



ORIGINAL ARTICLE

Measurement of dispositional mindfulness in children and adolescents: A review of available self-report measures in Spanish



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Abstract In recent years, mindfulness-based interventions have undergone considerable development in the field of childhood and adolescent interventions. This development has not been accompanied by a solid and systematic development of self-report measures to assess dispositional mindfulness even though such evaluation is critical to determine the effectiveness of interventions. In this manuscript, several mindfulness measures for children and adolescents are reviewed with emphasis on those measures available in Spanish. The following self-report measures of dispositional mindfulness for children and/or adolescents are examined: Mindful Attention Awareness Scale-Adolescent (MAAS-A; Brown et al., 2011), Mindful Attention Awareness Scale-Children (MAAS-C; Lawlor et al., 2014), Child and Adolescent Mindfulness Measure (CAMM; Greco et al., 2011), Comprehensive Inventory of Mindfulness Experiences-Adolescent (CHIME-A; Johnson et al., 2016), *Escala de Atención Plena en el Ámbito Escolar* [Mindfulness in the School Context Scale] (EAP; León, 2008), and Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006). A description of each measure is provided, as well as the most important properties of the Spanish versions. Finally, several recommendations are suggested to improve current measures of mindfulness for children and adolescents.

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PALABRAS CLAVE

Atención plena o *mindfulness* disposicional;
Autoinformes;
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Adolescentes

Medición de la atención plena o *mindfulness* disposicional en niños y adolescentes. Revisión de las medidas de autoinforme disponibles en español

Resumen En los últimos años, las intervenciones basadas en la atención plena o *mindfulness* han experimentado un considerable desarrollo en el campo de las intervenciones en la infancia y la adolescencia. Este desarrollo no ha estado acompañado por un desarrollo sólido y sistemático de las medidas de autoinforme para evaluar la atención plena disposicional a pesar de que

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dicha evaluación es fundamental para determinar la eficacia de las intervenciones. En este artículo se revisan varias medidas de atención plena para niños y adolescentes y se hace hincapié en las medidas disponibles en español. Se estudian las siguientes medidas de autoinforme de atención plena disposicional para niños y adolescentes: *Mindful Attention Awareness Scale -Adolescent* (MAAS-A; Brown et al., 2011), *Mindful Attention Awareness Scale -Children* (MAAS-C; Lawlor et al., 2014), *Child and Adolescent Mindfulness Measure* (CAMM; Greco et al., 2011), *Comprehensive Inventory of Mindfulness Experiences-Adolescent* (CHIME-A; Johnson et al., 2016), Escala de Atención Plena en el Ámbito Escolar [*Mindfulness in the School Context Scale*] (EAP; León, 2008), y *Five Facet Mindfulness Questionnaire* (FFMQ; Baer et al., 2006). Se ofrece una descripción de cada medida, así como las propiedades más importantes de las versiones en español. Por último, se sugieren varias recomendaciones para mejorar las medidas actuales de la atención plena de niños y adolescentes.

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Introduction

Mindfulness-based interventions are increasingly used with children and adolescents. Two recent reviews concluded that mindfulness-based interventions are beneficial for youth (Felver, Celis-de Hoyos, Tezanos, & Singh, 2016; Kallapiran, Koo, Kirubakaran, & Hancock, 2015). Mindfulness training reduces psychological problems such as depression, anxiety, and externalizing problems, and improves attention and academic achievement. Although mindfulness-based interventions are promising, very little is known about the mechanisms through which mindfulness acts (Calvete, 2017; Felver et al., 2016). Overall, it is expected that training in mindfulness will help improve dispositional mindfulness, which in turn acts as a resilience factor for coping with stress and adversity (Calvete, Orue, & Sampedro, 2016). However, most studies on the effectiveness of mindfulness-based interventions do not examine whether dispositional mindfulness changes as a consequence of the intervention. The study of the mechanisms by which mindfulness training produces positive outcomes is necessary to maximize the effectiveness of interventions by enhancing the active components and to inform theory development and interpretation of findings (Kazdin, 2007). Measurement of mindfulness is also important for testing models of the construct of mindfulness, identifying predictors and outcomes, and studying the developmental trajectory of dispositional mindfulness across the lifespan (Pallozzi, Wertheim, Paxton, & Ong, 2016).

