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Mindfulness for adults with Autism Spectrum Disorder and Intellectual Disability:

A pilot study

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Abstract

The present study aims to examine the effects of the MindfulTEA program, an Mindfulness-based Interventions (MBIs) specifically designed for adults with Autism Spectrum Disorder (ASD) and Intellectual Disability, to reduce behavioural problems. MBIs are effective in improving well-being in people with high-functioning ASD, but little is known about the impact of the MBIs on people with ASD and intellectual disability associated. Fourteen adults (age 18 to 44) with ASD and intellectual disability participated in the program. Results showed a significant decrease in self-injurious and aggressive/destructive behaviours after the MBI. Stereotyped behaviour did not show significant change. Results suggest that the MindfulTEA program could effectively reduce some types of behaviour problems in people with ASD and intellectual disability. MBIs could be a useful alternative to traditional behaviour management interventions for reducing behaviour problems in this population.

Keywords: aggressive behaviours; autism spectrum disorder; intellectual disability; mindfulness-based interventions; self-injuries

Introduction

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) defines Autism Spectrum Disorder (ASD) as a neurodevelopmental condition which affects two central areas: social-communication and the quality of behaviour, interests, or activities (American Psychiatric Association, APA, 2013). Studies reflect a considerable increase of prevalence over the last twenty years, with estimates of one case of ASD for every 54 children (Maenner et al., 2020).

Among the population with ASD there are individuals with different functioning levels and extremely heterogeneous support needs. An important factor of this heterogeneity is the presence of associated conditions such intellectual disability or specific language impairment (SLI). From 50% to 70% of individuals with ASD present intellectual disability associated (Emerson and Baines, 2010; Fombonne, 2003) and between 25% and 45% do not develop oral language (Kobayashi et al., 1992; Tager-Flusberg et al., 2005).

ASD is commonly associated whit other disorders and conditions besides intellectual disability and SLI. Behaviour problems comprise aggression, destructive behaviours and self-injurious behaviours (Rojahn et al., 2012a; Zaidman-Zait et al., 2014; Dominick et al., 2007; Lundqvist, 2013; McClintock et al., 2003; Rojahn et al., 2010). These behaviour problems in individuals with ASD have a negative effect on academic inclusion, social relationships and quality of life (Chiang and Wineman, 2014; Matson et al., 2010; von der Embse et al., 2011; Yianni-Coudurier et al., 2008) and are seen to increase parental stress (Lecavalier et al., 2006; Nieto et al., 2017; Pozo et al., 2014).

Traditionally, different typologies of interventions have been applied with the aim of reducing behaviour problems in individuals with ASD. Programs framed in Applied Behaviour Analysis have been the interventions most extensively used (see Brosnan and Healy, 2011). Although these types of interventions have been shown useful in the reduction of behaviour issues, most of them solely include procedures to control the context by third parties and do not contemplate providing individuals with skills that allow them to regulate their own emotional state or manage the context by themselves. In addition, some of those interventions use techniques, like punishment, which may result aversive (Brosnan and Healy, 2011).

As a result of these perceived disadvantages in the traditional model, in the last decade there has been considerable interest in the study of the efficacy of mindfulness-based interventions (MBIs) relating to different aspects of performance of individuals with ASD. Mindfulness is defined as the ability to bring attention intentionally to the experience in the present moment with an attitude of non-judgment and acceptance (Kabat-Zinn, 1990). Recent literature suggests that MBIs may be effective to improve general performance of individuals with ASD, who after participating in a MBI have shown a reduction in physical and verbal aggression, anxiety, depression, somatization, rumination, distress, sleeping problems, socio-communicative difficulties, and an improvement in general quality of life, physical and emotional wellbeing, impulse control and attention processes (Ahemaitijiang et al., 2020; Beck et al., 2020; de Bruin et al., 2015; Conner and White, 2018; Hwang et al., 2015; Juliano et al., 2020; Kiep et al., 2015; Pagni et al., 2020; Ridderinkhof et al., 2018; Ridderinkhof et al., 2020; Salem-Guirgis et al., 2019; Singh et al., 2011a; Singh et al., 2011b; Singh et al., 2019; Sizoo and Kuiper, 2017; Spek et al., 2013).

