

Hybrid model of parent training for mothers of preschool children with autism spectrum disorder based on applied behavior analysis to reduce parental stress

Modelo híbrido de treinamento parental para mães de crianças pré-escolares com transtorno do espectro autista baseado na análise do comportamento aplicada para redução do estresse parental

Modelo híbrido de entrenamiento parental para madres de niños en edad preescolar con trastorno del espectro autista basado en el análisis de comportamiento aplicado para reducir el estrés parental

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Abstract: This study sought to evaluate the contributions of a hybrid parental training carried out with eight mothers of preschool children with autism spectrum disorder, based on the science of applied behavioral analysis for reducing parental stress. The hybrid parental training was constructed and implemented by the researchers. The sample was divided into two groups: a Treatment Group and a Control Group. In the data analysis, comparisons were made of the levels of stress pre- and post-intervention and for the treatment group, direct practice with the child in a face-to-face environment was also analyzed. The results showed that the mothers in the treatment group reacted positively to the video and materials presented; however, no significant statistical differences were found that would suggest a reduction in stress levels between the two groups as a result of the training given. The limitations of the study were its small sample size and the fact that the children in both groups continued to receive intensive therapy treatment during the application of the parental training.

Keywords: autism; parent training; telehealth; applied behavior analysis; parental stress

Resumo: Este estudo buscou avaliar as contribuições de um treinamento parental híbrido realizado com oito mães de crianças pré-escolares com transtorno do espectro do autismo baseado na ciência da análise do comportamento aplicada para a redução do estresse parental. Foi realizado a construção e implementação do treinamento parental híbrido. A amostra foi dividida em grupo tratamento e controle. Em termos de análise de dados, foram feitas comparações do nível de estresse no período pré/pós-intervenção, assim como a análise de uma prática direta com a criança de forma presencial com o grupo tratamento. Os resultados obtidos demonstraram que as mães do grupo tratamento reagiram positivamente com as vídeos e materiais apresentados. No entanto, não foi observado diferenças estatísticas significativas para sugerir a redução do nível de estresse entre os dois grupos. As limitações do estudo foram o tamanho reduzido da amostra e o fato das crianças de ambos os grupos continuarem recebendo o tratamento em terapia intensiva durante a aplicação do treinamento parental.

Palavras-chave: autismo; treinamento de pais; telessaúde; análise do comportamento aplicada; estresse parental

Resumen: Este estudio buscó evaluar los aportes de un entrenamiento parental híbrido realizado con ocho madres de niños preescolares con trastorno del espectro autista basado en la ciencia del análisis aplicado de la conducta para la reducción del estrés parental. Se llevó a cabo la construcción e implementación de un entrenamiento parental híbrido. Se dividió la muestra en grupo de tratamiento y control, y se realizaron comparaciones del nivel de estrés en el período pre/postintervención, así como el análisis de la práctica directa con el niño en un cara a cara con el grupo de tratamiento. Los resultados obtenidos demuestran que las madres del grupo de tratamiento reaccionaron positivamente a los videos y materiales presentados; sin embargo, no se observaron diferencias estadísticas significativas que sugieran una reducción en el nivel de estrés entre los dos grupos. Las limitaciones del estudio fueron el pequeño tamaño de la muestra y el hecho de que los niños de ambos grupos continuaron recibiendo tratamiento de terapia intensiva durante la implementación de la capacitación de los padres.

Palabras clave: autismo; formación de padres; tele salud; análisis aplicado del comportamiento; estrés parental

According to the Diagnostic and Statistical Manual of Mental Disorders (5th ed.) (DSM-5 TR; American Psychiatric Association, 2023) autism spectrum disorder (ASD) is a neurodevelopment disorder characterized by persistent deficits in social interaction, repetitive behavioral patterns and restricted interests, and these symptoms must be present in early childhood, with different levels of support. The prevalence of ASD has been increasing exponentially. According to an epidemiological study carried out by the Centers for Disease Control and Prevention (2023), one in every thirty-six children in the USA currently has ASD.

