

Mindfulness-based stress reduction in adolescents with mental disorders: A randomised clinical trial

M^a Carmen Díaz-González¹, Carolina Pérez Dueñas^{2,3}, Araceli Sánchez-Raya^{2,3}, Juan Antonio Moriana Elvira^{2,3} and Vicente Sánchez Vázquez²

¹ Hospital Infanta Margarita de Cabra (Córdoba), ² Hospital Universitario Reina Sofía de Córdoba (España), and ³ Universidad de Córdoba

Abstract

Background: Currently, there is a strong movement to implement mindfulness interventions with young people. The objective of this randomised clinical trial was to assess the potential effects of a mindfulness-based stress reduction (MBSR) programme for adolescent outpatients in mental health facilities in Cordoba, Spain. **Method:** A total of 101 adolescents aged 13-16 years old, receiving psychological or psychiatric treatment for various disorders, were eligible for the study. The participants' scores on mindfulness, self-esteem, perceived stress, state-trait anxiety and other psychological symptoms were examined at two time-points. Eighty adolescents completed the study (MBSR+TAU group = 41; TAU group = 39). **Results:** The MBSR+TAU group showed a statistically significant decrease in anxiety state compared to the treatment-as-usual (TAU) group. No statistically significant differences were found between groups on the other scores, but the intervention was observed to have a greater impact on the MBSR+TAU group than in the TAU group, especially in reducing symptoms of depression, anxiety, paranoia and perceived stress. **Conclusion:** These results suggest that MBSR may be a useful adjunct treatment for adolescents in mental health facilities.

Keywords: Mindfulness-based stress reduction, mindfulness, adolescents, mental disorders.

Resumen

Reducción del estrés basada en mindfulness en adolescentes con trastornos mentales: un ensayo clínico aleatorio. Antecedentes: actualmente, existe un fuerte movimiento respecto a la implantación de las intervenciones de mindfulness con adolescentes. El objetivo de este ensayo clínico fue evaluar el efecto potencial de un programa de reducción del estrés basado en la atención plena (MBSR) para pacientes ambulatorios adolescentes en los servicios de salud mental de Córdoba, España. **Método:** un total de 101 adolescentes (13-16 años) con trastornos heterogéneos que recibían tratamiento psicológico o psiquiátrico fueron seleccionados para participar en el estudio. Las puntuaciones de los participantes en mindfulness, autoestima, estrés percibido, ansiedad-rasgo y otros síntomas psicológicos fueron evaluados en dos momentos. Ochenta adolescentes completaron el estudio (grupo-MBSR+TAU = 41, grupo-TAU = 39). **Resultados:** el grupo MBSR+TAU muestra una disminución estadísticamente significativa en ansiedad-estado comparado con el grupo de tratamiento habitual (grupo-TAU). No hay diferencias estadísticamente significativas entre los grupos en el resto de puntuaciones, pero hemos encontrado un mayor impacto de la intervención en el grupo MBSR+TAU que en el grupo TAU, especialmente en la reducción de los síntomas de depresión, ansiedad, paranoia y estrés percibido. **Conclusión:** estos resultados sugieren que MBSR puede ser un tratamiento complementario útil para los adolescentes en los servicios de salud mental.

Palabras clave: reducción de estrés basado en atención plena, mindfulness, adolescentes, trastornos mentales.

Teenagers are subjected to intense stress in various domains, including academic problems or problems related to social relationships, body image and the onset of sexual intercourse, among others, which may lead to psychological disorders. The World Health Organisation (WHO, 2001) reported that between 10% and 20% of adolescents suffer from mental health problems. Mental disorders are currently on the rise among children and adolescents. It has been reported that 13%-20% of children

living in the United States experience a mental disorder in a given year, and surveillance during 1994-2011 has indicated that the prevalence of these conditions is increasing, with the total annual cost of these disorders estimated to be \$247 billion. (US Department of Health and Human Services and Centers for Disease Control and Prevention, 2013). Regarding European countries, there are significant differences in prevalence estimates. The Belgium Health Interview Survey of 2004 found that 15.0% of respondents aged 15-24 reported having sleep disorders, 5.5% anxiety disorders and 4.8% depressive disorders. In the state of Baden-Württemberg, Germany, the prevalence rates for different adolescent mental disorders were 4% for anxiety disorders, 2.3% for affective disorders, 8.6% for conduct disorder and 1.7% for attention-deficit/hyperactivity disorder (Braddick, Carral, Jenkins, & Jané-Llopis, 2009).