To date, MBIs implemented with individuals with ASD may be split into two groups. The first group would be composed of MBIs and stand-alone mindfulness practices that have not been specifically designed to be implemented with individuals with ASD or with other neurodevelopmental disabilities, but have been adapted for individuals with ASD. This group would include the adaptations of the Mindfulness-Based Stress Reduction program (MBSR; Kabat-Zinn, 1990), the Mindfulness-Based Cognitive Therapy (MBCT; Teasdale et al., 2000), or the Surfing the Urge Meditation (Bowen et al., 2011; Beck et al., 2020; Conner and White, 2018; Juliano et al., 2020; Kiep et al., 2015; Pagni et al., 2020; Sizoo and Kuiper, 2017; Singh et al., 2019; Spek et al., 2013). Some of these adaptations consist in lowering sessions length and practices, reducing metaphors and ambiguous language, modifying psychoeducational content and eliminating those mindfulness practices which are more abstract and require more metacognitive skills (e.g., thought meditations) (Conner and White, 2018; Spek et al., 2013).

The second group would be composed of interventions that have been designed for individuals with ASD and other neurodevelopmental disabilities (e.g., Attention Deficit Hyperactivity Disorder, ADHD). In this group would be found the Mymind Program (de Bruin et al., 2015; Ridderinkhof et al., 2018) or Soles of the Feet Meditation (Singh et al., 2003). Methodology and content of these programs are more adapted to the specific characteristics and needs of the population with ASD. In this way, for example, they include repetitions of the practice, a short timetable with the practices with the aim of solving flexibility difficulties, and practices with sensory components such as sounds that are a common source of suffering for individuals with ASD (Ahemaitijiang et al., 2020; de Bruin et al., 2015; Hwang et al., 2015; Ridderinkhof et al., 2020; Salem-Guirgis et al., 2019; Singh et al., 2011a; Singh et al.,

2011b; Singh et al., 2019). However, an important aspect is that to our knowledge, individuals with ASD and intellectual disability associated (i.e., individuals who require very substantial support and with limited oral language) have more difficulties to access MBIs because neither MBIs adapted from general MBIs, nor MBIs specifically designed for individuals with ASD have been developed with specific adaptations for this group of people. The majority of studies that have examined the effectiveness of MBIs for individuals with ASD have been taken from population with high functioning ASD. Many studies establish the absence of intellectual disability (assessed by clinical judgment or standardized tests; IQ ≥ 85, IQ >70) as one of the inclusion criteria (Beck et al., 2020; Conner and White, 2018; Kiep et al., 2015; Pagni et al., 2020; Sizoo and Kuiper, 2017; Ridderinkhof et al., 2018; Ridderinkhof et al., 2020; Salem-Guirgis et al., 2019; Spek et al., 2013). Another study includes participants with ASD at borderline intellectual ability level (Singh et al., 2019). Another research group specifies that participants meet criteria of level 1 of severity according to DSM-5 (APA, 2013), which corresponds to individuals with high functioning ASD (Ahemaitijiang et al., 2020; Juliano et al., 2020; Singh et al., 2011b). Finally, another set of studies does not clarify the functioning level of all the participants in terms of the associated intellectual disability, the severity of disorder or other aspects such as language ability (Hwang et al., 2015; Singh et al., 2011a). However, in this last group some data could indicate that participants have high functioning level (e.g., participants of the study could complete self-reports; de Bruin et al., 2015). Thus, to our knowledge there is no research which has examined effectiveness of MBIs with individuals with ASD and intellectual disability associated. Furthermore, even though MBIs have shown benefits by decreasing behaviour problems of individuals with high functioning ASD, these results

could not be generalized to the population of individuals with ASD with intellectual disability associated.

The aim of the present study was to test the impact of an MBI on behaviour problems in a sample of adults with ASD and intellectual disability associated. For that purpose an MBI named *MindfulTEA Program* was specifically designed for these individuals. The hypothesis was that after participating in the program adults with ASD would show a decrease of behaviour problems.

Method

Participants

The sample was composed of 14 adults with an ASD diagnosis according to DSM-5 (APA, 2013). Age range was 18 to 44 years (13 male; M age = 24.53, SD = 7.17). All adults received support from institutions. Four inclusion criteria were established. The first criterion was an ASD diagnosis according to DSM-5 (APA, 2013). The second criterion was a medium-high severity grade of disorder according to The Childhood Autism Rating Scale (CARS; Schopler et al., 1980). CARS has shown be effective in detecting ASD in adults and allows classifying the severity of the disorder (Mesibov et al., 1989). Individuals with scores between 27 and 36.5 would present a moderate ASD and individuals with scores above 36.5 would present a severe ASD (Mesibov et al., 1989; Schopler et al., 1988). The third inclusion criterion was the presence of associated intellectual disability based on a previous diagnosis. As an additional measure of adaptive skills, adults were assessed using the Vineland Adaptive Behaviour Scales-Second Edition (VABS-II; Sparrow et al., 2005). The fourth criterion was displaying clinical behaviour problems. Support professionals completed the Behaviour Problems Inventory-Short Form (BPI-S; Rojahn et al., 2012a) for each participant. Taking into

