were competency-based and delivered using a behaviour skill training (BST) format. Table 1 provides demographic information for each therapist, including name, age, years of ABA experience, type of ABA experience, highest level of educational attainment, whether they had engaged in graduate level ABA coursework, and their assigned children.

The experimenter conducted therapist training in a room located in the preschool. The room contained one table and two chairs, as well as educational and play materials typically found in a preschool setting. Only training materials, which included preferred and novel play items, were placed on the table. Task analysis sessions with the children took place in areas of the preschool, where the target life skills would naturally occur (e.g., bathroom, exit area from the classroom). These sessions were conducted individually with each child to minimise incidental learning.

Informed consent was obtained from all children and therapists in the study, and all procedures conducted in the study were in accordance with the Research and Ethics Policy of the host service provider, university and the 1964 Helsinki Declaration and its later amendments.

Table 1 Demographic Information for each Child Participant (Upper Panel) and for each Staff Participant (Lower Panel)

Name	Gender	Ethnicity	Age	Diagnosis	Mode of Communication	Relative Strengths (ABLLS-R)	Relative Weaknesses (ABLLS-R)	Target Life Skill	Condition
Ciaran	Male	Caucasian	4.1	Autism Spectrum Disorder (ASD) Global Developmental Disorder (GDD) - not specified	Vocal	Receptive understanding; Play skills	Expressive communication; Motor imitation	Washing hands	Direct intervention
Pep	Male	Caucasian	4.1	ASD GDD - not specified	Picture Exchange	Play skills; Fine motor skills	Visual performance; Motor imitation	Putting on shoes	Generalisation
Rian	Male	Caucasian	4.1	ASD Borderline Intellectual Delay	Picture Exchange	Receptive understanding; Play skills	Fine motor skills; Motor imitation	Putting on socks	Direct intervention
Aaron	Male	Caucasian	5.2	ASD GDD - moderate	Picture Exchange	Visual performance; Literacy; Fine motor skills	Play skills; Receptive understanding; Expressive communication	Putting on trousers	Generalisation
Hannah	Female	Caucasian	3.1	ASD GDD - mild	Picture Exchange	Play skills; Expressive communication	Motor imitation; Visual performance	Washing hands	Direct intervention
Shane	Male	Caucasian	4.1	ASD GDD - not specified	Picture Exchange	Fine motor skills; Play skills	Motor imitation; Visual performance	Washing hands	Generalisation
Michael	Male	Caucasian	3.11	ASD	Picture Exchange	Play skills; Visual performance	Fine motor skills; Receptive	Putting on trousers	Direct intervention

Cameron	Male	Caucasian	5.2	ASD GDD (moderate)	Picture Exchange	Play skills Visual performance	understanding; Expressive communication Motor imitation Receptive understanding Expressive communication	Putting on jacket	Generalisation

Name	**Age**	**ABA experience**	**Type of ABA experience**	**Educational Attainment**	**Applied Behaviour Analysis (ABA) Coursework**	**Assigned Children**
Emma	24	1 year	Early Intervention	MSc in Psychology	ABA module during postgraduate studies	Ciaran; Pep
Tara	31	2 years	Early Intervention	BA in Sociology	ABA module during postgraduate studies	Rian; Aaron
Colm	26	1 year	Early Intervention; Adult services	BA in Education	Currently undertaking a postgraduate course in ABA	Hannah; Shane
Ruth	24	2 years	Early intervention	BA in Education	None	Michael; Cameron

Table 2 Presession Pairing Checklist Adapted from the Lugo et al. (2017) Protocol