The difficulties presented by children diagnosed with ASD not only impact the individual, but also those who live with them, especially their parents or caregivers (Dahiya et al., 2021). Parents of children with ASD suffer from high levels of parental stress when compared to parents of children with other disabilities or those with typical development (Craig et al., 2016). Children with ASD demand more time and care from their parents and caregivers. This can have a direct effect on the lives of all those involved, especially the mothers, on whom the burden is greatest, and who often give up their own personal interests and social lives to devote themselves to the care of their children (Anjos & Morais, 2021; Portes & Vieira, 2022).

One strategy to help parents face the challenges involved in caring for children with ASD is parental training, which offers a promising alternative that is feasible, well-accepted, and relatively low in cost (Dawson-Squibb et al., 2020). Parental training can also help reduce the emotional burden and parental stress (Kurzrok et al., 2021; Sneed & Samelson, 2022). Parental stress levels in parents of children with ASD are generally related to the child's behavior, barriers to participation in social and educational activities, or concerns about treatments (Shepherd et al., 2018).

Parental training can be defined as a strategy that aims to teach parents how to identify disruptive behaviors, analyze the function of these behaviors, adopt preventative strategies, manage such behaviors, and learn how to communicate better with the child. The training techniques include video modeling, roleplay, and direct instructions through expository classes and complementary materials (Wong et al., 2014).

Applied Behavioral Analysis (ABA) is currently indicated as one of the main sciences that has made a significant contribution to early intervention in ASD (Sella & Ribeiro, 2018). The interventions under this theoretical framework constitute an evidence-based practice for this population (Steinbrenner et al., 2020; Virués-Ortega, 2010; Wong et al., 2015). Although there is vast literature that presents evidence of the effectiveness of parental training in families with children diagnosed with ASD from an ABA perspective (Lee & Meadan, 2020; Lopes et al., 2021; Nevill et al., 2018; Rahman et al., 2016; Wong et al., 2015), the impacts of this training on mental health indicators are moderate, and more scientific production is needed on the subject (Mackenzie & Eack, 2022).

Families of children with ASD in locations with low resources encounter various barriers, such as the poor qualification of professionals in this field, a lack of public health infrastructure, the high cost of mental health services, social representations about the disorder, and greater geographical distance from the nearest specialized centers (Dawson-Squibb et al., 2020; Viljoen et al., 2021). Therefore, implementing parental training for parents of children with ASD using information and communication technologies (ICTs), through the use of telepractice offers a low-cost means of enabling access to evidence-based treatments and developing social and communication skills of children with ASD (Camden et al., 2019; Parsons et al., 2017; Wilkes-Gillan & Lincoln, 2018). Despite the lack of

technological applications for children with disabilities, the available studies report promising results for children with ASD (Samadi et al., 2020; Vismara et al., 2018).

Telepractice is a general term that embraces other terms, such as telehealth and telemedicine. It can be defined as a means of providing distance professional services through the use of the internet (Meadan et al., 2022). Telepractice can be offered in two forms: asynchronous and synchronous. The first is when information, such as videos, photos, or audio files are recorded and exchanged via technology between the therapist and the client without any live interaction between them, and the second is when there is real-time interaction through ICTs. When synchronous and asynchronous methods are used in combination, this is called hybrid telepractice, which combines the benefits of both synchronous and asynchronous approaches (Dudding, 2013). The combination of telepractice strategies with face-to-face teaching – the form adopted in this research – is also considered a hybrid model.

Based on this panorama, this study aimed to evaluate the contributions of a hybrid model of parental training for mothers of preschool children with ASD, based on ABA, aimed at reducing parental stress.

Method

This study is characterized as a non-randomized (quasi-experimental) clinical trial. It is part of a master's degree dissertation reporting on research approved the Ethics Committee of the University of Vale do Itajaí on 25/04/2022, under no. 5,366,120. In this type of clinical trial, the exposure of independent variables to the participants is controlled, and there is no randomization between the groups (Hernandez-Sampieri et al., 2013).

Participants

The study sample was formed by convenience. Eight mothers participated in the study, ranging from 34 to 44 years of age. Their children, all diagnosed with ASD, had a mean age of 3.75. The children had been undergoing behavioral intervention at a specialized center in the South of Brazil for approximately eight months. More information about the sample is shown in Table 1 (sample characterization) and Table 2 (data on the children of the sample).