account the cut-off established by Bowring et al. (2018) for each subscale of the BPI-S, it was considered that participants who had scores over the cut-off in one subscale displayed behaviour problems. All participants showed scores over the cut-off in at least one subscale. Therefore, before the MBI, 10 participants showed clinical Self-Injurious Behaviours (SIB, cut-off = 1.88), 9 participants showed clinical Aggressive/Destructive Behaviours (ADB, cut-off = 5.69) and 12 participants showed clinical Stereotyped Behaviours (SB, cut-off = 5.66). Regarding support status, 10 individuals attended a day care centre dedicated to individuals with ASD, 3 in a specific school for individuals with ASD and 1 in a support employment program. Table 1 shows sample characteristics and Table 2 shows participants characteristics.

Procedure

Institutions that specially care for individuals with ASD and their families were contacted and the participation in the study was offered. Once the institution agreed to participate, an informative session was carried out in which the aims and methodology of the MindfulTEA program were explained. Parents and legal tutors of potential participants were invited to the informative session. Parents and legal tutors of 40 adults with ASD were contacted. Informed consent and previous assessment were obtained for 18 adults after the informative session. Three of those 18 adults with ASD did not meet all the inclusion criteria. Of the 15 remaining participants taking part in the MBI, one completed less than 7 sessions of the program and consequently was not included in the final analysis. Figure 1 shows the flow of recruitment.

In order to assess the results of the program an intra-subject repeated measures design was carried out. Measures were collected one week before the MBI beginning

and immediately after intervention ending. Professionals who supported adults with ASD in their institutions performed the assessment.

Mindfulness-based intervention description

MindfulTEA program (TEA is the Spanish synonymous for ASD) is an MBI designed specifically for people with ASD. The program was designed by the Spanish Federation of Autism (FESPAU) and six MBI instructors. With the aim of creating a specific MBI for people with ASD and intellectual disabilities, FESPAU contacted with different Mindfulness experts from different locations. To generate the program, FESPAU professionals, who are experts in intervention models for people with ASD, and MBI instructors held systematic meetings. In these meetings, the professionals generated the content of the sessions and their methodology collaboratively. Subsequently, an ASD expert generated the visual aids. MindfulTEA program consists of eight group sessions, a 45-minute session per week. MBI developed by Singh et al. (2011a) consisted in five consecutive sessions and follow-up sessions, while Mymind Program implemented by de Bruin et al. (2015) consisted in eight sessions and one consolidation session. It was decided to develop a program close to Mymind, but reducing the duration of the sessions to maintain the attention of the participants. The main goal of the program is to help individuals with ASD to improve attention regulation and awareness of external stimuli and to own body inputs, increasing tolerance to them, and reducing emotion and behaviour reactivity when they appear. Content, structure and methodological adaptations of the MindfulTEA program have been specifically designed with the aim of being accessible to individuals with ASD and intellectual disability associated. Content and structure of the program and methodological adaptations are described below.

Regarding content and structure, the program is developed through different practices divided in three groups, 1) breathing attention and awareness practices, 2) external stimuli attention and awareness practices (visual and auditory stimuli), 3) other proprioceptive stimuli attention and awareness practices. The program begins performing breathing attention and awareness through different practices which are repeated along the program. Breathing attention and awareness is a basis for subsequent practices and once consolidated, a greater number of external stimuli attention and awareness practices are introduced. Because individuals with ASD may have difficulties with information which arises from their own bodies (Blanche et al., 2012), practices centred on attention and awareness to proprioceptive sensations are introduced as of the fourth session. With the aim of reducing verbal, attentional and cognitive demands, all sessions apply an experiential methodology without an explicit psychoeducational component. Table 3 shows a summary of the specific goals, main practices and sequence for each session.

