

Original Article

Effect of a teaching package on the performance of caregivers in occupation training for children with ASD¹

Efeito de um pacote de ensino sobre o desempenho de cuidadoras no treino de ocupações para crianças com TEA

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Abstract

Introduction: The functional limitations observed in people with Autistic Spectrum Disorder (ASD) may prevent independent participation in community settings. Learning everyday activities can increase the inclusive participation and quality of life of these people. Teaching strategies via professionals are described in the literature, while teaching via caregivers for these skills needs to be explored and becomes essential when considering that the increase in children with ASD is not accompanied by a proportional increase in qualified professionals, in addition to the fact that the parents deal directly with teaching these activities. **Objective:** To elaborate and evaluate the application of a training package for caregivers of children with ASD, for teaching sandwich preparation and toothbrushing. **Method:** Four caregivers participated. The teaching package included Instructional Video Modeling, Self-Monitoring, Delayed and Immediate Feedback. A performance accuracy criterion equal to or greater than 90% was adopted for two consecutive sessions. **Results:** All caregivers showed an increase in performance accuracy after exposure to the training package components. One caregiver reached the accuracy criterion by going through just one component or a combination of them. Three caregivers necessarily needed to go through the combination of components and the feedback phases to reach the criterion. **Conclusion:** Corroborating other studies, there was no significant difference in the performance of caregivers when comparing the components. As with previous studies, it is shown that the feedback phases played an important role in achieving the criterion. It is attested that the training package was satisfactory in teaching the caregivers.

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Keywords: Autism Spectrum Disorder, Activities of Daily Living, Caregivers, Applied Behavior Analysis.

Resumo

Introdução: As limitações funcionais observadas na pessoa com Transtorno do Espectro Autista (TEA) podem impedir a participação independente em ambientes comunitários. A aprendizagem de atividades cotidianas pode aumentar a participação inclusiva e a qualidade de vida dessas pessoas. Estratégias de ensino via profissional estão descritas na literatura, enquanto o ensino via cuidador para essas habilidades precisa ser explorado e torna-se essencial ao se considerar que o aumento de crianças com TEA não é acompanhado pelo aumento proporcional de profissionais qualificados, além de que os pais lidam diretamente com ensino dessas atividades.

Objetivo: Elaborar e avaliar a aplicação de um pacote de treinamento para cuidadores de crianças com TEA, para o ensino de preparo de sanduíche e escovação de dentes.

Método: Participaram quatro cuidadoras. O pacote de ensino incluiu Videomodelação Instrucional, Automonitoramento, *Feedback* Atrasado e imediato. Adotou-se o critério de precisão de desempenho igual ou superior a 90% por duas sessões consecutivas. **Resultados:** Todas as cuidadoras apresentaram aumento na precisão de desempenho após exposição aos componentes do pacote de treinamento. Uma cuidadora atingiu critério de precisão passando por apenas um componente ou pela combinação deles. Três cuidadoras precisaram passar necessariamente pela combinação dos componentes e pelas fases de *feedback* para atingir o critério.

Conclusão: Corroborando outros estudos, não houve diferença significativa nos desempenhos das cuidadoras quando se comparou os componentes. Assim como estudos anteriores, demonstra-se que as fases de *feedback* desempenharam um papel importante para o alcance do critério. Atesta-se que o pacote de treinamento foi satisfatório no ensino das cuidadoras.

Palavras-chave: Transtorno do Espectro Autista, Atividades Cotidianas, Cuidadores, Análise do Comportamento Aplicada.

Introduction

Among the functional limitations commonly observed in people with Autistic Spectrum Disorder (ASD), difficulties in performing daily activities independently stand out, as reported by Cruz-Torres et al. (2020) that adults with ASD can be highly dependent on family members. Among these activities, Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) stand out, categories of occupations that include “things that people need, want or are expected to do”. ADLs are activities aimed at taking care of one's own body and performed based on a routine, such as bathing, hygiene, dressing, etc. (Rogers & Holms, 1994). IADLs are activities to support daily life at home and in the community (American Occupational Therapy Association, 2015). Due to the difficulties in these occupations, people with ASD need more extensive instructions to learn how to perform them.

The limited acquisition of these occupations prevents individuals with ASD from acting independently in community settings (Ayres et al., 2013). Grab & Belfiore (2016) suggest that deficits in ADLs and IADLs have negative effects, since they affect the individual's ability

to actively participate in educational environments, for example. Corroborating this author, Sigafoos et al. (2005) point out that the functional acquisition of ADLs and IADLs represents a way to increase inclusive participation, quality of life and dominate and generalize these occupations as early as possible, increasing the possibility of social inclusion.