Target Behaviours
1. Staff selects toys/games/materials that the child is interested in
2. Staff invites the child in play by sitting with them and engaging with the toys and games
3. Proximity – Stay within an arm's length of the child throughout the session
4. Praise appropriate play- Staff intermittently praises the **specific** action the child is engaged in/performing *
5. Staff member uses an enthusiastic tone when engaging with child
6. Staff member reflects vocalisations made by the child by repeating the word, sentence or vocalisations into the play (Ex. Child says “Oh no!” Staff repeats “Oh no!” and adds “Barbie fell down!” *
7. Staff member intermittently imitates the child’s play *
8. Staff intermittently describes the appropriate play skills of the child in sentences *
9. Initiate – Staff provides the child with new/additional toys/items/materials throughout the session that are utilized in the staff/child joint play
10. Staff members use materials available to create new forms/types of play throughout the pairing session (Ex. Staff uses a box to create a barn for the toy farm animals and encourages the child to put the animals in the barn) *
** Must be displayed at least 4 times during 5-minute pairing session*

Dependent Variables and Data Collection

Using the task analyses (available in Supplementary Material) as data sheets, therapists recorded the number of steps on a task that were completed independently, on a session-by-session basis. Backward chaining was used with all tasks. Therefore, for a step to be scored as independent, it had to be completed, without prompts, within 5 seconds of the previous step being completed. For the first step in the task analysis chain, it was scored as independent, if it was completed, without prompts, within 5 seconds of the initial instruction (e.g., 'It's time to wash your hands').

Data were collected during baseline (phase1) and after each child's designated therapist received training in presession pairing skills (phase 2). Data collection took place during 1:1 sessions that occurred 4-5 times each week and sessions typically lasted 3-5 minutes.

During 35% and 45% of phase 1 and phase 2 presession pairing sessions, we also carried out assessments of therapist-child rapport, using a checklist that was based on infant and toddler signs of attachment (Fahlberg, 2012) (Table 3).

Table 3 Therapist-Child Rapport Checklist

Target Behaviour
1. Does the child approach the staff?
2. Does the child make eye contact with the staff?
3. Does the child smile at the staff?
4. Does the child vocalize at the staff?
5. When the staff calls the child's name, does the child respond?
6. Does the child attempt to engage the staff in an activity?
7. Does the child communicate with the staff (verbal, sign, PECS)?
8. Does the child (appropriately) touch the staff member?

Experimental Design and Data Analysis

We examined life skill acquisition for the uninterrupted 6-week period between October mid-term break and December full-term break. A concurrent multiple baseline across participants design was used to evaluate the impact of directly training therapists in presession pairing skills on life skill acquisition rates for a group of four children with autism (i.e., the 'direct intervention' experimental condition). We also ran a concurrent multiple baseline design across the remaining four children, to examine the extent to which the presession pairing skills directly trained with the first set of children, would generalise to work with this second set of children, and whether this would impact their life skill acquisition rates (i.e., the generalisation experimental condition).

To proactively minimise potential confounds arising from cumulative learning and increasing response effort in chained tasks, we counterbalanced the number of data points across phase 1 and phase 2A. We then used robust improvement rate difference (IRD) to determine the impact of the intervention on rates of skill acquisition among children in the current study (Parker et al., 2009; Parker et al., 2011). The individual children acted as the units of analysis and omnibus IRDs where calculated to evaluate the overall intervention effect size for all eight children, as well as to compare effect sizes between experimental conditions. Omnibus IRDs reflect an aggregation of data points across participants rather than a mean, thereby providing an overall IRD as if data for each individual were part of one larger experiment. By counterbalancing the number of data points across phases and then evaluating the aggregated data, we hypothesised that the confounds cited above would be equally likely to impact data in phase 1 and phase 2A. This in turn, would allow us to more confidently isolate the specific impact of the presession pairing intervention on skill acquisition rates among the children in our study.

Hand calculations, based on visual analysis and verified using the 'SingleCaseES' package available in 'r' (https://www.r-project.org), were used to calculate robust IRDs on phase 1 and phase 2A data for each child in the study. Aggregated data was then used to determine an omnibus robust IRD for the overall study, as well as separate omnibus robust IRDs for the 'direct intervention' and generalisation conditions, as per Parker et al. (2009). Confidence intervals were established using WinPepi (http://www.biomedcentral.com.1742-5573/content/1/1/6).