The MindfulTEA program proposes methodological adaptations designed to respond to the specific needs of individuals with ASD and intellectual disability associated. The main adaptations are detailed following. The first adaptation concerns difficulties in anticipating and organising activities, issues prevalent in individuals with ASD and especially significant in individuals with intellectual disability associated (Russell, 1997). For this reason, the MindfulTEA program introduces external tools to structure time and activity. With the same goal, in other programs implemented with individuals with ASD, timetables with practices are made at the beginning of the session (de Bruin et al., 2015; Ridderinkhof et al., 2018). However a significant difference in the MindfulTEA program is that structural adaptations are deeper. Following Treatment and Education of Autistic and related Communications

Handicapped Children guidelines (TEACCH; Mesibov et al., 2005), all sessions are developed according to the same design: placing the same activities at the beginning of all sessions and the same activities at the end of all sessions, and introducing new activities in the middle. In order to structure each session and practice, specific visual supports were developed so that individuals with ASD can anticipate de progress of the full session and the specific practice.

Another difference and key point in relation to the adaptations made for previous programs is that verbal burden has been reduced in order to diminish the effects of oral language understanding difficulties. In this way, instructions of the practices are given with simple sentences and always associated with visual support.

In the third place, practices are short and repeated along different sessions to accommodate the cognitive and attentional skills of people with ASD and intellectual disability associated and encourage learning. In addition, each practice is associated with an easily recognizable specific item (e.g., "the Boat", "the Kerchief") in such a way as to facilitate later generalisation in another context. The aim of this adaptation is that, after learning, the associated item may evoke the whole practice, so that when another person indicates to the participant the name of the practice (e. g "the Boat"), he or she could perform it without more guidance. Furthermore, the item is tangible, providing evident feedback and reducing imagination requirement. For example, in breathing attention and awareness practices, a real candle and a real kerchief is used to allow the person to observe the direct effect of his or her breathing. In the same way, to accommodate the metacognition difficulties in people with ASD and intellectual disability associated (Grainger et al., 2016), thought attention and observation practices are not included.

Finally, the MindfulTEA program contains sensory and motor-based adaptations to respond to sensory atypicalities presented in individuals with ASD (Baranek, 2002), taking especially into account difficulties in proximal stimulation since they are the most prominent atypicalities (Leekam et al., 2007). At the beginning of each session a deep touch practice is carried out (i.e. self-massage practice) to diminish participant's activation and help the following practices development. Also, sensory features have been included in the practices to amplify proprioceptive input (e.g., in diaphragmatic breathing practices, a heavy puppet is placed on the participant´s stomach to amplify the sensations of the area and facilitate attention on it). Table 4 shows the methodological adaptations.

In the present study, the facilitators of the MindfulTEA program were professional's mindfulness instructors who collaborated in the design. Each group of participants was led by a single Mindfulness instructor. Specifically, facilitators had been trained previously in one of the following programs: MBSR (Kabat-Zinn, 1990), MBCT (Teasdale et al., 2000), or Mindful Self-Compassion Program (MSC; Neff and Germer, 2013) which were a requirement to guide the program. During the MindfulTEA program implementation, facilitators were accompanied by professional experts in ASD who were the usual support of the participants in the centres where the program was carried out. Each professional accompanied one or two participants. For each practice, the MindfulTEA program facilitator modelled the practice and helped participants to perform it. Professional experts in ASD provided additional support to attend to the practice of those participants who required extra aid. No specific recommendations were made for the practice between sessions, leaving the judgment of each participant's support whether or not to continue the practice.

Measures

Behaviour Problems Inventory-Short Form BPI-S; Rojahn et al., 2012a). Participants´ behaviour problems were measured with the Behaviour Problems Inventory-Short Form (BPI-S; Rojahn et al., 2012a). Support professionals of adults with ASD and intellectual disability associated indicated behaviour problems before and after intervention. BPI-S has been widely used in the assessment of behaviour problems in the population with ASD and intellectual disability. BPI-S is composed of 30 items which provide information about three types of challenging behaviour through three subscales: Self-injurious Behaviour (8 items), Aggressive/Destructive Behaviour (10 items) and Stereotyped Behaviour (12 items). Self-injurious Behaviour (SIB) subscale and Aggressive/Destructive Behaviour (ADB) subscale measure frequency (from 0= never to 4= hourly) and severity (from 1= mild to 3= severe) of behaviour, whereas Stereotyped Behaviour (SBD) subscale just measures behaviour frequency. BPI-S has shown good psychometric properties (Mascitelli et al., 2015; Rojahn et al., 2012b; Bowring et al., 2018).

Ethical considerations

The study was approved by the ethics committee of FESPAU. All procedures performed in the study were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Data Analyses

Data were analysed using IBM SPSS Statistics (version 22). In order to examine program effectiveness, a pre-post mean comparison was carried out for the three subscales: SIB, ADB and SBD. Due to sample size, the effectiveness of MBI was

examined with the non-parametric Wilcoxon signed-rank test, and effect size

Rosenthal´s r (Rosenthal, 1991) for non-parametric test was calculated too, considering

≤0.10 small effect size, ≈0.30 moderate effect size and ≥0.50 large effect size (Cohen,

1988; Lipsey and Wilson, 2001).