Silva et al. (2018) developed a study with the objective of identifying the main demands and expectations of families of children with ASD, regarding the professionals involved in the treatment and coping with the daily life of the family and the developing child. In this study, it was observed that the greatest difficulties of two groups of children were dependence, especially with regard to impaired communication, dependence on food and dependence on situations involving hygiene and sphincter control.

Several studies discuss strategies for training ADLs and IADLs for children with ASD, which can be carried out in two ways: professionally and via a caregiver. In professional intervention, studies prove the effectiveness of training through tools such as Videomodeling (Drysdale et al., 2015; Guimarães et al., 2021; McLay et al., 2015); applications on mobile devices such as tablets, iPads and smartphones (Lopez Cazaux et al., 2019; Mruzek et al., 2019), and face-to-face training packages with behavioral components, systematic suggestions, reinforcement contingencies (Azrin & Foxx, 1971; Mruzek et al., 2019; Sutherland et al., 2017). There are a smaller amount of studies on training via caregiver. Most of them use training packages with caregivers and/or professionals with workshops or face-to-face training using behavioral procedures (Cruz-Torres et al., 2020; Kroeger & Sorensen, 2010; Rinald & Mirenda, 2012), or face-to-face training using video prompt (Cruz-Torres et al., 2020).

It is noted that there are a greater number of studies that use direct intervention compared to indirect. This configuration leads us to reflect that the increase in the prevalence of children with ASD brings a growing need for qualified professionals to perform this type of care, however, currently, there is a great barrier to obtaining quality services, because, according to Guimarães et al. (2021), the number of ASD cases grows at a higher and faster rate than the number of qualified professionals, leading to a delay in the initiation of intervention or even to non-access to these services by a considerable part of children with ASD.

Furthermore, the cost of professional intervention is high, and becomes unfeasible for most families, especially in developing countries like Brazil (Borba et al., 2015). In addition, it is worth noting that parents/caregivers of children with ASD are present most of the time and deal daily with the teaching of ADLs and IADLs and, therefore, become fundamental pieces for an effective intervention, as their continuous participation in these activities can contribute to an increased need for support (Silva et al., 2018).

Some studies have been conducted using Behavioral Skills Training (BST) to teach skills to parents and teachers of children with developmental delay. BST is a training package that utilizes feedback, testing, and modeling instructions, which rapidly produce a large increase in accuracy in the discrete trial teaching application (Lafasakis & Sturmey, 2007; Sarokoff & Sturmey, 2004). These studies had positive results, demonstrating that the performance of parents and teachers increased and produced desired behavioral changes in the children's repertoire.

Intervention via caregivers has been studied for teaching verbal skills (Borba et al., 2015; Silva et al., 2019), teaching non-verbal skills (Hawkins et al., 1966), reducing problem behaviors (Guimarães et al., 2018), in the acquisition of eye contact and joint attention (Bagaiolo et al., 2017).

Among the first studies in Brazil on forms of intervention via a caregiver for children with ASD, is the study by Borba et al. (2015), who demonstrated that this type of intervention was satisfactory for establishing collaborative behaviors in the referred population. However, although it presented promising data, this study also demonstrated that intervention training via caregivers demands many hours of dedication from behavior analysts. Some studies have sought to carry out training for professionals and/or caregivers with less intense alternatives for the presence of a behavior analyst (Vladescu et al., 2012; Pollard et al., 2014; Faggiani, 2014). Faggiani (2014), for example, developed and applied an online tutorial to train professionals to apply discrete trials, consisting of theoretical teaching, video modeling, observation of correction and identification of errors. Other studies in this format used video modeling to train professionals and/or caregivers (Catania et al., 2009; Nielsen et al., 2009; Barboza et al., 2015), videofeedback (Phaneuf & McIntyre, 2007, 2011) and self-monitoring skills in professionals (Santos et al., 2018). It was observed that this methodology can increase the accuracy of the teaching performance of both professionals and caregivers, reducing the amount of face-to-face hours of a behavior analyst, increasing the dissemination of training with a greater number of people and reducing the cost of training, intervention.

Neely et al. (2016) evaluated whether a telehealth training package (which consisted of an online module, self-assessment, and delayed feedback via videoconference) would result in improvements in the implementation of incidental mand teaching by beginning professionals. The results of this study showed that after the intervention there was an increase in the accuracy of the professionals' performance and the children's commanding behaviors increased.

Thus, considering the previously exposed points: 1) the difficulty that children with ASD may have in carrying out ADLs and IADLs, with dependence in situations involving hygiene and food being highlighted in the literature; 2) the increased incidence of people diagnosed with ASD; 3) the non-proportional growth in the number of professionals to provide care for this clientele; and 4) the possibility that the intervention with these children is carried out via a caregiver, with the objective of the present study to elaborate and evaluate the application of a training package, for parents/caregivers of children with ASD, for teaching ADLs and IADLs such as sandwich preparation and toothbrushing, verifying the effect of this training package on the performance of caregivers in the application of the referred teaching programs. The training package included: Written instruction, Instructional Video Modeling, Self-monitoring via Checklist, delayed feedback and immediate feedback.