Procedure

Before the study began, each therapist was matched with two children. The first child was assigned to the 'direct intervention' experimental condition and the second child was assigned to the 'generalisation' experimental condition. Both sets of children were treated identically, with the only exception being that the therapist would be directly trained on how to engage in pairing with the first child that they had been matched with. This would not happen for the second child that they were matched with.

Baseline (Phase 1)

Each session started with the therapist pairing with their assigned child for five minutes. During baseline, therapists were told to pair with their designated child but were not given any instructions or guidance on how to do this. Immediately following the 5-minute pairing session, the therapist and child walked to the area where the task analysis session would take place. The therapist then instructed the child to complete the task (e.g., 'It's time to wash your hands') and used backward chaining, combined with least-to-most prompting and errorless teaching strategies to teach the target step to the child.

The child was given 5 seconds to respond independently on the target step. If they did not respond, the therapist provided progressively more intrusive prompts until the target step was

completed correctly. Descriptive praise was provided immediately following correct completion of the target step (prompted or independent) and immediately following completion of the task. An additional preferred item was delivered on completion of the task depending on the child's performance on the target step.

Presession Pairing Training

The experimenter delivered presession pairing training, via a BST format, across three stages: 1) written and verbal instruction; 2) modelling, rehearsal and feedback with a confederate; and 3) rehearsal and feedback with a therapist's matched child from the 'direct intervention' experimental condition. Therapists were trained individually and the mastery criterion for stage 2 and stage 3 was 100% accuracy on the Lugo et al. (2017) protocol for one session. This protocol covered the rapport building skills of proximity, praise, reflection, imitation, description, initiation and creation.

Post-training (phase 2)

During this phase, which was split into two parts, procedures were identical to baseline. Data from phase 2A were used in the omnibus IRD analyses, while data from phase 2B were included to shown the pattern of subsequent skill acquisition.

Procedural Fidelity

Two types of procedural fidelity data were collected during this study. Firstly, we collected fidelity data on therapists' accurate implementation of presession pairing for 42% and 44% of phase 1 and phase 2 sessions, respectively. The presession pairing checklist can be found in Table 2 and is an adapted version of the Lugo et al. (2017) protocol. Average presession pairing fidelity across all children was 59% in phase 1 and 97% in phase 2.

Fidelity data was also collected on therapists' accurate implementation of the task analysis procedures for 60% and 86% of phase 1 and phase 2 sessions, respectively. Assessment material is available from the authors on request. Average fidelity across all children was 98% in phase 1 (range 71%-100%) and 99% in phase 2 (range 57%-100%).

Interobserver Agreement (IOA)

An independent observer collected IOA for the number of steps completed independently by each child on their target life skill for 78% of sessions during phase 1 and 89% of sessions during phase 2. A point-by-point method was used and IOA was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100. Mean IOA across all children was 96% for phase 1 and 96% for phase 2.

IOA was collected on 68% and 77% of rapport checks during phases 1 and 2, respectively. A point-by-point method was used. The mean percentage of agreement was above 97% in phase 1 (75%-100%) and 99% in phase 2 (75%-100%).

IOA was also collected for 61% of presession pairing fidelity checks in phase 1 and 77% in phase 2, as well as 85% of task analysis implementation fidelity checks in phase 1 and 97% in phase 2. A point-by-point method was used. For both phases, the mean percentage of agreement was 99% for the presession pairing fidelity checks (range: 90%-100%). The mean percentage of agreement for the task analysis implementation fidelity checks was 97% in phase 1 (range 71%-100%) and 99% in phase 2 (range 71%-100%)

Social Validity

On completion of the study, the therapists filled out an 11-item respondent-based measure that examined the presession pairing training intervention, in terms of relevance, potential for improvement and overall usefulness.