Two consecutive analyses were carried out. In the first place, an analysis using

the whole sample (N=14) for each subscale was performed separately. In the second

place, an analysis using only the clinical sample for each subscale was carried out. For

this second analysis participants were split into two groups for each variable according

to if they met clinical criteria of SIB, ADB and SB or not. In this way, for each of three

subscales it was a group of participants with clinically significant scores before the MBI

and another group of participants with clinically non-significant scores before the MBI.

The setting of those groups was determined by the cut-off established by Bowring et al.

(2018) for each subscale, in such a way that participants who had scores over the cut-off

in one subscale conformed the clinical group of that subscale. Therefore, before the

MBI, 10 participants showed scores over the clinical cut-off in the SIB subscale, 9

participants showed scores over the clinical cut-off in the ADB subscale and 12

participants showed scores over the clinical cut-off in the SB subscale.

Results

The first analyses performed with the whole sample (N=14) did not show

significant changes in the variables analyzed (SIB: Z= -1.605, *p*= .108; ADB: Z= -

1.497, *p*= .134; SB: Z= -.566, *p*= .571). However, changes were observed in the second

analyses, were only adults with scores over the cut-off in each subscale were included.

Participants with clinical scores in SIB subscale before the MBI, showed a statistically

significant reduction of their scores (Z = -1. 97, *p*= .049) after the MindfulTEA

program, and participants with clinical scores in ADB subscale before the intervention, showed a decreasing tendency near to the significant statistical threshold (Z= -1.895, p= .058) after the MBI. Effect sizes were moderate to large in both cases (SIB, r= -.44; ADB, r= -.45). The decrease in SB subscale scores was not statistically significant (Z= -1.102, p= .27) and effect size was small (SB: r= -.22). Table 5 shows Wilcoxon signed-rank test for the whole sample. Table 6 shows clinical sample size for each variable, CARS and VABS-II means for each clinical group and results of Wilcoxon signed-rank tests and effect sizes associated.

Discussion

This study examined the effectiveness of an MBI named MindfulTEA program in reducing behaviour problems in adults with ASD and intellectual disability associated: individuals with substantial support needs and limited oral language. Results showed a statistically significant reduction in Self-injurious Behaviour and a decreasing tendency, near the significant statistical threshold, in Aggressive/Destructive Behaviour in those participants who had scored over the clinical cut-off in those measures before the MBI. Effect sizes were moderate to large. Stereotyped Behaviour did not experiment significant changes.

   To our knowledge, this is the first study which approaches and finds positive results in behaviour problems reduction in people with ASD and intellectual disability after an MBI. In the ASD field, MBIs have demonstrated promising results decreasing behaviour problems in population with high functioning ASD. However, the necessary functioning profile of individuals with ASD to implement these programs had not yet been explored (Singh et al., 2011a). Positive result findings in this study, with an adapted MBI to population with ASD and intellectual disability needs, suggest that

intervention was feasible and that adaptations included might contribute to promote program effectiveness. The design, application and research of a specific MBI with the aim of reducing behaviour problems in these individuals is especially relevant considering two aspects. The first is that this population represents a significant percentage of total population with ASD (Emerson and Baines, 2010; Fombonne, 2003; Kobayashi et al., 1992; Tager-Flusberg et al., 2005). The second is that behaviour problems have an important impact on multiple levels on the quality of life of people with ASD and their families (Chiang and Wineman, 2014; Lecavalier et al., 2006; Matson et al., 2010; Nieto et al., 2017; Pozo et al., 2014; von der Embse et al., 2011).

Generating and adapting MBIs for people with ASD who require very substantial support implies a qualitative difference in the way that behaviour problems are addressed in this population. In this respect, a change is generated from the external stimuli and contingencies management by others (in the way that traditional ABA based models contemplated) to the awareness, acceptation and regulation of internal stimuli that are the bases of MBI. Both perspectives may not be exclusive.