Unfortunately, the rapid growth of mindfulness-based interventions has not been accompanied by a development of valid measures of dispositional mindfulness. Research on the mindfulness construct and psychometric characteristics of its measures is still at an early stage, and there is no consensus on how mindfulness should be conceptualized and measured (Andrei, Vesely, & Siegling, 2016). If this scenario is negative for the measurement of mindfulness in adults, the situation is even more challenging in children and adolescents.

In this scenario of lack of consensus, there is a variety of questionnaires to assess mindfulness. Most of them were created in a relatively short period. For instance, during a five-year period, eight self-report measures of dispositional mindfulness were published (see for a review, Rau & Williams, 2015). In general, most of the available measures are inspired in an Eastern conception of mindfulness that reflects a contemplative tradition rooted in Buddhism, and highlight the aspects of purposeful attention to and awareness of the present moment with a nonjudgmental attitude of openness and acceptance (Andrei et al., 2016).

One of the most important characteristics that distinguish different approaches to the assessment of dispositional mindfulness refers to the measurement model of the construct. Evidence from several measures suggests that mindfulness is a unitary construct (e.g., Brown & Ryan, 2003). In contrast, other measures have been built on the basis of a conceptualization of mindfulness as a multidimensional construct. Two important dimensions that are included in multiple measures are awareness (or presence) and acceptance (or non-judging). These two dimensions provide the strongest theoretical and empirical association with the mindfulness construct (Rau & Williams, 2015). However, whereas these two dimensions are common in several measures of mindfulness, some other measures include additional dimensions such as observing, describing, and non-reacting. Observing captures the importance of noticing internal and external stimuli (Baer, Smith, & Allen, 2004). Description includes the use of words to describe and label the observed phenomena (Segal et al., 2002). Non-reaction refers to the ability to observe thoughts and feelings without being influenced by them (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Interestingly, the observing dimension has been controversial, as its role seems to differ depending on the characteristics of the sample. The different functioning of observing has led to the elimination of the dimension in some questionnaires.

Measures of mindfulness have only recently been adapted for use with children and adolescents. For instance, Greco, Baer, and Smith (2011) used the *Kentucky Inventory of*

Mindfulness Skills (KIMS; Baer et al., 2004) to develop the *Child and Adolescent Mindfulness Measure* (CAMM). Similarly, two youth measures were based on the *Mindful Attention Awareness Scale* (MAAS; Brown & Ryan, 2003): the MAAS for adolescents (MAAS-A; Brown, West, Loverich, & Biegel, 2011) and the MAAS for Children (MAAS-C; Lawlor, Schonert-Reichl, Gadermann, & Zumbo, 2014).

The assessment of mindfulness in children and adolescents involves important challenges. Cognitive and emotional development in children and adolescents is incomplete, and their reading skills and capacity for self-reflection are more limited (Pallozzi et al., 2016). Grossman (2011) suggested that self-report measures of mindfulness were unreliable at these developmental stages. Nevertheless, the review by Pallozzi et al. (2016) indicated that some of the available measures of mindfulness are adequate for children and adolescents.

Most of the youth measures were first developed for English-speaking populations and then translated and adapted to other countries and languages. Specifically, three measures were adapted for use in Spanish-speaking children and adolescents: *Cuestionario de las Cinco Facetas de Mindfulness-Adolescentes* (FFMQ-A; Royuela-Colomer & Calvete, 2016), *La Escala de Atención y Conciencia Plena para Adolescentes* (MAAS-A; Calvete, Sampedro, & Orue, 2014), and *Medida de Mindfulness en Niños y Adolescentes* (CAMM; Turanzas Romero, 2013; Viñas, Malo, González, Navarro, & Casas, 2015). In addition, León (2008) developed *La Escala de Atención Plena en el Ámbito Escolar* in Spain. These assessment tools are widely used, and their psychometric properties have been analyzed independently in several studies (Bruin, Zijlstra, & Bögels, 2013; Kuby, McLean, & Allen, 2015). To date, however, there are no studies that provide a concise summary of the existing children and adolescent mindfulness measures for Spanish-speaking populations. In this review, we examine the characteristics of the available questionnaires in Spanish to assess dispositional mindfulness in children and adolescents.

Objective of the current review

This paper offers an overview of the current status in the field on self-report assessment of mindfulness in children and adolescents internationally and in Spain and Spanish-speaking populations. The following assessment tools are examined: MAAS-A (Brown et al., 2011), MAAS-C (Lawlor et al., 2014), CAMM (Greco et al., 2011), CHIME-A (Johnson, Burke, Brinkman, & Wade, 2016), EAP (León, 2008), and FFMQ (Baer et al., 2006). A description of each measure is provided, as well as the most important properties for each measure. Table 1 displays a summary of the reviewed measures.