Method

Participants

Four caregivers of children diagnosed with ASD participated in this study. Participants 1 (P1), 2 (P2), 3 (P3) and 4 (P4) were, respectively, 41, 35, 38 and 45 years old.

As inclusion criteria, participants should be caregivers of children diagnosed with ASD, have no experience in behavioral-analytical intervention and be available to carry out training in the morning or afternoon. Caregivers who did not meet the inclusion criteria and who were absent or did not attend the intervention moments without justification

were excluded from the study. Study participants were recruited by invitation (talking in person or via *WhatsApp*) to caregivers of children undergoing intervention at a Private Child Care Clinic in Belém do Pará. In order to participate in the study, the caregivers signed an Informed Consent Form (TCLE). The present study was submitted and approved by the Research Ethics Committee of the Nucleus of Tropical Medicine – NMT of UFPA, according to opinion n. 4.615.029.

Environment, material and equipment

The research was carried out in a home environment and/or in the room of two private clinics in Belém-PA. When performed in the home environment, it was requested that the collection be carried out in a home environment free of distractions, noise and people passing by. When performed at the clinic, data collection was performed in a separate room, also free of distractions, noise and people passing by.

For the application of the research, the researcher took the necessary material for data collection: Bread, butter, knife, cheese, ham, plate, toothbrush, toothpaste, and a cell phone for filming the videos. In addition, videos, written instructions and a self-monitoring checklist for training were also presented. The videos were presented on a notebook.

Preparation of instructional videos

The videos were narrated by the experimenter with instructions on how to teach toothbrushing and sandwich making skills to children with ASD. For its preparation, initially, a script was prepared for each scene, demonstrating the step-by-step application for teaching toothbrushing and sandwich preparation. Then, the videos were filmed, which consisted of an adult teaching occupations to another adult (confederate – who simulated the behaviors of a child with ASD). After filming, the necessary edits were made to the video and it was presented to the caregivers using a notebook or computer. Two videos were produced, one teaching the teaching application for the sandwich preparation skill and the other teaching the toothbrushing skill.

Experimental design, independent variable and dependent variable

The experimental design employed in this study was the concurrent multiple baseline between participants (Johnston & Pennypacker, 1993). In this type of design, which is an intra-subject design, in which the possible effect of the Independent Variable (IV) can be verified by observing the performance of the same participant before and after insertion of the VI, repeated measures of the Dependent Variable (DV) are taken and, after a few sessions, when stability in the VD is verified, the IV is inserted. Some aspects need to be taken into account to obtain experimental control: a minimum of three Baseline (LB) sessions, performance evaluation without the presence of IV, must be performed for the first participant; between the LB of one participant and the other there must be a minimum difference of two sessions (for example, if three LB sessions are performed for the first participant, the second must have a minimum of five LB sessions); the VI can only be inserted if stability is observed in the DV (maximum variation of 10% more or less over three sessions) or a decreasing trend (see Table 1). The VI of the study consisted of the implementation of a teaching package (instructional video modeling, self-monitoring and

delayed feedback and immediate feedback) to train caregivers to implement teaching procedures for sandwich preparation and toothbrushing (Dependent Variable - DV). The possible effect of IV on VD was measured using an instrument to assess the integrity of application (see Table 1) of caregivers of teaching procedures for ADLs and IADLs.

Table 1. Summary of the instrument used to evaluate the performance of caregivers in the implementation of teaching procedures.

Evaluated behaviors	Record
<i>Caregiver got child's attention?</i> – (Did you ensure that the child was attentive or making eye contact before giving the command?)	
<i>Did you present the background correctly?</i> – (Did you provide the instruction in a clear and objective manner?)	
Did you wait up to 3 seconds after the instruction? – (Give the instruction up to 2 times)	
IF THE CHILD ANSWERED CORRECTLY	
Caregiver praised and/or congratulated the child after he had followed the instruction – (the consequence should happen within 2 seconds)	
<i>Caregiver proceeded to the next step</i>	
IF THE CHILD ANSWERS INCORRECTLY	
<i>Caregiver provided necessary assistance to child</i> – 3 seconds between aids. (The level of help depends on the child's repertoire). - gave help in up to 3 seconds	
<i>After the child answered correctly WITH help, the caregiver praised the child</i> – Praise should take place within 2 seconds	
<i>Caregiver proceeded to the next step</i>	

Procedures

The procedure was divided into four phases: Phase 1 (Baseline; Phase 2 – Experimental treatment, subdivided into 2 stages with randomization of components and skills; Phase 3 – Feedback level 1; and Phase 4 – Feedback level 2). Phases 3 and 4 depended on the performance of each participant to happen.