The early detection of mental disorders during adolescence, together with the use of evidence-based psychological treatments, is therefore of importance. To determine the effectiveness of potential psychological treatments, methodologically rigorous research is needed. Interventions based on mindfulness (MBIs) are beginning to show promise as treatments for various diseases in adolescents, including ADHD (Zylowska et al., 2007), anxiety disorders (Greco, Blackledge, Coyne, & Ehrenreich, 2005), mixed externalising disorders (Bogels, Hoogstad, van Dun, De Schutter, & Restifo, 2008), behavioural disorders (Singh et al., 2007) and eating disorders (Greco, Barnett, Blomquist, & Gevers, 2008). More specifically, studies on mindfulness-based stress reduction (MBSR) in adolescence have yielded encouraging results in a wide range of fields, among them academia (Edwards, Adams, Waldo, Hadfield, & Biegel, 2014), adolescents in foster care (Jee et al., 2015), chronic pain (Jastrowski Mano et al., 2013), paediatric care (Sibinga, Perry-Parrish, Thorpe, Mika, & Ellen, 2014), heart disease (Freedenberg, Thomas, & Friedmann, 2014) and various mental disorders (Biegel, Brown, Shapiro, & Schubert, 2009).

The aim of this study was to contribute to the research on the use of MBIs in adolescents with psychological disorders. We explored the effects of MBSR in adolescents attending mental health centres in the province of Cordoba, Spain. We evaluated the effect of a MBSR intervention on several variables: mindfulness, self-esteem, perceived stress, anxiety and psychological symptoms in general. Based on previous studies on the use of MBSR in adolescents (Biegel et al., 2009; Edwards et al., 2014), we hypothesised that the MBSR+TAU group would show a larger increase in mindfulness and self-esteem and a larger decrease in psychological symptoms and stress compared to the TAU group.

Method

Participants

A total of 101 adolescents participated in the study. The participants were randomly assigned to the MBSR+TAU group ($n = 51$) or the TAU group ($n = 50$). Eighty adolescents completed the treatment (MBSR+TAU: $n = 41$; TAU: $n = 39$). The adolescents were considered to have completed treatment if they attended at least 75% of the sessions (i.e. 6 of the 8 sessions held). The reasons for dropping out of the study were: incompatibility with other activities performed (MBSR +TAU = 4; TAU = 3), transport difficulties (MBSR+TAU = 0; TAU = 2), disinterest (MBSR+TAU = 1; TAU = 4) and discomfort with the group intervention (MBSR+TAU = 4; TAU = 0); three other participants dropped out of the study without explanation (MBSR+TAU = 1; TAU = 2). The size of the group in the MBSR+TAU intervention ranged from 12 to 13 participants.

The final sample therefore consisted of 80 adolescents, with a majority of girls (boys: $n = 36$, 45%; girls: $n = 44$, 55%). The age of the participants ranged from 13 to 16 years. The mean age of the MBSR+TAU group was 14.61 years ($SD = 1.09$) and the mean age of the TAU group was 14.49 years ($SD = 1.12$).

The inclusion criteria were having received mental health services in the province of Cordoba and age between 13 and 16 years. Exclusion criteria were having a neurological or psychiatric disorder that might interfere with participation (for example severe brain injuries, significant cognitive impairment, mental retardation, autism spectrum disorders, psychotic disorders, current suicidal ideation) and current drug or alcohol misuse or dependence.

Instruments

The Spanish version of the following questionnaires and scales were administered to all participants at baseline and after eight weeks of the assigned treatment.