Instruments

Socio-demographic questionnaire: an instrument constructed by the researchers, with the aim of eliciting information about the children and mothers participating in the research. The questionnaire sought to characterize the children according to: sex, age, year of diagnosis, school situation, total length of time the child had been in intervention, and length of time at the center. The mothers were characterized by place of birth, marital status, level of education, profession, family income, number of children, members of the household, and caregivers of the child, and whether they were receiving psychological follow-up.

Videoconference Checklist: A document created by researchers to be used as a script during the videoconferences held with mothers of the treatment group, in order to standardize the online meetings. This included reminders, such as keeping the videoconference to a maximum of ten minutes, guidelines on how to conduct the meeting, and the information that should be collected.

In-person practical training script: this was created entirely by the researchers so that during the in-person meetings, the researchers could observe the participants' skills in implementing the practices taught in the videos. The document presented a series of requests for the researcher to ask the participant. If the request was carried out by the participant, the researcher moved on to the next. Or if the participant had difficulty performing the request, the researcher gave assistance. The requests provided opportunities to consolidate the contents shown in the videos, with the participants putting them into actual practice with their children. Skills were reinforced such as engaging the child, motivation, reinforcement, instruction, token economy, types and help, incidental and subtle forms of teaching, behavior function, managing inappropriate behavior, and imitation. The script also gave information on what the researcher should do if the child presented inappropriate behavior.

Protocol for observing in-person training: This protocol was created entirely by the authors, with closed questions on a Likert scale through which the observers were able to analyze the mothers' performance during the videos of the in-person training. This document was related to the Roadmap of practical in-person training, as it enabled the researchers to evaluate whether participants were able to

perform the tasks they were asked to carry out, and whether they did so independently, or needed some kind of help from the researcher (modeling or verbal).

Social Responsiveness Scale (SRS-2): This is a Likert scale composed of different forms for different age groups. It seeks to quantitatively and reliably quantify a wide range of possible losses of socialization, communication, repetitive behaviors and restricted interests that may be associated with ASD, and present the level of symptoms: mild, moderate or severe, through the responses filled out by the parents or teachers. The SRS-2 is composed of sixty-five measurements (Constantino & Gruber, 2020). The validation studies for the Brazilian context of this scale demonstrate psychometric properties with values of consistency $\alpha = .95$ and $\alpha = .97$, sensitivity of 96.8 %, specificity of 100 % and a negative predictive value of 99.99 % for the identification of ASD (Borges & Hauck-Filho,).

Parental Stress Index – Short Form: To evaluate parental stress, the Portuguese adaptation of the Parental Stress Index – Short Form (PSI-SF) was used. It consists of thirty-six items, and is divided into three subcategories: difficult child; parental suffering; and dysfunctional interactions (Santos, 2008). The validation study of PSI-SF in Portugal (Santos, 2008) presents psychometric properties, with Cronbach's alpha coefficient of .92. The instrument has not yet been validated for Brazil context, but since Brazil and Portugal share the same language, it was decided to use this scale, due to a lack of evaluation instruments in this area validated for Brazil.

Procedures

Hybrid Parental Training

The proposal for training parents of children with ASD was constructed according to the following steps: A) discussion among researchers on parental training in hybrid format for parents/caregivers of preschool children diagnosed with ASD, b) a review of the literature on the subject over the last five years, c) deciding on the contents of each video, d) preparing the visual material (slides) to be presented in the videos, recording and editing the videos, e) checking and correcting the videos, f) making the videos available, g) applying the parental training, and h) evaluating their effectiveness.

The topics covered in the training were: 1) What is Autism Spectrum Disorder and the ABA used with this demand, 2) basic principles such as reinforcement, punishment, and extinction, among others, 3) What is behavior, how to define it, and its possible functions, 4) How to establish motivating operation and carry out a preference assessment with the child, 5) systems to assist in the teaching of skills (system of tips) and how to present instructions clearly and if necessary, redirect behavior, 6) differential reinforcement strategies applied in daily life, 7) the importance of play and the possibilities of playing and teaching with the child, 8) how to set up and perform a schedule of activities with the child, and the importance of and how to establish instructional control, 9) the difference between naturalistic and structured teaching, and how to apply each.