Overview of available mindfulness scales

The mindful attention awareness scale (MAAS; Brown & Ryan, 2003)

The MAAS is probably the most widely used unidimensional measure of mindfulness. Brown and Ryan (2003) based the MAAS on a conceptualization of mindfulness as enhanced

attention to and awareness of current experience or present reality. The MAAS differs in its origins from other measures in that it was derived both from historical and contemporary Buddhist scholarship on mindfulness and from clinical theory and research on the practice of mindfulness (Brown et al., 2011). Although the original version of the MAAS included two factors – presence and acceptance – the acceptance component was excluded because the authors considered that it was redundant and did not increase validity.

The MAAS consists of 15 items that describe the absence of mindful attention in various circumstances (e.g., ‘‘I tend to walk quickly to get where I’m going without paying attention to what I experience along the way’’, ‘‘I snack without being aware of what I am eating’’). Items are responded on a six-point response scale ranging from 1 (*almost never*) to 6 (*almost always*) so the total score ranges between 15 and 90. This indirect assessment approach has been criticized, as the scale could measure attentional failures or running on ‘‘automatic pilot’’ rather than dispositional mindfulness (Rau & Williams, 2015). However, in the opinion of Brown and Ryan (2003), items reflecting less mindlessness are likely more accessible to most individuals because mindless states are much more common than mindful states.

Although the MAAS is a brief measure, it has shown excellent psychometric properties in terms of internal consistency, test–retest reliability, and factor structure (De Bruin et al., 2011). The Spanish translation has shown good properties in adults (Soler Ribaudi et al., 2012). The MAAS scores are associated with the practice of meditation (Brisbon & Lowery, 2011) and are negatively correlated with several psychological problems (e.g., Black, Sussman, Johnson, & Milam, 2012; Jermann et al., 2009).

Brown et al. (2011) slightly adapted the MAAS to adolescents (MAAS-A) by removing one item relating to driving. The MAAS-A has displayed adequate psychometric properties in adolescent samples. For instance, the authors found that Cronbach’s alpha ranged between .84 and .93 (Brown et al., 2011). The MAAS-A has been used as an outcome indicator in several mindfulness-based interventions with adolescents (Pallozzi, Wertheim, Paxton, & Ong, 2016). For instance, Brown et al. (2011) conducted an intervention study with a psychiatric group of adolescents and found that these adolescents showed increases in MAAS-A scores after training in mindfulness, and that the improvement in dispositional mindfulness was significantly related to positive changes in well-being. Furthermore, the MAAS-A has been used in samples of adolescents of several countries, including Spain. The Spanish version of the MAAS-A presents excellent psychometric properties (Calvete et al., 2014). The results in a large sample of Spanish adolescents aged between 12 and 18 years confirmed the one-factor structure of the MAAS-A and indicated a Cronbach’s alpha of .85. The scores were negatively correlated with symptoms of depression, antisocial behavior, anger, drug abuse, and lack of self-control (Calvete et al., 2014).

Benn (2004) modified the MAAS to use with younger populations by altering the language to be age-appropriate and changing the six-point Likert-type scale to a more child-friendly format. For instance, the item about driving was changed to ‘‘walking into a room, and then wondering why I went there’’. Findings of a recent study with a sample of children indicated that the MAAS-C displays high internal

Table 1 Summary of main characteristics of available measures of mindfulness for children and adolescents.