The Mindful Attention Awareness Scale for Adolescents (MAAS-A; Brown, West, Loverich, & Biegel, 2011). The MAAS-A assesses attention to and awareness of what is occurring in the present moment. The scale consists of 14 items measured on a six-point scale ranging from 1 (almost always) and 6 (almost never). Higher scores indicate greater mindfulness. Cronbach's alpha coefficient for the scale is 0.88.

The Rosenberg Self-Esteem Scale (SES; Rosenberg, 1965). Self-esteem is defined as feelings of self-worth and self-respect. The scale consists of 10 items, half of which are worded positively and half of which are worded negatively. The items are answered using a four-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Higher scores indicate higher self-esteem. The internal consistency of the scale (using Cronbach's alpha) was 0.92.

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). This instrument assesses the degree to which situations in life during the last month are appraised as stressful. The scale consists of 10 items measured on a five-point scale ranging from 0 (never) to 4 (very often). Higher scores indicate high perceived stress. Cronbach's alpha for the PSS is 0.74.

The State-Trait Anxiety Inventory for Children (STAI-C; Spielberger, 1973). The STAI-C evaluates state anxiety (how anxious the respondent feels at a given time; 20 items) and trait anxiety (how anxious the respondent feels in general; 20 items). The inventory uses a three-choice format (state anxiety: not at all, a bit, a lot; trait anxiety: almost never, sometimes, often) and is suitable for children aged from 9 to 15 years. The KR-20 Kuder-Richardson coefficients range from 0.82 to 0.87 for state anxiety and from 0.78 to 0.81 for trait anxiety.

The State-Trait Anxiety Inventory (STAI; Spielberger, 1983). This inventory was used to assess anxiety in 16-year-old participants. It consists of 20 items to measure state anxiety, to which responses are given on a four-point scale ranging from 0 (not at all) to 3 (very much so) and 20 items assessing trait anxiety, to which responses are given on a four-point scale ranging from 0 (almost never) to 3 (almost always). High scores indicate high anxiety. Cronbach's alpha is 0.92 for state anxiety and 0.94 for trait anxiety.

The Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1994). This questionnaire assesses patterns of symptoms. It comprises 90 multiple-choice items with five response options ranging from 0 (not at all) to 4 (very or extremely) and is suitable for individuals aged 13 years and older. It evaluates nine primary psychopathology dimensions (somatisation, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism), as well as and three global indices of psychological distress (the global severity index, the total positive symptoms and the positive distress symptom index). High scores indicate greater psychopathology. Cronbach's alpha coefficients range from 0.77 to 0.90.

Procedure

Adolescent users of the mental health services of Córdoba, Spain, were recruited in four waves from 2014 to 2016. Participation in the study was completely voluntary and there was no financial incentive

for participation. Both the adolescents and their parents were informed about the study by their psychologists or psychiatrists, including arrangements for confidentiality and safeguarding of all identifying information. They were told they could withdraw from the study at any time. The participants were randomly assigned to the MBSR+TAU group or the TAU group. The group assignment was blinded to the participants but not to the researchers during the study. The study was approved by the Cordoba Research Ethics Committee and was conducted in accordance with the fundamental principles set out in the Declaration of Helsinki (1964).

MBSR+TAU intervention

This group received the MBSR intervention in addition to standard therapy (TAU). The MBSR programme had the same structure and content as the original MBSR programme (Kabat-Zinn, 1990), but was adapted for adolescents along the same lines as the MBSR-T programme (Biegel, Chang, Garrett, & Edwards, 2014). The MBSR intervention consisted of eight 90-minute weekly sessions. No day retreat was held. The sessions covered issues affecting adolescents. The duration of formal practice sessions was reduced from 45 minutes to 10-20 minutes to take into account the shorter attention span of adolescents. Participants were also asked to perform brief practice sessions at home. The groups were led by two instructors trained and experienced in delivering MBSR interventions, who practised meditation regularly.

The intervention consisted of formal practice that took place in the group sessions and informal practice at home. The exercises suggested by Biegel (2009) were used. Formal practice sessions consisted of sitting or moving meditation, body-scan and hatha yoga exercises. Participants were encouraged to engage in different mindfulness practices at home for about 25 or 30 minutes a day and were given some CD recordings to help them with the exercises and worksheets to record their experience.