Results

Presession Pairing Skills

As a result of training in presession pairing, all therapists improved their pairing skills from phase 1 to phase 2 (Figure 1). This improvement was observed across both experimental conditions, with average presession pairing fidelity increasing from 64.5% to 95.8% for the 'direct intervention' condition and 55.3% to 97.3% for the generalisation condition. Training sessions lasted an average of 2 hours 30 minutes and therapists mastered the presession pairing skills after 1-2 trials with a confederate and 1-3 trials with their assigned 'direct intervention' child.

Therapist-Child Rapport

In line with improved presession pairing fidelity among therapists, average rapport increased from 73% to 80% for the 'direct intervention' condition and 66% to 69% for the generalisation condition. Rapport improved for three of the four 'direct intervention' children; Michael was the only child showing a decline (97% to 71%). Reports from staff indicated that he was experiencing recurrent sickness during the period that covered phase 2. However, we cannot be sure if this impacted therapist-child rapport. In the generalisation condition, rapport improved between Aaron and Tara, while it remained relatively stable for Shane and Cameron and their respective therapists. A reduction in rapport was observed between Pep and Emma. Figure 1 shows the change in rapport for each therapist-child dyad from phase 1 to phase 2.

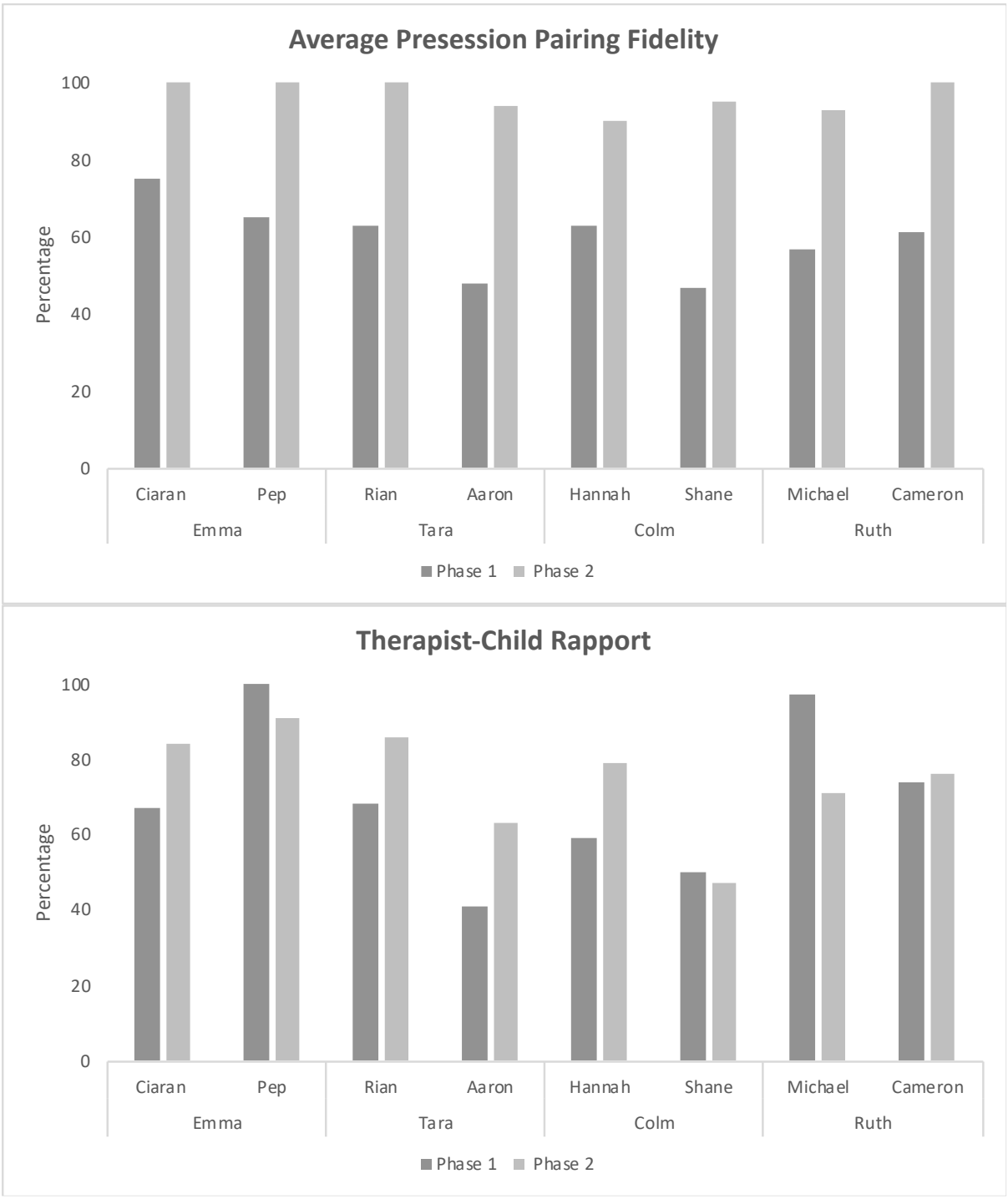

Figure 1. Upper Panel - Changes in presession pairing fidelity from phase 1 to phase 2 for each of the therapists, with their 'direct intervention' child (left) and their generalisation child (right). Lower Panel - Changes in therapist-child rapport from phase 1 to phase 2 for each of the therapists, with their 'direct intervention' child (left) and their generalisation child (right).