Name of the scale	Dimensions	Number of items/response format	Psychometric properties (internal consistency, test-retest)	Age range of samples where the questionnaire has been used	Availability in Spanish	Adequacy for children and adolescents and recommendations
MAAS-A (Brown et al., 2011)	1. Acting with awareness	14 items/6 response options	Adequate	14–18 yrs.	Yes	Yes. However, instructions should be revised to increase readability and response format should be reduced to 5 options
MAAS-C (Lawlor et al., 2014)	1. Acting with awareness	15 items/6 response options	Adequate	Fourth to seventh grade. Mean age = 11.43 yrs. ($SD = 1.07$).	No	Yes. However, response format should be reduced to 5 options
CAMM (Greco et al., 2011)	1. Acting with awareness and non-judging	10 items/5 response options	Adequate	9–18 yrs.	Yes	Yes. However, the understanding of the items might be more difficult in young children, as most of the items are reverse-scored and abstract
CHIME-A (Johnson et al., 2016)	1. Internal experience awareness 2. External experience awareness 3. Acting with awareness 4. Accepting and non-judgment 5. Non-reactivity 6. Openness 7. Relativity of thoughts 8. Insightful understanding	25 items/5 response options	Adequate consistency except for the Openness scale. Poor test-retest correlation	12–14 yrs.	No	More research is needed. It is a promising approach to measure different aspects of mindfulness in youth
EAP (León, 2008)	1. Kinesthetic attention 2. External attention 3. Internal attention	12 items/5 response options	Low consistency for Openness subscale	12–16 yrs.	Yes	More research is needed. It does not provide a complete approach to mindfulness, as it only assesses awareness and it should be combined with other measures
FFMQ-A (Baer et al., 2006)	1. Acting with awareness 2. Observing 3. Describing 4. Non-judging 5. Non-reactivity	39 items/5 response options	Adequate	13–19 yrs.	Yes	Yes. However, the utility of the Observing dimension in children and adolescents without experience in meditation is controversial

Note: MAAS-A, Mindful Attention Awareness Scale-Adolescent; MAAS-C, Mindful Attention Awareness Scale-Children; CAMM, Child and Adolescent Mindfulness Measure; CHIME-A, Comprehensive Inventory of Mindfulness Experiences-Adolescent; EAP, Escala de Atención Plena en el Ámbito Escolar; FFMQ-A, Five Facet Mindfulness Questionnaire-Adolescent.

consistency and a one-factor solution, and that scores on the MAAS-C are associated with indicators of well-being across several domains (Lawlor et al., 2014).

Pallozzi et al. (2016) examined several characteristics of measures of mindfulness such as readability, difficulty of items, and response format. They concluded that, although the six response options of the MAAS is higher than the cut-point of five response options that is preferable for children and adolescents, the MAAS-A offers a suitable option for adolescent populations. Its unidimensional factor structure has been replicated in adolescent populations. In addition, it has a high proportion of concrete items (80%) and adequate readability. Despite these positive characteristics, these authors also recommended that the instruction set for the MAAS-A should be revised to increase readability for children and adolescents.

Child and adolescents mindfulness measure (Greco et al., 2011)

The CAMM was the first, and one of the most widely used measures, developed to assess mindfulness skills in children and adolescents from ages 9 to 18. It is a 10-item self-report scale that measures mindfulness as a unidimensional construct defined as present-centered awareness and the ability of being non-judgmental toward one's inner experiences. Respondents have to decide how often each statement is true for them using a five-point Likert type scale ranging from 0 (*never true*) to 4 (*always true*) (e.g., "I tell myself that I shouldn't feel the way I'm feeling," "I stop myself from having feelings that I don't like.'). The scores are computed by inverting all the items and summing the responses, so the total score ranges between 0 and 40.

For the development of the CAMM, Greco et al. (2011) adapted the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004) to youth samples through a series of studies. The KIMS consists of 39 items developed from an initial pool of 77 items designed to measure four mindfulness dimensions: observing, describing, acting with awareness, and accepting without judgment. In Study 1, Greco et al. selected 25 items from the observing, acting with awareness, and accepting without judgment facets of the KIMS and excluded the items from the describing dimension because they considered that this dimension presented understanding difficulties for children. In Study 2, an exploratory factor analysis supported a two-factor structure composed of acting with awareness and accepting without judgment. The observing facet was dropped from the scale due to its contradictory nature in youth. It might be either maladaptive – characterized by judgment and reactivity – or adaptive – characterized by openness and acceptance. In Study 3, the remaining 16-items were examined with a confirmatory factor analysis and reduced to a 10-item questionnaire with a single-factor structure of mindfulness as a present-centered awareness and non-judgmental stance toward internal experiences.

The single-factor solution has been confirmed by several studies. For instance, Kuby et al. (2015) found this was the best model in adolescent boys and girls separately. However, alternative structures have also been proposed. As an example, in the Netherlands, Bruin et al. (2013) found evidence

for the one-factor model, but also for a two-factor model. The latter was examined independently in two samples of school-age children and adolescents. Both samples shared a common factor of present moment, non-judgmental awareness. However, differences were found for the second factor, which was the suppression or avoidance of thoughts in children and the distractibility or difficulty of paying attention in adolescents. This finding suggests that the CAMM might measure mindfulness differently depending on the age and the developmental stage.