Examples and practical relationship with daily life were presented in the videos, in clear language, explaining any technical terms with terms that could be more easily understood by the mothers. Each video lasted approximately forty minutes. Themes 1-6 were contained in two videos, and the others, in one video. All the videos were made available on YouTube, via a private link. Throughout the training, the mothers of the treatment group continued to have access to the videos they had already watched.

Data collection

First step

Initially the researcher sent an invitation via WhatsApp to the parents or guardians of children who attended the center, inviting them to take part in the research. The mothers who accepted the invitation (by replying to the message) and who met the study inclusion criteria, took part. The inclusion criteria were: a child diagnosed with ASD, from mild to severe, according to the Social Responsiveness Scale (SRS-2); a child who had been in early intervention at the center for the past 6 to 12 months; child aged between 2 years 6 months and 6 years; participants who had not previously received training or courses in applied behavior analysis; access to the Internet; literate; had time to attend the center. The exclusion criteria were: a neurodevelopmental deficiency or disorder that could prevent the individual from attending and participating in the training classes or responding to the instruments.

The groups were divided randomly. The first four mothers who agreed to participate in the research were assigned to the Treatment Group, and the remainder to the Control Group. A visit was scheduled with each participant, to come to the center, where they were asked to sign an Informed Consent Form – ICF. The sociodemographic questionnaire, SRS-2, and the Parental Stress Index (PSI) were also applied. In this visit, only the mothers of the Treatment Group received instructions from the researcher on the process of the program, and how to access the videos (approximately 30/40 minutes each), on different themes related to ASD and ABA.

The mothers were asked to watch two videos of two modules per week in the next seven days. After they had watched the videos, a video conference with the researcher was scheduled and conducted. After that, two more modules were made available. However, some mothers were unable to watch all the videos within the established deadline, so a period of fifteen days was given, for the mothers to watch the videos and attend the videoconference. This procedure continued, until a final face-to-face meeting was carried out. This meeting included the practical part, which was recorded for analysis by the researcher. The entire process took 13 weeks.

For the four participants of the Control Group, the researcher listened to any requests the participants had, and they were informed that they would receive messages via WhatsApp, to monitor the case, and that any requests would be forwarded to the technical team responsible for the child's care at the center. The mothers were also informed that they would receive the same training once the research was completed.

Second step

After the first stage, the mothers watched the first two videos and took part in the videoconference. During the videoconference with the participants of the Treatment Group, a videoconference checklist was administered and the subsequent videos were made available for them to watch. This procedure was repeated fortnightly, until the participants had finished watching all the videos. Next, an in-person meeting was scheduled, to carry out the practical part of the training.

Third step

In the third stage of data collection, the researcher and the participants of the Treatment Group attended the center individually, with their children, where the practical part of the training was carried out. This session was recorded for observation by the judges.

The meeting took place in a room equipped with two cameras to capture audio and video. The sessions lasted no more than twenty minutes, and followed the itinerary for the hands-on training. At the end of the session, the participant was referred to another room in which the Parental Stress Index-Short Form (PSI-SF) was applied again.

Fourth step

Two judges with training and experience in ABA, employees of the intervention center where the research took place, performed an independent analysis of the four recorded videos of the practical face-to-face sessions with the participants of the Treatment Group. For the analysis they followed the protocol of observation of the practical training in face-to-face.

Data analysis

First, the information collected through the sociodemographic questionnaire was organized, tabulated and analyzed descriptively, in order to characterize the participants' profile in relation to the research objectives.

The data obtained from the Parental Stress Index-Short Form (PSI-SF) were analyzed using descriptive statistics, seeking to describe a set of data, and through inferential statistics, aiming to understand, compare and draw conclusions on the responses to the questionnaires applied to the research participants (Dancey & Reidy, 2019). The Wilcoxon non-parametric tests were used to evaluate intragroup differences and the Mann Whitney test was used to analyze the differences between the Treatment and Control Groups (Dancey & Reidy, 2019).