The application of MBIs to the population with ASD and intellectual disability allows exploring the mechanisms of action of the MBIs. Challenging behaviour in people with ASD has been related to the presence of anxiety (Cervantes et al., 2013; Moskowitz et al., 2017), which may affect up to 77% of individuals with ASD (Hollocks et al., 2019; Mazefsky et al., 2008). Problem behaviour and anxiety have been related likewise to difficulties in emotional regulation (ER) mechanisms of people with ASD (Berkovits et al., 2017; Mazefsky et al., 2013). ER refers to the process of modulation of different features of emotional experience, and includes physiological, cognitive and behavioural elements (Chambers et al., 2009). MBIs have shown effectiveness in improving the ER mechanisms in the population with high functioning

ASD (Conner and White, 2018; Salem-Guirgis et al., 2019). However, when analysing ER and MBIs in individuals with ASD and intellectual disability, perhaps special attention should be paid to physiological features related to bodily sensation instead of cognitive elements. In this way, it is shown that MBIs and mindfulness practices influences attention, modulation, perception and response mechanism to interoceptive, proprioceptive and visceral stimuli (Farb et al., 2015; Haase et al., 2016; Luders et al., 2009). For example, it seems that increasing attention to bodily sensations before an emotional event provokes an emotional reactivity damping when it appears (Lutz et al., 2014). The MindfulTEA program includes different bodily sensations attention and awareness practices on a repetitive bases. It is possible that these practices might contribute to improve ER mechanisms in this population through improving attention and awareness to interoceptive and proprioceptive stimuli.

Another key factor in ER is executive control which is also a central element in ASD (Russell, 1997). In the population with high functioning ASD, MBIs have improved executive control (Conner and White, 2018; Ridderinkhof et al., 2018). Practices and methodological adaptations of MindfulTEA program provide necessary aids to facilitate participants focus attention by inhibiting irrelevant stimuli, sustain attention and monitor interoceptive and behavioural response; all of which are components of executive control (Anderson 2008). Therefore, the program may be effective in aggressive- destructive behaviour and self-injurious behaviour reduction through improvements in executive control mechanisms.

Finally, it should be noted that the program did not generate changes in Stereotyped Behaviour subscale. It is possible that underlying mechanisms of aggressive-destructive behaviour and self-injurious behaviour were qualitatively different to those of stereotyped behaviour. In this way, recent studies have shown that

stereotyped behaviour is not related to anxiety in individuals with ASD (see Nieto and Huertas, 2020). It is necessary to continue exploring underlying mechanisms of each type of behaviour (aggressive-destructive behaviour, self-injurious behaviour and stereotyped behaviour) with the aim of refining appropriate interventions for each case.

We are required to invest in efforts in improving the emotional wellbeing of people with ASD who have more support needs, even though the methodological challenge and the possibility of controlling and measuring variables are more complex in this population. The design and application of MBIs for individuals with ASD and intellectual disability implies the challenge of adapting in a significant manner both the content of the program and the format of the practice. These adaptations should be developed taking into account a performance (cognitive and metacognitive, executive, socio-communicative and sensory) which is qualitatively different in this population. However, it supposes a qualitative change in the way of approaching problem behaviour in this population and implies endowing people with ASD with more self-regulation skills to manage their own emotions and internal sensations with the aim of improving their wellbeing and doing so in a respectful and kind context.

Limitations and Future Research Directions

This pilot study presents limitations. The first limitation is the absence of a control group which does not allow attributing unequivocally the results to the MBI effect. Future research should include an active control group in the study design which would enable the analysis of the effects attributable to the program and the effects attributable to other factors. A second limitation is the sample size. The small simple size renders the results not generalizable. Studies with larger sample size are needed in order to generalise the MBI findings. A third limitation is related to the implementing

measures of the program. Although the session attendance was controlled, practice between them was not. Future research should contemplate additional measures of daily practice and their effects on the program.

Additionally, future studies may include other strategies which contribute to a more complete view of the program and its effects. An in-depth assessment of the sensory atypicalities would allow us to observe the specific effects of these features in practice and in the outcomes. On the other hand, incorporating follow up measures would allow us to observe findings evolution and to make improvements in the program and to observe possible long-term effects. Finally, it would be useful to include observation measures which enable assessment of behaviour problems without the subjectivity of third-party reports. Equally, it would be suitable to include wellbeing measures to observe the effect of the program further behaviour problem.