The 10-item version of the CAMM has been widely used. The studies that examined its psychometric properties reveal adequate internal consistency with Cronbach's alphas ranging from .70 to .85, and good convergent and discriminant validity (Pallozzi et al., 2016). For instance, Greco et al. (2011) found positive correlations of the CAMM with measures of quality of life, academic competence, and social skills and negative correlations with somatic complaints, internalizing symptoms, and externalizing behavioral problems. The CAMM was also used to examine changes in mindfulness after mindfulness training (Sinclair & Goodfriend, 2013). Recently, Vickery and Dorjee (2016) employed the CAMM to measure changes in mindfulness scores among children from 7 to 9 years after the "Paws b program" (2015), an 8-week mindfulness-based intervention. They did not find changes in the CAMM scores pre-to-post intervention, which might be explained by the age of the sample.

The CAMM has also been adapted to other countries, and most of the validation studies support a one-factor structure, such as the Portuguese version (Cunha et al., 2013). Viñas et al. (2015) examined a Catalan version of the scale (age = 11–16). Exploratory and confirmatory factor analyses supported a 10-item model with one factor. A sample item is: "Em sento malament per tenir sentiments que no tenen sentit". The psychometric properties were adequate and similar to the original version (Greco et al., 2011). The internal consistency was adequate ($\alpha = .80$), and the measure was positively correlated with measures of social, family, academic and emotional self-concept; effortful control, activation control, and inhibition control. The test-retest reliability one year later was $r = .47$, which suggests moderate stability of the measure.

The Spanish version of the CAMM was preliminarily translated and examined by Turanzas Romero (2013) in a sample aged between 12 and 15 years. His results supported a two-factor structure composed of (1) awareness and attention, and (2) acceptance. However, as the latter was only composed by 2 items, he suggested using the scale as a single-factor structure. The psychometric properties of this version were adequate (e.g., $\alpha = .78$). The scale was positively correlated with academic achievement and other mindfulness measures (the EAP; León, 2008).

The CAMM has some advantages for use with children. It is short (15–20 min), straightforward, with easy-to-understand language, and its correction is simple. According to Pallozzi et al.'s (2016) analyses, it has a suitable readability index. However, it has some limitations. First, the original CAMM items are reverse-scored. Recent research suggests that reverse scores might not measure the same as direct items (Reise & Waller, 2009). Second, 80% of the items are abstract, which can complicate their comprehension

(Pallozzi et al., 2016). Third, there is still not enough evidence to conclude whether the questionnaire measures the same at different ages and developmental levels. Finally, research on the Spanish version of the questionnaire is only beginning and there is need for additional studies that examine the CAMM as a measure of intervention outcome.

The five-facet mindfulness questionnaire (FFMQ; Baer et al., 2006)

Baer et al. (2006) combined all the items from five questionnaires (the MAAS, Brown & Ryan, 2003; the Freiburg Mindfulness Inventory, Buchheld, Grossman, & Walach, 2001; the KIMS, Baer et al., 2004; the Cognitive and Affective Mindfulness Scale, Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2004; The Mindfulness Questionnaire, Chadwick, Hember, Mead, Lilley, & Dagnan, 2005) into a single data set and used exploratory factor analysis to examine the structure of this combined item pool. They found a five-facet structure, which then obtained support from confirmatory factor analysis. The five facets were named: *Observing* (attending to or noticing internal or external experiences), *Describing* (using words to describe inner experience), *Acting with awareness* (attending to the present moment), *Non-judging of inner experience* (the non-evaluation of thoughts and feelings), and *Non-reactivity to inner experience* (the ability to let thoughts and feelings come and go, without getting caught up in them). Thus, the proposed facets are very similar to those included in the KIMS.

These researchers developed the *Five-Facet Mindfulness Questionnaire* (FFMQ) with the 39 items of the initial pool that presented minimum loadings of .40 on one factor and with a difference of at least .20 between the highest and next highest factor loading. Items are responded on a five-point response format, ranging from 1 (*never or rarely true*) to 5 (*very often or always true*). The authors found that the structure that best fits the data was a 4-factor hierarchical structure consisting of a second-order factor (Mindfulness) that explained all lower level factors except for Observing. However, in a later study in a sample of experienced meditators, Baer et al. (2008) confirmed a structure with one second-order factor (Mindfulness) that accounted for the five first-order factors of the FFMQ. Since then, various studies have found that the observing dimension of mindfulness could be maladaptive in samples of non-meditators and that it correlates negatively with other dimensions of mindfulness (Royuela-Colomer & Calvete, 2016; Sugiura, Sato, Ito, & Murakami, 2012).