Phase 1 – Baseline: evaluation of the implementation repertoire of teaching ADLs and IADLs

In this phase, the initial repertoire of each caregiver was evaluated for the implementation of the teaching procedure for preparing sandwiches and brushing teeth. The caregivers were asked to apply the intervention programs (teaching the two skills) with a confederate (person simulating a child with ASD).

For this, during the baseline phase, the caregiver received a sheet with written instructions regarding the teaching program. The confederate's responses were planned in advance and consisted, for example, of not responding to a certain instruction from the

caregiver in order to assess whether she would provide the necessary help to issue the response. Another way for the confederate to behave was to respond independently to the caregiver's instruction to assess whether she would praise the child's behavior and present the next stimulus in the behavioral chain, continuing the chain. Therefore, the caregiver's ability to apply different procedures (adequate instruction, help, reinforcement, etc.) within the teaching of the programs, in a randomized manner, was evaluated. At this stage, no feedback was provided.

Phase 2 – Experimental treatment: training in the implementation of toothbrushing and sandwich preparation programs for caregivers via instructional video modeling and self-monitoring via checklist

The experimental treatment phase was divided into two stages: both consisted of training the caregivers to implement the sandwich preparation and toothbrushing skills programs via instructional video modeling and via checklist self-monitoring. However, they happened randomly for each caregiver, with the aim of verifying whether any component of the package would have a greater effect on the caregiver's performance.

The randomization of programs and skills happened as shown in Table 2.

Table 2. Order of randomization of Steps 1 and 2 of the experimental treatment.

Participants	Order of randomization of Steps 1 and 2	
	Step 1	Step 2
P1	B2 + A1	A2 + B1
P2	A2 + B1	B2 + A1
P3	A2 + B1	A1 + B2
P4	A1 + B2	B1 + A2

At each step, the caregiver went through different combinations of package components with skills. First, the caregiver was exposed to unprecedented combinations of the two components with the two skills. If her performance did not meet the accuracy criterion (two consecutive sessions with accuracy equal to or greater than 90%), she would move on to Step 2, in which the inversion of the components for skills took place. For example: in Step 1, it was planned for P1 to be exposed to self-monitoring sessions via checklist (AC) for toothbrushing and instructional video modeling sessions (VMInst) for sandwich preparation. If, for these combinations, the participant's performance did not reach the accuracy criterion, in Step 2 it was planned to invert the components for skills, therefore, VMInst for toothbrushing and AC for sandwich preparation.

Throughout these steps, if the caregiver's performance reached the accuracy criterion (two consecutive sessions with accuracy equal to or greater than 90%) in one of the skills,

with one of the components of the package, the training was ended for that skill, otherwise, advanced to the next Phase, Level 1 Feedback.

Component A – Instructional video modeling (VMInst)

Initially, the experimenter explained this step and how to start, pause, increase or decrease the video volume, etc. Then, the caregiver watched the video “Teaching the skill of brushing teeth” or “Teaching the skill of making sandwiches (Wu & Silva, 2022a, 2022b) presented by the experimenter in a notebook. In the video, the application of the procedure for preparing a sandwich and/or brushing teeth was taught. After the caregiver watched the video, she was asked to apply the skill teaching program addressed in the video. This application was performed with the confederate, filmed and later analyzed to measure the integrity of their performance.

Component B – Self-monitoring via checklist

In component B of the package, the caregivers were presented with a checklist with the relevant aspects in the application of the activity teaching programs. The experimenter explained to the caregiver what the instrument consisted of and asked them to watch their own video of application of the programs with the confederate, from the previous step, and concomitantly fill out the referred checklist. The objective of this component was to verify whether the fact that the caregiver evaluates their own performance (self-monitoring) would produce changes in the performance of the caregiver's own programs. After the caregiver saw their application video of the programs and completed the checklist, they were asked to apply a session of the program addressed along with the checklist. If the caregiver's performance did not reach 90% accuracy, they were asked again to watch the video and complete the checklist. If, even so, the caregiver did not reach performance accuracy, they were exposed to the next component of the package for the other skill.

In cases where the caregiver achieved performance accuracy equal to or greater than 90% in the first or second session, they were asked to perform another session of application of the teaching program, however, without prior exposure to the component again. These attempts were also recorded by the experimenter, who verified the completeness of application of the caregivers' teaching programs, to support the objectives of the next step or phase.