Treatment-at-usual intervention

TAU encompassed individual, group psychotherapy and pharmacological treatment from the various mental health services attending to adolescents from the province of Córdoba. The duration of TAU is heterogeneous, according with usual clinical care at the site.

Data analysis

This study used a 2 (Treatment Group: MBSR+TAU; TAU) by 2 (Time: baseline; post-treatment) mixed design with group as a between-subjects variable and time as a within-subjects factor. The experimental group received the MBSR intervention as an adjunct to standard treatment. The TAU group received standard treatment at mental health centres. In the MBSR+TAU group, the baseline assessment was carried out before the first session of the MBSR programme and the post-treatment assessment was carried out eight weeks later, immediately after completion of the programme. In the TAU group, the baseline assessment was carried out in the first session and the post-treatment assessment was also carried out eight weeks apart.

SPSS 20.0 for Windows was used. To compare the effects of the MBSR+TAU and TAU interventions on mental health outcomes, we used the general linear model (GLM) approach to

analyse data from participants who completed the intervention period. All continuous predictor variables were centred before the GLM analyses. We checked the homogeneity of variance in all the GLM analyses and the Huynh-Feldt epsilon correction was applied where necessary. Each dependent variable post-treatment was analyzed with ANCOVA with Treatment group (MBSR+TAU vs. TAU) as categorical factor and pre-treatment values of each dependent variable as covariate. The clinical significance of observed changes was valued using effect size estimates (Cohen's *d*).

Results

The demographic characteristics and diagnoses of the adolescents are described in Table 1. The clinical diagnoses are based on the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10). We analysed diagnoses in terms of eight specific categories of disorders: adjustment disorders, anxiety disorders, behaviour disorders, depression, other emotional and behaviour disorders with onset usually occurring in childhood or adolescence, eating disorders, attention deficit disorder and hyperactivity and other disorders (personality traits, tic disorder, dissociative disorder and unspecified mental disorder). As can be seen in Table 1, the TAU and MBSR+TAU groups had similar diagnostic profiles. Table 2 shows the psychological treatments and pharmacological treatments the participants received during the intervention period. All participants received individual psychological treatment during the intervention period and there were no group differences regarding receipt of group treatment or pharmacological treatment.

Table 3 shows the mean and standard deviation for each pre and post-dependent variable for each group, the *F* and *p* values of the group effect for each post-treatment dependent variable with

Table 1
Demographic and ICD-10 diagnostic characteristics

Variable	MBSR+TAU N = 41		TAU N = 39		<i>p</i> _{diff}
	n	%	n	%	
Age					
13 years	8	19.5	10	25.6	
14 years	11	26.8	9	23.1	
15 years	11	26.8	11	25.6	
16 years	11	26.8	9	23.1	
Age mean and SD	14.61 ± 1.09		14.49 ± 1.12		.78
Gender (females)	23	56.1	21	53.8	.84
Diagnostic characteristics					
Adjustment	2	4.9	1	2.6	.58
Anxiety	9	22.0	8	20.5	.87
Behavior	2	4.9	4	10.3	.36
Depression	5	12.2	4	10.3	.78
Other disorders in childhood/ adolescence	8	19.5	8	20.5	.91
Eating disorders	3	7.3	5	12.8	.41
ADHD	4	9.8	2	5.1	.43
Other disorders	8	19.5	7	17.9	.85

Note: The *p*_{diff} shows significance levels based on *t* tests and χ^2 test group differences. MBSR: mindfulness-based stress reduction. TAU: treatment-as-usual.

each pre-treatment dependent variable as covariate, and the size effect for each pre-post-variable dependent for each group. There was a significant main effect for STAI-state post-treatment, showing that MBSR+TAU group scored significantly less on measures

of state anxiety ($M = 53.87$; $SD = 33.36$) compared to TAU group ($M = 67.05$; $SD = 32.15$), $F(1, 77) = 2.79$, $MSE = 2049.06$, $p < .05$.

No statistically significant differences were observed between the groups for the other scores, but we found that all scores showed a greater impact of the MBSR+TAU intervention than in the TAU intervention, especially regarding symptoms of depression, anxiety, paranoia (SCL90-R) and perceived stress (PSS).