The FFMQ has been translated into several languages in several countries (e.g., China: Deng, Liu, Rodriguez, & Xia, 2011; Italy: Giovannini et al., 2014; Japan: Sugiura et al., 2012; Norway: Dundas, Vøllestad, Binder, & Sivertsen, 2013; Spain: Cebolla et al., 2012). The FFMQ has been used with adolescents in various studies (Ciesla, Reilly, Dickson, Emanuel, & Updegraff, 2012).

Recently, the FFMQ has been adapted to adolescents aged between 13 and 19 years in Spain (Royuela-Colomer & Calvete, 2016). Sample items of the Spanish version are: “Soy bueno en encontrar palabras para describir mis sentimientos” (Describing), “Me distraigo fácilmente” (reverse item, Acting with awareness), “Pienso que

algunas de mis emociones son malas o inapropiadas, y que no debería sentir las” (reverse item, Non-judging), “Cuando tengo pensamientos o imágenes mentales negativas, me tranquilizo rápidamente” (Non-reactivity), and “Presto atención a sensaciones como el viento en mi cabello o el sol sobre mi cara” (Observing). Confirmatory factor analyses supported the five-factor correlated model of the FFMQ-A. However, no support was found for hierarchical models of the FFMQ. Test-retest was adequate, suggesting that individual differences are stable over time in adolescents. Cronbach’s alpha coefficients ranged between .75 (Non-reactivity) and .91 (Describing). Consistent with previous studies with adults, inter-correlations among the facets indicated that Observing was negatively correlated with Non-judging and Acting with awareness (e.g., Sugiura et al., 2012). As mentioned above, it has been suggested that observing acts differently compared to the other mindfulness facets. Baer et al. (2006, 2008) suggested that individuals with no meditation experience observe their feelings or actions while judging them at the same time, thus concluding that observing may be a maladaptive factor in non-meditating samples. Furthermore, Royuela-Colomer and Calvete (2016) found that, in contrast to the beneficial effects of other mindfulness facets, observing predicted an increase in depressive symptoms by increasing ruminative responses in adolescents.

Pallozzi et al. (2016) found that the adult version of the FFMQ has a Reading Grade Level of 9 according to the Dale-Chall index, which is influenced by presence of difficult words. However, they did not examine the difficulty and readability of the FFMQ-A, which includes several changes in items to make it adequate for adolescents. In their review, Pallozzi et al. (2016) found that the FFMQ was one of the longest questionnaires together with the KIMS. However, as the FFMQ can be completed in 30 min of focused work, they considered the FFMQ manageable for adolescents, unless it is included in a larger battery of questionnaires. Recently, a short version of the FFMQ with only 24 items has been developed (Bohlmeijer, Peter, Fledderus, Veehof, & Baer, 2011). Future research should examine the properties of this version in children and adolescents.

The comprehensive inventory of mindfulness experiences-adolescents (CHIME-A; Johnson et al., 2016)

Based on the German mindfulness adult scale, the *Comprehensive Inventory of Mindfulness Experiences* (CHIME; Bergomi, Tschacher, & Kupper, 2013), Johnson et al. (2016) conducted a series of studies to adapt the CHIME to adolescents aged 12–14 years. The CHIME-A is composed of 25 items divided into 8 factors: (1) *Awareness of internal experiences* (awareness of emotions); (2) *Awareness of external experiences* (awareness of environment); (3) *Acting with awareness* (awareness of present moment as opposed to being caught up in thinking about the past/future); (4) *Accepting and non-judgmental orientation* (self-kindness toward mistakes and perceived weaknesses); (5) *Decentering and non-reactivity* (ability to step back from difficult thoughts and emotions and not react immediately); (6) *Openness to experience* (capacity to allow

the presence of difficult emotions and thoughts); (7) *Relativity of thoughts* (recognition of thoughts as transient and subjective); and (8) *Insightful understanding* (recognition that subjective interpretation of situations can create or compound difficulty). Sample items are: ‘‘I try to avoid emotional pain as much as possible’’ or ‘‘I try to stay busy to keep certain thoughts or feelings out of my mind’’. Respondents rate each statement on a five-point scale ranging from 1 (*Never*) to 5 (*Always*).