Phase 3 – Level 1 feedback (delayed)

At this stage, delayed feedback took place. After the caregiver went through the two intervention stages (in Phase 2) with the randomization of the two components of the package for the two skills, without reaching the performance accuracy criterion, They was exposed to the third phase of the study, the Level Feedback phase 1. In this, based on the previous session, the experimenter met with the caregivers in person, showed the video of the last session and, at the end of the video, presented the positive and negative points regarding the caregiver's application, and general aspects of the intervention, such as session organization, for example. After the caregiver received feedback on their application, they were asked to apply a session of the skill in focus. If the caregiver achieved performance accuracy equal to or greater than 90%, they were asked to apply another

session again, without first being exposed to said feedback again. After the first feedback session, if the caregiver did not present performance accuracy equal to or greater than 90%, they could still be exposed to feedback twice more.

Phase 4 – Level 2 feedback (immediate)

After exposure to the Level 1 Feedback phase, if the caregiver did not meet the performance accuracy criterion, they would be exposed to another feedback phase (Level 2). In this phase, the caregiver underwent role playing, in which they applied the teaching program with the confederate and received oral feedback while applying the program.

Data analysis

Data analysis was carried out based on the caregivers' application performance in the toothbrushing and sandwich preparation programs. With the sessions held at home or at the clinic with the confederate, it was verified whether the implementation of the intervention package (instructional video modeling + self-monitoring + feedback) increased the caregiver's application performance. At each session, based on the integrity checklist, the caregiver's application performance was counted, which was measured in terms of the percentage of aspects implemented correctly.

Social validation

For the evaluation of the social validation of the teaching procedure of this study, the participants completed a questionnaire composed of five closed questions, answered according to a Likert scale (Completely Disagree, Partially Disagree, Neutral, Partially Agree and Totally Agree) and an open question for possible suggestions. The questions were: I believe that the content addressed in this training package can help me to expand the teaching of other Daily Life Skills for my child; The training system was effective in conducting the teaching procedure for trained skills; The content was approached in a clear and didactic way; The training system was displayed properly (no interruptions or defects in the material); I would recommend other parents to take this training; and Do you have suggestions or comments for us to modify or improve this training package for future study?

The purpose of this evaluation was to verify how much the participants believed that the teaching procedure was effective and satisfactory, and to collect suggestions for possible improvements in the procedure.

Results

Figure 1 presents data from participants P1, P2, P3 and P4 throughout the Baseline, Phase 2 (experimental treatment with the components of the instructional video modeling package and self-monitoring via checklist, Phase 3 (feedback level 1) and Phase 4 (level 2 feedback).

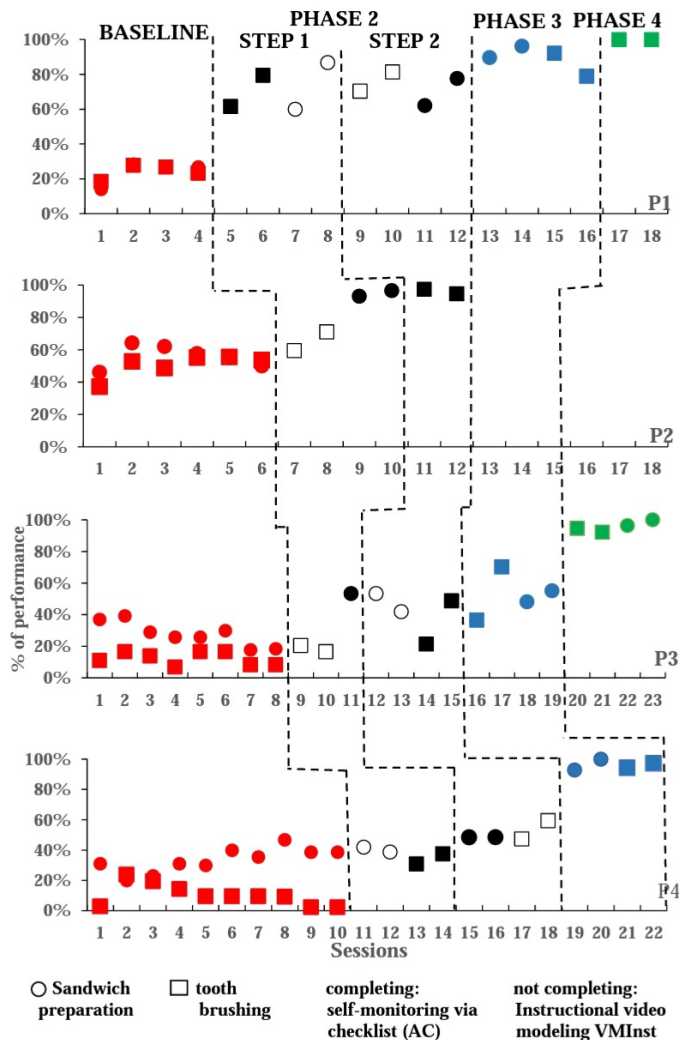


Figure 1. Performance accuracy of application of the “sandwich preparation” and “toothbrushing” programs, identified by the shapes (circle and square), of participants 1, 2, 3 and 4 in the phases of: Baseline, Phase 2, Phase 3 and Phase 4. The components of the VMIInst package, and AC, presented in Phase 2, are identified by completing and not completing the forms.