The video recordings of the in-person training with the participants were analyzed individually, through the observation protocol of the hands-on training, counting the occurrence of each item of this instrument during the training. The first three minutes of the videos were disregarded from the analysis,

as this period was allowed for the mothers and children to settle themselves in the care room. The rest of the video time was coded.

To verify the reliability of the instrument for observing the participants' behavior during the training, the analyses of two expert judges were used, each with more than 2 years of experience in ABA. They were instructed on the use of the protocol for observation of the practical in-person training. They watched the videos independently, and through the protocol, identified whether or not the participants presented behaviors requested by the researcher. In the items where they did not correctly present these behaviors, the researcher acted as a third judge, and analyzed the items to make the final decision.

In general, inter-observer agreement should be at least 80 %. To obtain the level of agreement, the following formula was applied: $\sum A / \sum (A+D) \times 100$ after each judge had analyzed each video. An overall average of 95.45 % was obtained for inter-observer agreement.

Results and Discussion

Analyzing the demographic data of the participants (Table 1), it was found that all were in a marital relationship with the child's father, and living together with their spouse. The analysis also found a high level of education, with seven of the mothers having degrees or postgraduate degrees. Only the participant P-3 had completed high school but not higher education. Regarding family income, it was above R\$4001 per month, with some participants having income of more than R\$7000 per month. These data imply that the mothers had good access to information about autism and quality intervention, which suggests lower levels of parental stress, as cross-sectional factors beyond ASD, such as conflicts in the marital relationship, lack of support network, lack of public policies to ensure care for children with ASD, low socioeconomic level and low levels of education are all negative factors for the mental health of family members (Anjos & Morais, 2021).

Also in regard to the participants' information, it was observed participant P-1 was not in employment at the time of the research.

The results of the SRS-2 scale (Table 2), which evaluated the level of support of children through the mothers' responses, showed that 3 of the 8 children receive mild support level, and the others moderate support. Through the existing literature, it is possible to verify that the higher the level of support the child needs, the higher the manifestation of symptoms, which could be related to parental stress (Hartley et al., 2017).

It was observed that participant P-5 of the Control Group presented the lowest stress scores on the scale (pre-test score 67/post-test score 73). However, this was also the only case in which the participant of the research was not the main caregiver of the child. He was a father (who did not participate in the research), and another fact is that the mother had worked full-time since the child was diagnosed, while the father had stayed at home to look after the child. Usually, the father is not the primary caregiver of the child with ASD, and does not carry out basic care activities (Jorge et al., 2021).

Table 1*Characterization of the sample (N = 8)*

Participant & sex	Age	Civil status	Level of Education	Current activity	Family income	No. of people in the household	PSI - SF	
							Pre-test	Post-test
P-1. F	36	Stable union	Post-graduate	Housewife	More than R\$7501	Parents, the child and one brother	106	97
P-2. F	41	Married	Complete Higher Education	Accounts analyst	R\$5001 to R\$5500	Parents, the child and one brother	124	102
P-3. F	35	Married	Complete Higher Education	Shopkeeper	R\$7001 to R\$7500	Parents, the child and one brother	90	86
P-4. F	41	Married	Post-graduate	Civil Servant	More than R\$7501	Parents, the child and one brother	114	105
P-5. F	31	Stable union	Superior complete	Administrative assistant	R\$4501 to R\$5000	Parents and the child	67	73
P-6. F	44	Married	Post-graduate	Teacher	R\$4001 to R\$4500	Parents, the child and one sister	117	122
P-7. F	34	Married	Complete higher education	Nurse	R\$6001 to R\$6500	Parents and the child	115	127
P-8. F	38	Married	Complete higher education	Businesswoman	More than R\$7501	Parents, the child and one brother	119	125