Life Skill Acquisition Rates

Figure 2 presents a visual analysis of participant performance during phase 1, phase 2A and phase 2B. The number of independent steps displayed by each child in the 'direct intervention' condition was at zero for at least two sessions immediately prior to initiating presession pairing training with their assigned therapist. However, each of these four children independently performed the target step on their respective life skills during the first session following therapist training and although data were quite variable across phase 2 for the 'direct intervention' children, there is visual evidence of skill acquisition for Ciaran and Rian during phase 2A and 2B. Variable data trends across all children and phases in the generalisation condition precluded us from drawing any clear conclusions about the impact of the intervention for this group, based on visual analysis alone.

The omnibus difference in improvement rates (IRD) between phase 1 and phase 2A was 0.49 CI_{95} (0.32, 0.65) for the 'direct intervention' condition and 0.58 CI_{95} (0.42, 0.74) for the generalisation condition. The mean IRD was 0.37 (range 0.3-.48) and 0.46 (range 0.28-0.78) for the 'direct intervention' and generalisation conditions, respectively. Omnibus IRD analyses for the total sample showed a difference of 0.54 CI_{95} (0.42, 0.65) in improvement rates between phase 1 and phase 2A. The mean IRD was 0.42 (range 0.28-0.78). Although these effect sizes would be considered modest by conventional standards (Parker et al. 2009), there was still an improvement relative to baseline, despite evidence-based approaches to life skill instruction (i.e., prompting; task analysis and chaining; Wong et al., 2014) being used in the baseline phase.