Based on Figure 1, it can be seen that the performance accuracy of P1 in all teaching programs, before the insertion of VI, was less than 40%. After treatment application, in Phase 2, Step 1, in which P1 was exposed to two sessions of the AC component for toothbrushing, her performance accuracy increased to 62% in the first session and to 79% in the second session. Also in this step (Step 1), P1 was exposed to two sessions of the VMIInst component for sandwich preparation, reaching 60% in the first session and 87% in the second. As P1's performance did not reach the established performance accuracy criterion (90% or more in her consecutive sessions), she was exposed to Step 2, of the same phase (Phase 2).

In this step (Step 2), P1 was exposed to the inversion of components, that is, he underwent two sessions of VMInst for toothbrushing, presenting a performance of 70% in the first session and 81% in the second; and two AC sessions for sandwich preparation, showing performance accuracy of 62% in the first session and 78% in the second session. As P1's performance did not reach the established performance accuracy criterion, he moved on to the next phase of the study: Feedback Level 1.

In the Level 1 Feedback phase, P1 was exposed to two delayed feedback sessions for both programs (toothbrushing and sandwich making). After feedback for the application of the sandwich preparation program, P1 reached 90% performance accuracy in the first session and 96% in the second session. As for the toothbrushing program, after feedback, P1 performed 92% in the first session and 79% in the second. Thus, for this program, the participant was exposed to the Level 2 Feedback phase.

In the Level 2 Feedback phase, P1 was exposed to more intrusive feedback, with role playing. After this procedure, P1 achieved a performance of 100% application accuracy in two consecutive sessions, reaching the determined performance criterion.

For P1, 21 sessions (including Baseline, Phase 2, Phase 3 and Phase 4) were performed in all. Data collection with this participant took place over 15 weeks, with an average of 1.4 sessions per week.

P2, in the baseline phase, performed below 65% in both teaching programs (toothbrushing and sandwich preparation). After insertion of the treatment, in Phase 2, Step 1, in which P2 was exposed to two VMInst sessions for toothbrushing, she obtained an application performance of 59% in the first session and 71% in the second session. In the same stage (Stage 1), after two AC sessions for sandwich preparation, P2 obtained a performance of 93% in the first session and 97% in the second. Therefore, after Step 1, P2 reached the performance accuracy criterion for the sandwich preparation skill and did not reach it for the toothbrushing skill, thus needing to be exposed to Step 2 of the same phase (Phase 2).

In Step 2, P2 was exposed to two CA sessions for the toothbrushing skill. From this stage on, P2 obtained an application performance of 97% in the first session and 95% in the second. Thus, the participant's performance reached the established accuracy criterion and the participant did not need to be exposed to the other phases of the study.

With P2, 12 sessions (including baseline and Phase 2) were performed in all. Data collection took place over four weeks, with an average of three sessions per week.

P3, before the insertion of the treatment, presented performance accuracy lower than 45% in both teaching programs. With Phase 2, Step 1, in which she was exposed to two sessions of the VMInst component for toothbrushing, the participant obtained a performance accuracy of 21% in the first session and 17% in the second session. Still in the same stage (Stage 1, Phase 2), P3 was exposed to a session of the CA component for sandwich preparation, reaching 53% of performance. As P3 did not reach the performance accuracy criterion established for both programs, it was exposed to Step 2 of the same phase (Phase 2).

In Step 2, P3 was exposed to the inversion of components, that is, he underwent two VMInst sessions for sandwich preparation, presenting a performance of 53% in the first session and 42% in the second; and two AC sessions for toothbrushing, with an application performance of 21% in the first session and 49% in the second session. As the participant

did not reach the accuracy criterion in the teaching programs, she was exposed to the next phase of the study: Feedback level 1.

In the Level 1 Feedback phase, P3 was exposed to two delayed feedback sessions for both programs (toothbrushing and sandwich making). After feedback for the toothbrushing program, the participant reached 37% in the first session and 70% in the second session. As for the feedback for the sandwich preparation program, the participant presented a performance of 48% in the first session and 55% in the second session. Thus, not reaching the performance criterion, P3 was exposed to Phase 4 of the study: Feedback level 2.

With the Level 2 Feedback phase, P3 reached a performance of 95% in the first session and 92% in the second session of the toothbrushing program. Also, the participant achieved 96% performance accuracy in the first session and 100% in the second session for the sandwich preparation program.