In their adaptation, the authors first examined how well the full adult measure (37-items) was understood by youth. Considering expert recommendations, the language was simplified, Likert descriptors were re-arranged and the reverse-scored items were clustered all together at the end of the scale. Following the feasibility examination, several exploratory factor analysis and confirmatory factor analyses were conducted, and the data supported a 25-item model divided into the above-mentioned factors. This model had excellent model fit indices and adequate internal consistency except for the Openness to experience subscale ($\alpha = .55$). The authors did not find good temporal stability, as only three of the facets had a significant test–retest correlation: Acting with awareness, Decentering/non-reactivity, and Openness.

Johnson et al. (2016) examined the external validity of the questionnaire. For the convergent validity, the authors found that the CHIME-A was positively correlated with the CAMM (Greco et al., 2011), and measures of well-being. Discriminant validity was supported by negative correlations with measures of difficulties in emotion regulation, perfectionism, negative affect, weight and shape concerns, depression, and anxiety.

To our knowledge, the CHIME-A has only been examined by Johnson et al. (2016) and it has some limitations. First, it has only been analyzed in the age group of 12–14 years, and different results may require further examination. In addition, the scale is a modification of an adult version and the simplification of the vocabulary to youthful language might miss some of the original meaning. Moreover, contrary to the adult version in which the eight factors were explained by a broader second-order factor, results from the CHIME-A did not support a hierarchical structure and the subsequent overall mindfulness score. Despite the limitations, this scale is promising and needs to be tested cross-culturally, in other areas, and pre and post mindfulness-based interventions.

Escala de Atención Plena en el Ámbito Escolar (EAP; León, 2008)

The Escala de Atención Plena en Ámbito Escolar (EAP; León, 2008) is the first scale developed in Spanish to assess mindfulness in youth aged 12–16 years. The EAP measures mindfulness as the state of being focused in the present moment consciously, observing in a contemplative way all the perceptions and sensations as experienced in the present moment, without judging them. The scale is composed of 12 items, and responses are rated on a Likert-type format ranging from 1 (*never*) to 5 (*always*). Sample items are: ‘‘Cuando me ducho, siento como el agua cae por mi cuerpo’’ and ‘‘Me doy cuenta rápidamente cuando algo me produce alegría’’.

The scale was developed in an attempt to measure the relationship between mindfulness and academic achievement. León, Martín, García and Felipe (2008) examined a preliminary 20-item scale in a sample of children aged 12–15 years. After the results of a factor analysis, the scale was reduced to 15 items, and a second study by León (2008) supported a 12-item model. Both studies supported a 3-factor structure composed of kinesthetic attention (the ability to be aware of movement and motor actions of the body), external attention (the ability to direct attention to the external events of one’s surroundings), and internal attention (the ability to change and focus attention inward, toward intellectual aspects, the world of the ideas, emotions, and feelings).

The study of the psychometric properties of the scale (León, 2008) revealed adequate internal consistency for the entire scale ($\alpha = .84$), as well as for Kinesthetic attention ($\alpha = .74$), and External attention ($\alpha = .80$). However, the consistency was limited for Internal attention ($\alpha = .66$). The test–retest reliability of the first version of the scale (20-item) was $r = .78$, which indicated high stability after a 4-week interval (León et al., 2008).

The EAP is simple and short, and it uses child-friendly language. Moreover, there are no reverse items, which is good for children and adolescents. However, we should consider some limitations of the scale. First, it has only been validated in two studies. There are no studies that used the scale in other samples, contexts, or as an intervention outcome measure. Due to its limited use, there is not enough information about the psychometric properties of the scale, and more information is needed on convergent and discriminant validity, as well as on factor structure.

Discussion

In this paper, we have reviewed the available self-report measures to assess dispositional mindfulness in children and adolescents, with special emphasis on the measures in Spanish. The review indicates that there are only three questionnaires adapted to Spanish, the MAAS-A, the CAMM, and FFMQ-A, and one questionnaire originally developed in Spanish, the EAP. In addition, there is another questionnaire in English available for adolescents, the CHIME-A, which, likely due to its recent development, has not yet been validated in Spanish.