To test the effect of doing the exercises at home, we analysed the frequency with which adolescents practised MBSR between sessions, because it was a very important factor in the intervention. They made weekly self-report of practices at home. A low frequency was found for this effect given that none of the participants practised MBSR at home for six weeks or more over the course of the eight-week treatment. Specifically, only one adolescent (2.43%) practised for five weeks, six (14.63%) practised for four weeks, seven (17.07%) practised for three weeks, eight (19.51%) practised for two weeks, five (12.19%) for one week, and fourteen (34.14%) did not do the exercises indicated in the group sessions during the intervention period.

Table 2
Treatment received from other sources by participants in MBSR+TAU and TAU groups

	MBSR+TAU N = 41		TAU N = 39		<i>p</i> _{diff}
	n	%	n	%	
Group therapy					
Pretest	10	24.39	10	25.6	.89
Posttest	6	14.6	6	15.4	.92
Psychotropic medication					
Pretest	9	22	12	30.8	.37
Posttest	5	12.2	8	20.5	.31
Discharge	15	36.6	11	28.2	.42

Note: The *p*_{diff} shows significance levels based on *t* tests and χ^2 test group differences. MBSR: mindfulness-based stress reduction. TAU: treatment-as-usual.

Table 3
Mean (and SD) values in MBSR+TAU and TAU groups at Pre-treatment, and Post-treatment Time Points. The size effect (*d*) and *F* and *p* values

Variable	MBSR+TAU			TAU			<i>F</i> and <i>p</i> values
	Pretest	Posttest	<i>d</i>	Pretest	Posttest	<i>d</i>	
STAI/STAIc state	68.17 (33.93)	53.87 (33.36)	00.42	72.25 (29.14)	67.05 (32.15)	00.17	$F(1,77) = 2.79$ $p < .05$
STAI/STAIc trait	69.56 (31.40)	52.56 (35.17)	00.51	69.59 (27.94)	58.43 (32.75)	00.36	$F(1,77) = 1.15$ $p = .28$
MAAS-A	54.17 (12.59)	56.24 (12.80)	-0.16	55.71 (13.23)	54.05 (13.25)	00.12	$F(1,77) = 2.49$ $p = .11$
SES	25.85 (7)	28.12 (7.27)	-0.32	26.74 (6)	27.74 (6.12)	-0.16	$F(1,77) = 1.61$ $p = .21$
PSS	21.17 (4.94)	18.85 (5.58)	00.44	21.35 (5.11)	20.35 (5.71)	00.18	$F(1,77) = 2.21$ $p = .14$
SCL-90R							
Somatization	16.14 (11.21)	14.26 (10.79)	00.17	13.97 (10.56)	12.87 (10.68)	00.10	$F(1,77) < 1$
Obsession- compulsion	17.17 (8.15)	16.17 (7.86)	00.12	14.66 (7.95)	14.20 (8.91)	00.05	$F(1,77) < 1$
Interpersonal sensitivity	14.78 (9.20)	12.12 (8.94)	00.29	13.35 (9.07)	12.02 (9.08)	00.14	$F(1,77) = 1.46$ $p = .23$
Depression	20.19 (14.39)	15.56 (12.33)	00.34	18.48 (13.31)	17.17 (13.25)	00.09	$F(1,77) = 2.46$ $p = .12$
Anxiety	14.75 (10.29)	11.12 (9.78)	00.36	12.64 (9.34)	11.48 (8.31)	00.13	$F(1,77) = 1.49$ $p = .22$
Hostility	10.02 (6.43)	8.92 (6.38)	00.17	8.94 (6.48)	9 (7.18)	-0.01	$F(1,77) = 1.13$ $p = .28$
Phobia	5.85 (5.86)	5.44 (6.53)	00.06	6.17 (5.66)	5.97 (5.65)	00.03	$F(1,77) < 1$
Paranoia	9.78 (5.67)	8 (5.84)	00.31	8.25 (5.27)	7.89 (5.54)	00.06	$F(1,77) = 1.96$ $p = .16$
Psychoticism	9.95 (6.72)	7.93 (7.69)	00.28	9.20 (7.47)	8.28 (7.22)	00.12	$F(1,77) < 1$
GSI	1.44 (0.79)	1.18 (0.78)	00.33	1.26 (0.84)	1.18 (0.80)	00.09	$F(1,77) = 1.77$ $p = .19$
Total	129.46 (71.37)	106.73 (70.75)	00.32	115.97 (74.04)	106.51 (72.83)	00.12	$F(1,77) = 1.36$ $p = .24$