With P3, 28 sessions (including Baseline, Phase 2, Phase 3 and Phase 4) were performed in all. Data collection took place over eight weeks, with an average of 3.5 sessions per week.

P4, before the insertion of the treatment, presented performance accuracy lower than 50% in both teaching programs (toothbrushing and sandwich preparation). With Phase 2, Step 1, in which P4 was exposed to two sessions of the VMInst component for sandwich preparation, the participant obtained a performance accuracy of 42% in the first session and 39% in the second session. Still in the same step (Step 1, Phase 2), P4 was exposed to two sessions of the AC component for toothbrushing, reaching 31% performance accuracy in the first session and 38% in the second. As P4 did not reach the established performance accuracy criterion, it was exposed to Step 2 of the same phase (Phase 2).

In Step 2, P4 was exposed to the inversion of components, that is, he underwent two AC sessions for sandwich preparation, presenting a performance of 48% in the first session and 48% in the second; and two sessions of VMInst for toothbrushing, showing an application performance of 47% in the first session and 59% in the second session. As the participant did not reach the accuracy criterion in the teaching programs, she was exposed to the next phase of the study: Feedback level 1.

In the Level 1 Feedback phase, P4 was exposed to two delayed feedback sessions for both programs (toothbrushing and sandwich preparation). After feedback for the sandwich making program, the participant achieved 93% performance in the first session and 100% in the second session. As for the feedback for the toothbrushing program, the participant performed 94% in the first session and 97% in the second session.

With P4, 22 sessions (including Baseline, Phase 2 and Phase 3) were performed in total. Data collection took place over six weeks, with an average of 3.6 sessions per week.

Discussion

The present study evaluated the effect of implementing a training package on the performance of caregivers in the application of ADL and IADL teaching programs. The training package included: written instruction, instructional video modeling, self-monitoring via checklist, delayed feedback and immediate feedback.

All caregivers who participated in the study showed an increase in the performance accuracy of application of the programs after exposure to the components of the training package. However, only one caregiver achieved the accuracy criterion by using only one component or a combination of components. The other three caregivers necessarily needed

to go through the combination of package components and through the delayed and immediate feedback phases. The feedback phases played an important role in the participants' achievement of criteria, corroborating data from similar studies in which a feedback phase was also necessary for the participants' performance to reach the accuracy criterion [e.g., Barboza (2019); Pollard et al. (2014); Santos et al. (2018)].

The fact that three of the four study participants needed to go through the feedback phase (delayed and/or immediate) before reaching the precision criterion could be seen as a limitation of the effect of the training components (video modeling and self-monitoring checklist), however, DTT (Discrete Trial Training) [see Almeida & Martone (2018)] is a teaching procedure that often requires instruction, demonstration, simulated rehearsal (role play), with feedback to be faithfully implemented. In the present study, the feedback phase occurred briefly only to indicate specific errors committed, thus corroborating other studies that required the feedback phase (Barboza et al., 2015; Santos et al., 2018).

In general, the participants had a higher mean application integrity when exposed to the self-monitoring component via checklist (mean integrity of 67% in the sandwich preparation activity and 59% in the toothbrushing activity). One hypothesis for this slight difference in the mean performance accuracy between the activities may be due to the fact that the toothbrushing activity has a greater number of steps (components of the behavioral chain), when compared to the sandwich making activity. In the video modeling component, they obtained an average performance of 54% in the sandwich preparation activity and 53% in the toothbrushing activity (again with a slightly lower performance in the toothbrushing skill).

It is noteworthy that P2 was the only participant who did not have to go through the feedback phase(s). During treatment, the participant was only exposed to Phase 2 of the study (Step 1: instructional video modeling for toothbrushing and self-monitoring via checklist for sandwich preparation; and Step 2: self-monitoring via checklist for toothbrushing). This participant was the one with the highest average performance at baseline (51% in toothbrushing and 56% in sandwich preparation). Despite the fact that she had no experience with the application of DTT for ADLs and IADLs, her education in higher education, in the pedagogy course, and the greater amount of time she spent with her son (taking care of the child was her main function), can explain the sufficiency of the self-monitoring component via checklist for the acquisition of skills.

Regarding the data from the other participants, it is not possible to guarantee that one component of the package was sufficient or was more efficient than the other. P1, for example, presented an average performance of 75% in the instructional video modeling component and 70% in the self-monitoring component via checklist, therefore, a difference between the components of only 5%. Participant P3 presented an average performance of 53% in the VMInst component and 35% in the CA component; a difference of 18% between the components. Participant P4 presented an average performance of 48% in the VMInst component and 41% in the AC component; a difference of 7% between these. The overall average in the VMIns component was 54% and the AC was 64%; a difference of 10% between the components. A hypothesis for this slight difference in performance as a function of the components may be due to the fact that, in the video shown to the participants, aspects related to the integrity of the procedure (getting the child's attention and waiting up to 3 seconds for the child's response) were addressed briefly and with less detail, compared to the self-monitoring checklist, which

presented each stage of what was being evaluated in the caregivers' application. Therefore, it is suggested that, in future studies, the script used in the video clearly and objectively presents all the aspects that are presented in the self-monitoring checklist so that this difference between the components is minimized.