Table 2*Characterization of the children of the sample (N = 8)*

Participant & sex	Age of the child	Level of Education	Level of functionality according to report	Severity level according to SRS-2	Intervention time at the Center	Hours of intervention per week
P-1. M	5 years	Preschool	Level 02	Moderate	8 months	15h/week
P-2. M	5 years	Preschool	Level 03	Moderate	10 months	20h/week
P-3. M	3 years	Does not attend School	Level 02	Moderate	10 months	20h/week
P-4. F	4 years	Preschool	Level 02	Minor	9 months	15h/week
P-5. F	3 years	Preschool	Level 02	Minor	8 months	10h/week
P-6. M	4 years	Preschool	Level 02	Moderate	7 months	4.5h/week
P-7. M	3 years	Preschool	Level 03	Moderate	6 months	15h/week
P-8. M	3 years	Preschool	Level 02	Minor	11 months	15h/week

Note. F: Female; M: Male

The results obtained from the PSI-SF scale were tabulated in an Excel spreadsheet, and calculations were performed to obtain the mean and standard deviations for each individual and group, both pre- and post-intervention. Wilcoxon's non-parametric tests were used to compare the groups in both stages of the research (pre- and post-intervention). These data are presented in Table 3. The Mann-Whitney test was used to compare the results between groups.

Table 3
PSI-SF pre/post-test result

Treatment Group	Pre-intervention		Post-intervention		<i>p</i>
	Mean	SD	Mean	SD	
Dimensions					
Parental Suffering	45,00	8,60	38,75	8,34	0,68
Dysfunctional Interactions	27,00	5,77	25,00	8,04	0,46
Difficult Child	36,00	5,22	33,75	2,75	0,28
Final Score	108,00	9,00	97,50	6,95	0,06
Control Group	Pré - teste		Pós - teste		<i>p</i>
	Mean	SD	Mean	SD	
Dimensions					
Parental Suffering	37,00	12,13	39,50	10,84	0,10
Dysfunctional Interactions	31,00	6,21	33,25	7,63	0,10
Difficult Child	36,50	10,01	39,00	11,57	0,06
Final Score	104,50	3,32	111,75	3,47	0,06

The research involved 8 participants, all female, with a mean age of 37.5 years, all mothers of children diagnosed with ASD at preschool age. It was assumed that the mother is the primary caregiver of the child (Machado et al., 2018), which is what we found in this research. As the main caregivers, it is common for mothers to suffer from excessive burden, lack of support, health issues, and impact on their lives and relationships. These aspects were evaluated through the Parental Suffering dimension of the PSI-SF.

In this dimension, initially the scores of the participants of the same group were compared for both stages (pre/post) and both groups did not present any statistically significant differences ($p < 0$), and in the comparisons of the means between groups for this same dimension, in the pre-intervention the mean for the treatment group, of $M = 45.00$ ($SD = 8.60$), was greater than the mean of the control group $M = 37.00$ ($SD = 12.130$), the post-intervention mean for the treatment group was $M = 38.75$ ($SD = 8.34$), thus, the mean decreased so that it was less than that of the control group, which was $M = 39.50$, thus, it increased in the post-intervention. Despite this, there was no statistically significant difference between the two groups ($U = 0.48$; $p < 0$).

Collaborating with Parental Suffering, some studies suggest that mothers of children with ASD suffer greater impacts on their lives, including on their physical, mental and/or professional health, due to the intensive care needs of the child, leading to feelings of being overburdened (Machado et al. 2018).

In the dimension of dysfunctional interactions, the parents' expectations of the relationship with the child are evaluated; the possibility of being reinforced, accepted, bonding with their child, that is, and the level of relational satisfaction with the child. Comparing the results of the participants in the same group, there were no significant differences ($p < 0$), and the same occurred when comparing between groups ($U = 1$; $p < 0$). This result reveals that the mothers' sense of being unable to build a close relationship with their children diagnosed with ASD, which may threaten the mother's own sense of identity and contribute to maternal stress (Porter & Loveland, 2019). Increasing the interaction between parents and children, as well as the feeling of being connected, can contribute to reducing the level of stress (Anjos & Moraes, 2021).

The last dimension is called Difficult Child, and its affirmations are related to the characteristics of the child, such as humor, hyperactivity, requirement, adaptability, acceptance, autonomy, and how much these characteristics impact the parents' lives. In the intra-group comparison, no results were obtained with statistical significance ($p < 0$), or when comparing the results for both groups ($U = 1$; $p < 0$), as in the post-test ($U = 0,68$), suggesting that the mothers' perception of their children and their

children's behaviors is similar for both groups. These results reinforce the link between the mothers' stress levels and the severity of the central symptoms of their children with ASD. The literature also indicates a close relationship between parental stress and the characteristics/symptomatology of ASD (Siu et al., 2019; Tsermentseli & Kouklari, 2021).