Note: STAI/STAIc: State-Trait Anxiety Inventory/ State-Trait Anxiety Inventory for children. MAAS-A: Mindful Attention Awareness Scale in adolescents. SES: Rosenberg Self-Esteem. PSS: Perceived Stress Scale. SCL-90-R: Symptom Checklist-90-R

Discussion

MBIs are validated interventions in both adults (Khoury et al., 2013) and adolescents (Zoogman, Goldberg, Hoyt, & Miller, 2014). The purpose of our study was to assess the impact of a MBSR intervention on several psychological variables (mindfulness; self-esteem; perceived stress; state and trait anxiety) and other clinical variables (somatisation, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, global severity index) in a sample of adolescents with various mental disorders.

We expected the MBSR+TAU intervention to increase MAAS-A mindfulness scores relative to the TAU group. Surprisingly, the results indicate that the changes in mindfulness were not statistically different in the two groups, although a greater improvement in mindfulness skills was observed in the MBSR+TAU group. Hupper and Johnson (2010) argued that when people start learning mindfulness it may not be reflected in their daily activities and their score on a mindfulness index may actually decrease until the training improves their mindfulness skills to the point where the effects generalise to everyday life. Another factor that might have influenced the effectiveness of our MBSR intervention is the amount of formal practice undertaken at home, since other studies have reported that the increase in mindfulness was related to the amount of practice done at home. Biegel et al. (2009) found that the effectiveness of their mindfulness intervention for adolescents was related to several formal practice variables, particularly the number of practice days and the duration of sitting meditations. Some studies with adults have also reported that the benefits of mindfulness are positively associated with amount of practice (e.g., Carmody & Baer, 2008). In our study, practice has been particularly low. We noted that the adolescents found it difficult to complete the assigned exercises at home, which may have decreased the effectiveness of the MBSR intervention. Practising at home in adolescence is usually low to moderate, because youth are often not voluntary participants in therapy, or they do not play an active role in problem maintenance or resolution (Houlding, Schmidt, & Walker, 2010). Undertaking the exercises at home is a key aspect in this type of intervention and it is essential that the practices be integrated into the daily lives of adolescents in order to enhance the benefits of intervention. Our study has been limited because low frequency in the home practice would have been an influence in the lack of differences among groups in the variables measured. We find important to focus on the increasing of adherence to practices in further studies, in order to achieve a major comprehension of how can it influence the effect of MBSR intervention.

The main finding regarding the measures of clinical symptoms was that state anxiety decreased more in the MBSR+TAU group than in the TAU group during the intervention period. This result

indicates that adolescents who had higher scores in anxiety need and benefit more from the MBSR intervention. No post-treatment differences were observed between the groups in any of the other variables, but in all cases the MBSR+TAU group showed a greater change, thus suggesting that the MBSR intervention has some beneficial effect on them, particularly as measured by the SCL-90-R depression, anxiety and paranoia subscale scores. The difference in effect was in the same direction for hostility and psychoticism but was less marked. A greater reduction in perceived stress (PSS) was also found in the MBSR+TAU group. These changes are consistent with Siegel's (2007) argument that the practice of mindfulness establishes a greater balance between emotional states in general, because it teaches one to respond to life instead of reacting. Mindfulness involves distinguishing the event or situation from the sensations, images, feelings and thoughts that it evokes or the judgements it prompts and could thus reduce emotional distress in adolescents. Our results are consistent with those of Biegel et al. (2009), who reported that a MBSR intervention led to improvements in a mixed sample of adolescents with mental health problems.