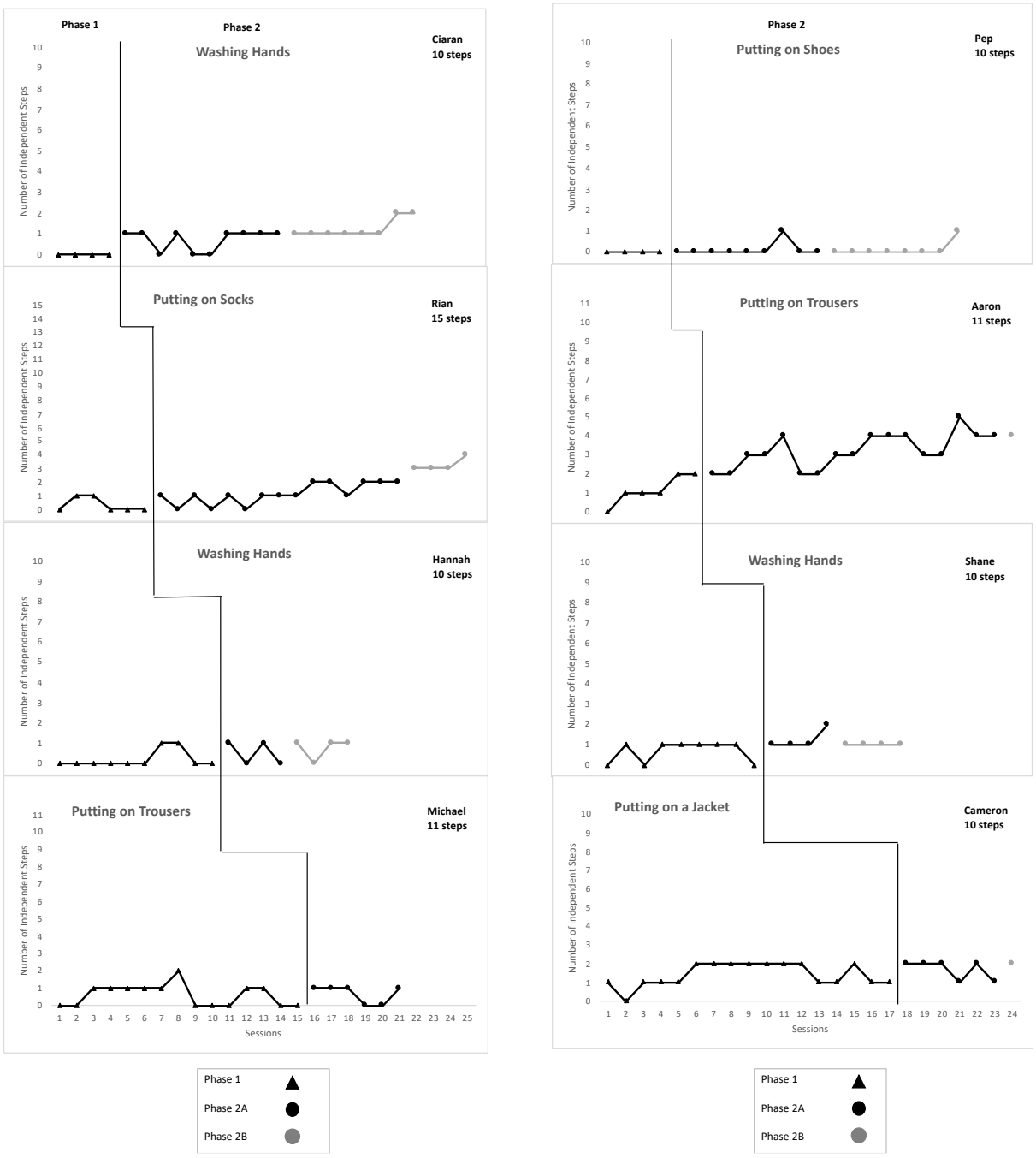

Figure 2. Number of Steps Completed Independently on Target Life Skills for the 'Direct Intervention' Condition (Left Panel) and the Generalisation Condition (Right Panel)

Social Validity

All four therapists rated the presession pairing training very favourably, in terms of relevance, planning, opportunities for participation, providing motivation to learn more on the topic and overall impact in their current role.

Discussion

The main purpose of this study was to train four behavioural therapists in presession pairing skills, as per the Lugo et al. (2017) protocol, and examine the impact on life skill acquisition rates among a group of eight young children with autism. According to results, our training intervention had a modest impact, in terms of improving skill acquisition rates for the overall sample. Typically, an effect size of the magnitude obtained in the current study would be evidence of a minimally effective intervention. However, in this case, we would argue that the modest effect size is indicative of evidence-based teaching practices being used across all phases of the study. Given that best practice was adhered to with extremely high levels of procedural fidelity during phase 1 and phase 2, there may have been limited scope for substantially improving skill acquisition rates post-training. Nonetheless, our results provide support for the assumption that presession pairing may form part of a functionally important pathway, augmenting skill acquisition, when embedded within context-appropriate evidence-based practice. With this in mind, upskilling already skilled therapists in a standardised pairing protocol may serve to maximise client outcomes.