In the sum of the dimensions (final score), and in the analysis among the participants of the treatment group, no statistical relevance was found ($p \leq 0$). Comparing the means of the final scores in both stages, in the pre-test the treatment group presented $M = 108.00$ ($SD = 9.00$), which is higher than that of the control group $M = 104.50$ ($SD = 3.32$). However, in the post-test performed shortly after the parental training, the treatment reduced the mean score to $M = 97.50$ ($SD = 6.95$), while the treatment group increased the mean score to $M = 111.75$ ($SD = 3.47$). And between groups ($U = 0.68$; $p \leq 0$) and the post-intervention ($U = 0.34$; $p \leq 0$) which did not suggest significance, therefore it was concluded that there were no differences that could suggest that the treatment group's participation in the hybrid parental training had a significant impact on the level of stress, when comparing through statistical analysis.

This research, as well as others on parental training, did not find any evidence to support a significant change in parental stress in the study population (DAI et al., 2018; Fisher et al., 2020; Mackenzie & Eack, 2022). This may be associated with the fact that the children were in intervention and the participants were assisted by professionals specialized in ASD, or that stress is influenced by different variables, such as the characteristics of the individual caregiver, the characteristics of the child, the family structure and dynamic, bonds established between the caregiver and the child, social and socioeconomic factors, support network, ability to access quality information and intervention, cultural context, among others (Louie et al., 2017). To affirm that parental training can help reduce stress levels, these variables would need to be studied in greater depth.

It is important to emphasize the importance of instrumentalizing and empowering parents and caregivers of children with ASD. Despite the absence of statistical evidence of its effectiveness, the individuals of the treatment group gave positive opinions, such as that the techniques taught can be introduced into their routines, that the content was interesting and necessary, and that it would help them in different aspects, such as managing disruptive behaviors, generalization and teaching new skills. This contributes directly to the development of the child and improves the family context, and by broadening the understanding of the whole process involving ASD, it can make a significant contribution not only to lowering the levels of parental stress, but also levels of anxiety and depression, giving the mothers hope (Liu et al. 2021).

Final considerations

The main objective of this research was to evaluate the contributions of a hybrid model of parental training for mothers of preschool children with ASD based on ABA for parental stress reduction. It is concluded, after listening to the participants of the treatment group, that the training made an important contribution to their routines. It was also observed that in the practical session with the researcher, the participants were able to implement the techniques properly. These were qualitative results of the research, although it is not possible to affirm that the group that received training had a reduction in parental stress compared to the control group.

A parental training model under the principles of ABA can help raise awareness among parents of the ways in which they can assist the development of their children, give them effective ways to teach new skills or manage disruptive behavior, increase parents' knowledge, and minimize the impact of parental stress. It is recommended that this training be applied to other caregivers, to evaluate its effects on lowering parental stress. Parental training is a low-cost tool, and when carried out in the hybrid format, it becomes more accessible to families.

This study also presents some limitations; one is the small sample ($N = 8$), which significantly compromised the validity of the findings; another is that the mothers accompany their children in a specialized and private institution. Other variables that may have contributed to the comparison of pre/post-intervention stress were not investigated thoroughly, for example marital relationship, mother's mental health, the demands of having to care for other children, and the caregiver's perception of the child with ASD, among others. Another limitation we encountered was that the researcher had already had previous opportunities to work with the children who composed the sample, and present

instructional control with them, and this may have prompted the children to present the expected behavior during the practical in-person training. Also, the fact that children were already receiving intensive and regular interventions, at the center, based on ABA, was an intervening variable.

Given the above, it is suggested this research be replicated, taking into account the necessary changes related to the limitations presented, in order to obtain better results.

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A. R. E. has contributed in 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14; J.R.M.P. in 3, 6, 7, 8, 10, 12, 14.

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