In the case of self-esteem and the rest of the variables analysed, the absolute mean changes were greater in the MBSR+TAU group but there was no statistically reliable group difference. However, it is important to note that the MBSR intervention could help teenagers to learn to treat their thoughts or negative judgements of themselves simply as thoughts instead of as events that reflect reality, and therefore promote greater self-acceptance. Such a change would be important, as it would improve their mental health and psychosocial adjustment. An increase in self-esteem after MBSR training would support Kabat-Zinn's (1990) argument that mindfulness improves self-knowledge and makes one more willing to accept oneself as one is. Brown, Ryan and Creswell (2007) also found that training in mindfulness promoted greater self-awareness and reduced negative self-references, which are linked to low self-esteem.

Overall, our study suggests that MBSR intervention is well accepted and tolerated by adolescents, as 80% of the participants in the MBSR+TAU group completed treatment, a figure that is in line with the 78% completion rate for the MBSR+TAU intervention reported in Biegel et al. (2009). Our results suggest that the MBSR intervention is a promising treatment for adolescents with mental disorders. Although the only variable on which the MBSR+TAU intervention had a significant effect was state anxiety, we must not forget that the MBSR+TAU had a greater absolute mean effect on all the other clinical variables than the TAU and also produced a greater absolute mean increase in self-esteem. These findings encourage us to conduct further research into how MBSR may benefit adolescents with mental disorders so that we can provide treatments supported by clinical evidence.

References

- Biegel, G. M. (2009). *The stress reduction workbook for teens: Mindfulness skills to help you deal with stress*. Oakland, CA: New Harbinger Publications, Inc.
- Biegel, G. M., Brown, K.W., Shapiro, S. L., & Schubert, C.M. (2009). Mindfulness-based stress reduction for the treatment of adolescent psychiatric outpatients: A randomized clinical trial. *Journal of Consulting and Clinical Psychology* 77(5), 855-866. doi:10.1037/a0016241
- Biegel, G. M., Chang, K., Garrett, A., & Edwards, M. (2014). Mindfulness-based stress reduction for teens. In R. A. Baer (Ed.), *Mindfulness-Based Treatment Approaches: Clinician's Guide to Evidence Base and Applications*, 2nd ed. (pp. 189-212). San Diego, CA: Elsevier.