However, it is worth noting that this difference in performance based on the components is small and cannot be considered a significant difference, corroborating other studies that have shown that the use of videomodeling (Catania et al., 2009; Guimarães et al., 2018; Nielsen et al., 2009; Barboza et al., 2015), and self-monitoring (Santos et al., 2018) were efficient in increasing the application performance of caregivers and/or professionals, since all participants in the present study increased their average application integrity after exposure to the video modeling and self-monitoring checklist components, even though exposure to feedback was required later.

When analyzing the difference between the trained activities, it can be seen that the participants had a slightly higher average performance in the sandwich preparation activity, with a performance of 65% in this activity, compared to 56% obtained in the toothbrushing activity; a difference of 9%. This difference in performance is quite small. However, it is worth clarifying that the sandwich preparation activity has fewer steps or components of the chain (5) compared to the toothbrushing activity (7). For future studies, it is important to select activities with the same number of components in the chain to avoid possible effects of this variable on the dependent variable of the study.

The present study corroborates data from Borba (2014), Borba et al. (2015), Barboza et al. (2015) and Guimarães et al. (2018), finding evidence of the effectiveness of diversifying forms of behavioral analytical intervention for ASD via caregivers, thus reaching a greater number of families and increasing the intensity of the intervention in terms of number of hours with the child. Still in this direction, with the feasibility of training caregivers, it is possible to get the caregiver not only to play an active role in the intervention, but to be one of the main agents in this process (Wang, 2008).

However, it is worth mentioning that, although caregivers can play an active role in the intervention, this does not exempt the participation of a Behavior Analyst in the intervention process, since the research demonstrates that despite the increase in performance accuracy after the video modeling and self-monitoring checklist components, the final phase of Feedback is still necessary for caregivers to reach the established accuracy criterion, just as we must emphasize the importance of a trained professional accompanying the intervention process with the child.

As for the social validation of the study, the caregivers reported agreeing that the training package can help expand the child's other ADLs and IADLs; that the training system was effective in conducting the teaching procedure for trained skills; that the content was addressed in a clear and objective manner; that the system was displayed properly; and that they would recommend to other parents. As suggestions, the participants indicated that the feedback should take place right after the video modeling and self-monitoring sessions so that they progressed faster. As a compliment, one of the caregivers reported that "the training contributed a lot to the child's daily activities". We can consider that, in a service delivery context (Moore & Cooper, 2003), feedbacks can follow each intervention session. However, in the context of this research, as it is applied research, there was a need to present the feedbacks only at the time they were planned to occur.

It is important to emphasize the relevance of the study for the area of occupational therapy, since the intervention via a caregiver can contribute to the development of autonomy and

independence of children with ASD, since it is one of the difficulties commonly observed in clinical practice and in studies that address this issue (Silva et al., 2018).

As a limitation of this study, we can mention the failure to carry out the generalization phases, which would be with the caregivers' child, and the follow-up phase. It is suggested that, in future studies, these phases be included to verify the generalization and maintenance of the skill acquired in the research.

Conclusion

Considering that, more generally, this study aimed to train caregivers to teach sandwich preparation and toothbrushing to their children, it can be concluded that the training package used was satisfactory in training caregivers, since all participants they reached the performance accuracy criterion, attesting to the learning of those skills. Furthermore, more specifically, the study showed that the components of the training package can be used alone or in combination. It was also verified that, in general, the participants need feedback to improve their performance. The presence of the Behavior Analyst is necessary both in the training of caregivers and in the follow-up of their intervention. This study adds to the literature of occupational therapy the description of an evidence-based methodology for teaching ADLs and IADLs to children with ASD, a topic that, although extremely relevant in the area, still lacks a description of assertive methodological designs. Thus, this study contributes to the literature in the area and to professional practice.

Studies like this are extremely important, for example, with regard to the search for intervention alternatives for individuals from families who have difficulties in accessing quality behavioral intervention services.

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Author's Contributions

Sayori Vasconcelos Wu was responsible for writing of the text, data collection and analysis, author of the master's thesis [carried out at the Nucleus of Theory and Research of Behavior (NTPC), Federal University of Pará, UFPA], which gives rise to this text. Mariane Sarmento da Silva Guimarães and Glenda Miranda da Paixão were responsible for contributions in the discussion and revision of the text. Álvaro Júnior Melo e Silva was the work supervisor. All authors approved the final version of the text.

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