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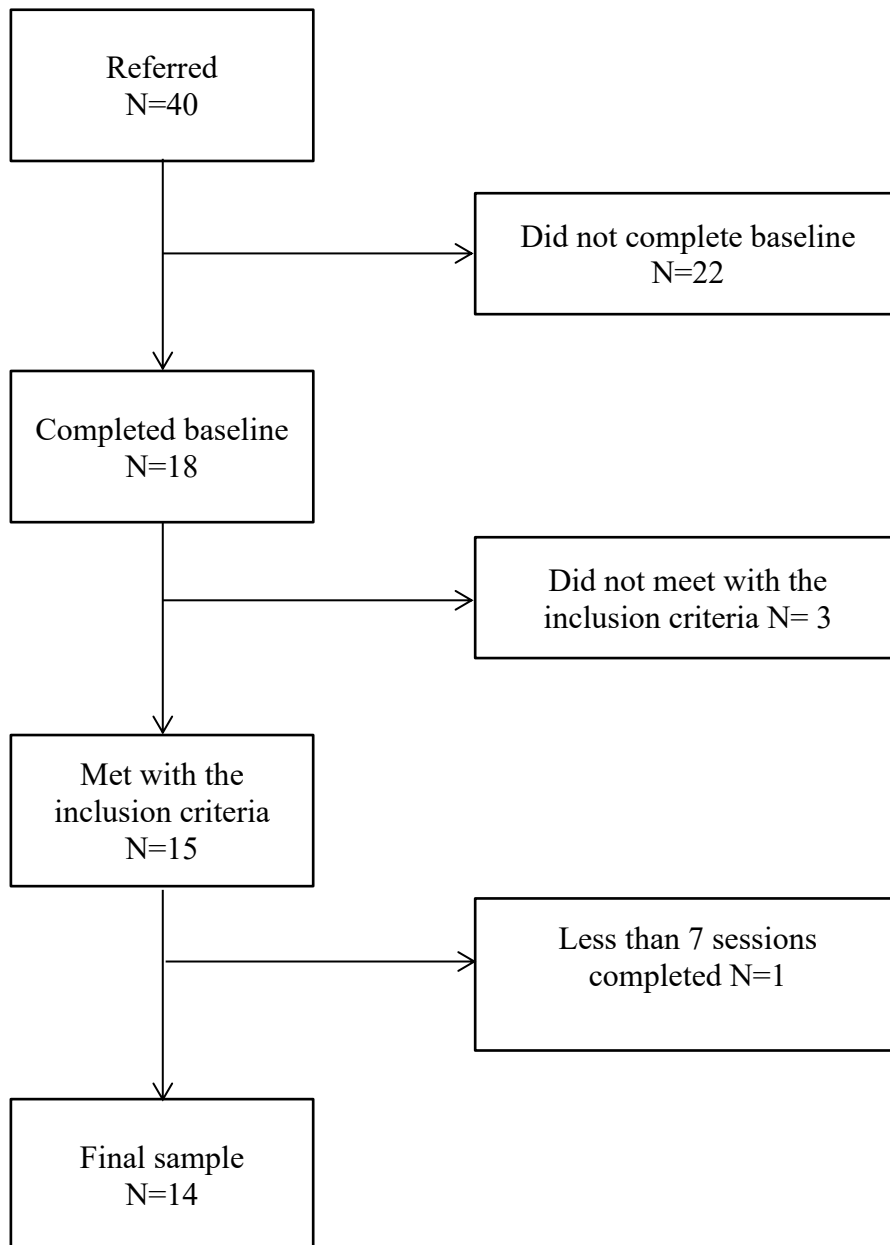**Figure 1**.

Flowchart of recruitment.

Table 1

Characteristics of participants

	Adults with ASD (N=14)
Gender	
Male	13
Female	1
Age *M (SD)*	24.21 (7.53)
Range	18-44
Psychotropic medication use (%yes)	12 (70.6)
Education type	
Special Education School (%)	3 (21.4%)
Day-care centre for adults with ASD (%)	10 (71.5%)
Supported Employment (%)	1 (7.1%)
CARS *M (SD)*	38.46 (6.69)
Range	30-52
VABS II	
Communication Range, *M (SD)*	21-57, 32.07 (12.21)
Daily Living Skills Range, *M (SD)*	21-65, 34.64 (13.98)
Socialization Range, *M (SD)*	20-40, 27.36 (8.33)
Adaptive Behaviour Composite, Range *M (SD)*	20-50, 29.50 (10.78)
BPI-S	
Clinical SIB	10
Clinical ADB	9
Clinical SB	12

Note. M Mean, *SD,* Standard Deviation, *CARS*, Childhood Autism Rating Scale; *VABS-II*, Vineland Adaptive Behaviour Scales-II Standard Score, *BPI-S*, Behaviour Problems Inventory-Short Form

Table 2.