In the current study, we were also interested in evaluating the degree to which presession pairing skills learned with one child would generalise to a second child and subsequently impact the second child's life skill acquisition rates. According to presession pairing fidelity data, therapists readily transferred their newly acquired skills to presession pairing sessions with children assigned to the generalisation condition, without additional instruction. In fact,

we observed greater improvements in presession pairing fidelity (55.3% to 97.3%) for the generalisation condition, compared to the 'direct intervention' condition (64.5% to 95.8%). A larger onmibus IRD was also recorded. However, this should be interpreted with caution, as the individual IRDs for the generalisation condition are markedly more dispersed (0.28-0.78) compared to the 'direct intervention' condition (0.3-0.48). Aaron appears to be exerting a disproportionate impact on the omnibus IRD for the generalisation condition. Nevertheless, he was the only child in this condition to display improved rapport with his therapist from phase 1 to phase 2.

Although the presumed purpose of presession pairing was to improve rapport between therapist and child, the average increase in rapport across both conditions was small; 'direct intervention' increased form 73% to 80% and generalisation increased from 66% to 69%. In addition, only one child from the generalisation condition demonstrated improved rapport with his therapist, compared to three children from the 'direct intervention' condition. On average baseline presession pairing fidelity and baseline rapport checks were lower for the generalisation condition. It is possible that the children assigned to the 'direct intervention' condition were naturally predisposed to displaying behaviour that allowed therapists to naturally deliver praise, imitate vocalisations and actions and create new enjoyable activities, without receiving training in Lugo's protocol. Therefore, even though presession pairing fidelity was observed to increase significantly for the generalisation condition in phase 2, the impact on rapport may have taken longer to emerge, particularly as this group were starting with lower levels of therapist-child rapport.

With this in mind, we would recommend future studies extend baseline and intervention phases to give additional time to compare the impact of evidence-based teaching practices, used in isolation, against the impact of evidence-based teaching practices combined with presession pairing strategies, on acquisition rates at the individual participant level. In the

current study, we were precluded from extending our phases as we wanted to capture the impact of the intervention during a period uninterrupted by school holidays. As a result, we decided to aggregate the data and summarise it using IRD analyses. However, if future studies could extend the phases, while also aggregating the data and summarising the effect for the entire design, conclusions would be more powerful as they would be based on findings from both the individual and group levels.

Furthermore, a combined approach, like the one suggested above, may be preferable with skill acquisition data, given the potential for variability and countertrends in both baseline and intervention phases. In cases where conclusions are precluded through visual analysis, the option then remains to calculate a single summary of effect for each participant or the entire design. Emerging standards within social science and single case designs, in particular, are focusing on the need to include effect sizes to aid in interpreting findings, as well as to allow for ease of summary and meta-analysis across studies examining a common intervention (Hedges et al., 2012). In the current study, we have proposed a method for achieving this, which minimises potential confounds arising from cumulative learning and increasing response effort in chained tasks, by counterbalancing data points across phases and using IRD to summarise the impact of the intervention on skill acquisition.

While findings from the current study are promising with respect to the potential for presession pairing to augment the rate of skill acquisition produced through the implementation of evidence-based teaching practices, caution must be exercised in overextending the significance of our findings. This is the first study, to the best of our knowledge, which has evaluated the effects of presession pairing on life skill acquisition rates. Furthermore, the generalisability of our findings is naturally limited as we have only examined these effects in the context of embedding Lugo's presession pairing protocol, within a teaching package that employs backward chaining and least-to-most prompting

strategies. As such, we cannot comment on the potential impact on other skills or other populations. Nonetheless, the current training protocol was effective and efficient; therapists readily generalised the skills targeted during training to the real-world work environment and to children with which they had not received direct instruction in presession pairing. In addition, outcomes were generally positive for children in both experimental conditions, in the context of improved skill acquisition rates.

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