- Bogels, S., Hoogstad, B., van Dun, L., De Shutter, S., & Restifo, K. (2008). Mindfulness training for adolescents with externalising disorders and their parents. *Behavioural and Cognitive Psychotherapy*, 36(2), 193-209. doi:10.1017/S1352465808004190
- Braddick, F., Carral, V., Jenkins, R., & Jané-Llopis, E. (2009). *Child and adolescent mental health in Europe: Infrastructures, policy and programmes*. Luxembourg: European communities.
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Addressing fundamental questions about mindfulness. *Psychological Inquiry*, 18(4), 272-281. doi:10.1080/10478400701703344
- Brown, K. W., West, A. M., Loverich, T. M., & Biegel, G. M. (2011). Assessing adolescent mindfulness: Validation of an Adapted Mindful Attention Awareness Scale in adolescent normative and psychiatric populations. *Psychological Assessment*, 23, 1023-1033. doi:10.1037/a0021338
- Carmody, J., & Baer, R.A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine*, 31, 23-33. doi:10.1007/s10865-007-9130-7
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behaviour*, 24, 385-396.
- Derogatis, L. (1994). *SCL-90-R administration, scoring and procedures manual (3a. ed.)*. Minneapolis: National Computer Systems.
- Edwards, M., Adams, E., Waldo, M., Hadfield, O., & Biegel, G. (2014). Effects of mindfulness group on Latino adolescent students: Examining levels of perceived stress, mindfulness, self-compassion, and psychological symptoms. *The Journal for Specialist in Group Work*, 39(2), 145-163. doi:10.1080/01933922.2014.891683
- Freedenberg, V.A., Thomas, S.A., & Friedmann, E. (2014). A pilot study of a mindfulness based stress reduction program in adolescents with implantable cardioverter defibrillators or pacemakers. *Pediatric Cardiology*, 36, 786-795. doi:10.1007/s00246-014-1081-5
- Greco, L. A., Blackledge, J. T., Coyne, L. W., & Ehrenreich, J. (2005). Integrating acceptance and mindfulness into treatments for child and adolescent anxiety disorders: Acceptance and commitment therapy as an example. En S. M. Orsillo & L. Roemer (Eds.), *Acceptance and mindfulness-based approaches to anxiety: Conceptualization and treatment* (pp. 301-322). New York, NY: Springer Science.
- Greco, L. A., Barnett, E., Blomquist, K. K., & Gevers, A. (2008). Acceptance, body image, and health in adolescence. En L.A. Greco & S. C. Hayes (Eds.), *Acceptance and mindfulness interventions for children and adolescents: A practitioner's guide* (pp. 187-218). Oakland, CA: New Harbinger.
- Houlding, C., Schmidt, F., & Walker, D. (2010). Youth therapist strategies to enhance client homework completion. *Child and Adolescent Mental Health*, 15, 103-109. doi:10.1111/j.1475-3588.2009.00533.x
- Huppert, F. A., & Johnson, D. A. (2010). A controlled trial of mindfulness training in schools: The importance of practice for an impact on well-being. *Journal of Positive Psychology*, 5, 264-274. doi:10.1080/17439761003794148
- Jastrowski Mano, K. E., Salamon, K. S., Hainsworth, K. R., Anderson Khan, K. J., Ladwig, R. J., Davies, W. H., & Weisman, S. J. (2013). A randomized, controlled pilot study of mindfulness-based stress reduction for pediatric chronic pain. *Alternative Therapies in Health and Medicine*, 19(6), 8-14.
- Jee, S. H., Couderc, J. P., Swanson, D., Gallegos, A., Hilliard, C., Blumkin, A., et al. (2015). A pilot randomized trial teaching mindfulness-based stress reduction to traumatized youth in foster care. *Complementary Therapies in Clinical Practice*, 21, 201-209. doi:10.1016/j.ctcp.2015.06.007
- Kabat-Zinn, J. (1990). *Full catastrophe living: The program of the Stress Reduction Clinic at the University of Massachusetts Medical Center*. New York: Dell
- Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., & Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, 33, 763-771. doi: 10.1016/j.cpr.2013.05.005
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Sibinga, E.M., Perry-Parrish, C., Thorpe, K., Mika, M., & Ellen, J.M. (2014). A small mixed-method RCT of mindfulness instruction for urban youth. *Explore (NY)*, 10(3), 180-186. doi:10.1016/j.explore.2014.02.006
- Siegel, D. (2007). *The mindful brain: Reflection and attunement in the cultivation of wellbeing*. New York, NY: Norton.
- Singh, N. N., Lancioni, G. E., Joy, S. D., Winton, A. S. W., Sabaawi, M., Wahler, R. G. et al. (2007). Adolescents with conduct disorder can be mindful of their aggressive behavior. *Journal of Emotional and Behavioral Disorders*, 15, 56-63. doi:10.1177/10634266070150010601
- Spielberger, C.D. (1973). *State-Trait Anxiety Inventory for Children: Preliminary manual*. Palo Alto, CA: Consulting Psychologists Press.
- Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- U. S. Department of Health and Human Services and Centers for Disease Control and Prevention (2013). Mental health surveillance among children-United States, 2005-2011. *MMWR Morb. Mortal. Wkly. Rep.* 62, 1-35.
- World Health Organisation (2001). *The world health report 2001- Mental Health: New Understanding, New Hope*. Geneva: WHO.
- Zoogman, S., Goldberg, S. B., Hoyt, V. T., & Miller, L. (2014). Mindfulness interventions with youth: A meta-analysis. *Mindfulness*, 6, 290-302. doi:10.1007/s12671-013-0260-4
- Zylowska, L., Ackerman, D. L., Yang, M. H., Futrell, J. L., Horton, N. L., Hale, S. T. et al. (2008). Mindfulness meditation training with adults and adolescents with ADHD. *Journal of Attention Disorders*, 11(6), 737-746. doi:10.1177/1087054707308502