MBI MindfulTEA Program

Session	Objectives	Core Practices and Sequence
1	Introduce the program, Introduce the facilitator , Attention regulation, Finding the breathing anchor, Awareness trough the senses	Self-massage , The Boat (Breathing), The Candle (Breathing), The Kerchief (Breathing), The Gong (External stimuli), The Boat (Breathing)
2	Attention regulation, Finding the breathing anchor, Awareness trough the senses	Self-massage , The Boat (Breathing), The Candle (Breathing), The Kerchief (Breathing), The Gong (External stimuli), The Boat (Breathing)
3	Attention regulation, Finding the breathing anchor, Awareness trough the senses	Self-massage, The Boat (Breathing), The Candle (Breathing), The Kerchief (Breathing), The Gong/ What is missing?(External stimuli), The Boat (Breathing)
4	Attention regulation, Awareness trough the senses, Body Awareness, Noticing the reactivity, Self-regulation	Self-massage, The Candle (Breathing), The Kerchief (Breathing), The animals: Turtle and Giraffe (Proprioceptive Stimuli), The Gong/ What is missing?(External Stimuli), The Boat (Breathing)
5	Attention regulation, Awareness trough the senses, Body Awareness, Noticing the reactivity, Self-regulation	Self-massage, The Candle (Breathing), The kerchief (Breathing), The animals: turtle. (Proprioceptive Stimuli), The Ladybug (External Stimuli), The Butterfly (Proprioceptive Stimuli), The Boat (Breathing)
6	Attention regulation, Awareness trough the senses, Body Awareness, Noticing the reactivity, Self-regulation	Self-massage, The Candle (Breathing), The Kerchief (Breathing), The Feet (Proprioceptive Stimuli), The Ladybug (External Stimuli), The Butterfly (Proprioceptive Stimuli), The Starfish (Proprioceptive Stimuli), The Boat (Breathing)
7	Attention regulation, Awareness trough the senses, Body Awareness, Noticing the reactivity, Self-regulation	Self-massage, The Candle (Breathing), The Kerchief (Breathing), The Feet (Proprioceptive Stimuli), The Butterfly (Proprioceptive Stimuli), The Starfish (Proprioceptive Stimuli), The Crown (External Stimuli), The Boat (Breathing)
8	Attention regulation, Awareness trough the senses, Body Awareness, Noticing the reactivity, Self-regulation, Evaluation	Self-massage, The Candle (Breathing), The Kerchief (Breathing), The Starfish (Proprioceptive Stimuli), The Crown (External Stimuli), I like or I don´t like it, The Boat (Breathing)

Table 3.

Methodological adaptations of the program

Specific performance in ASD	Adaptation
Difficulties in anticipating and organising activities	Specific visual support to structure and anticipate each session. Specific visual support to structure and anticipate each practice. Same beginning and ending in all sessions.
Oral language understanding difficulties.	Visual support. Instructions given with simple sentences.
Cognitive and metacognitive difficulties.	Short practices. Repeated practices along the sessions. Practices associated with specific items Tangible items for feedback. Thought attention and observation practices not included.
Sensory atypicalities	Deep touch practices at the beginning. Sensory features to amplify proprioceptive input.

Table 4.

Pre-test and post-test BPI-S scales comparison with whole sample for each subscale. Wilcoxon signed rank test.

	n	Pre- Intervention		Post- Intervention		Z	*p*
		M	SD	M	SD		
SIB	14	6	6,97	3,64	3,365	-1,605	,108
ADB	14	12,21	14,82	7,87	10,167	-1,497	,134
SB	14	17,21	9,28	16,93	11,03	-,566	,571

Note. SIB Self Injurious Behaviour, *ADB* Aggressive Destructive Behaviour , *SB* Stereotyped Behaviour, *n* number of people in clinical range for each scale, *M* mean, *SD* Standard Deviation, *Z* Wilcoxon signed-rank test statistic. * Significance at *p* < .05

Table 5.

Pre-test and post-test BPI-S scales comparison with clinical sample for each
subscale. Wilcoxon signed rank test.

	n	Pre- Intervention		Post- Intervention		Z	*p*	*r*
		M	SD	M	SD			
SIB	10	8.4	6.91	4.8	3.22	-1.97*	0.049	-0.44
ADB	9	18.33	15.39	10.56	11.66	-1.895	0.058	-0.44
SB	12	19.75	7.21	17.58	10.69	-1.102	0.271	-0.22

Note. SIB Self Injurious Behaviour, *ADB* Aggressive Destructive Behaviour , *SB*
Stereotyped Behaviour, *n* number of people in clinical range for each scale, *M*
mean, *SD* Standard Deviation, *Z* Wilcoxon signed-rank test statistic, *r* Rosenthal
statistic for effect size,
* Significance at $p < .05$