From the psychometric point of view, most of these instruments have suitable properties for use with children and adolescents. For example, the internal consistency of the scales and subscales is generally good, with the exception of the Openness to experience subscale of the CHIME-A (Johnson et al., 2016) and the Internal attention subscale of the EAP (León et al., 2008). Only two of the reviewed instruments (the FFMQ-A and the CAMM) provide data of concurrent validity for the Spanish versions, showing their positive association with other measures of mindfulness (e.g., Royuela-Colomer & Calvete, 2016; Turanzas Romero, 2013). Regarding the predictive validity of the versions in Spanish, only the MAAS-A (Calvete et al., 2014) and the FFMQ-A (Royuela-Colomer & Calvete, 2016) have obtained negative associations with various psychological problems. In addition, the scores of the CAMM (Turanzas Romero, 2013)

and the EAP (Leon et al., 2008) have been found to be associated with academic performance, indicating their usefulness in educational settings. Overall, the data suggest that further research is still needed on measures of mindfulness in Spanish. For most of them, the evidence is still scarce and has been obtained very recently.

As mentioned above, although the consistency of most of the measures is appropriate, some of them can be improved from the point of view of reading and understanding by children and adolescents. The analysis by Pallozzi et al. (2016) indicates that two of the measures (the MAAS-A and FFMQ) exceed the cut-off of 5 response options for items, and all other measures have 5-point response formats. Therefore, in the future, the functioning of some of these measures should be examined with easier response scales, such as, for example, only three options (*never*, *sometimes*, and *often*), which can be more understandable for younger people.

Some of the self-report measures examined include items with abstract ideas that can be difficult, especially for children. It is very important to make an effort to adapt the language. For example, in the version for adolescents of the FFQM, some items were written in a friendlier way (e.g., “*Me critico cuando tengo ideas absurdas*” instead of “*I disapprove of myself when I have irrational ideas*”; Royuela-Colomer & Calvete, 2016). Moreover, in general, a detailed reading reveals that the items of the dimensions of Acting with awareness tend to be simpler than items of other subscales.

One of the most important aspects to consider when selecting a measure of mindfulness refers precisely to the dimensions of mindfulness included in the measure. The two measures most frequently used with children and adolescents, the MAAS-A and the CAMM, assess a single dimension. This unique dimension includes the aspect of attention or acting with awareness, although the CAMM includes two items related to acceptance or not judging. In the case of EAP, although the items are organized into three subscales, all they refer to types of attention.

We think that measures based exclusively on the attention component are limited. Although there is no consensus on the dimensions of dispositional mindfulness and how many there are, the evidence obtained from several factor analyses suggests that dispositional mindfulness does not consist of a single dimension. The evaluation of the different facets of mindfulness is necessary to know its protective and beneficial role in the field of various psychological problems. Moreover, mindfulness-based interventions should examine to what extent the various dimensions of mindfulness improve as a result of the intervention and the potential mediating role of these improvements in behavioral and emotional changes displayed by participants in the interventions. The results of this analysis would provide key information about which meditation training components should be strengthened (Kazdin, 2007) and would inform theory on mindfulness.

From this point of view, we consider that the FFMQ-A provides adequate information on various dimensions of mindfulness. The short version of the FFMQ (Bohlmeijer et al., 2011) should be examined in children and adolescents. Furthermore, of the dimensions assessed by the FFMW, the dimension of Observing is probably unnecessary because the available evidence to date suggests that

this dimension can reflect a maladaptive characteristic in individuals who do not practice meditation regularly. For example, in the study of Royuela-Colomer and Calvete (2016), observing was associated with a more ruminative style and depression. Although the debate on the dimensionality of the construct of mindfulness is not specific to childhood and adolescence as it is still unresolved in adults, we think that it should also be considered at these developmental stages.

Moreover, in relation to the above, another limitation observed in the available research on measures of mindfulness for children and adolescents is the lack of studies with a developmental perspective. It is important to examine the development of the construct and its dimensions in different age groups. Some of the reviewed studies suggest that the factor structure may vary depending on the age of the participants (Johnson et al., 2016). Moreover, during middle childhood, children develop and consolidate cognitive thinking. They also acquire self-awareness and empathy, and therefore, the study of the development of dispositional mindfulness helps understand the development of meta-cognition and self-regulation (Lawlor et al., 2014).

We have not included in this review some adult mindfulness measures that have been used among adolescents. As an example, Lau and Hue (2011) employed the Freiburg Mindfulness Inventory (FMI; Buchheld et al., 2001), as an outcome measure for an intervention. However, most of the studies have been either correlational or intervention, and have not analyzed the internal structure and other psychometric properties of these questionnaires in youth. Therefore, we excluded them from our review.

Finally, recently, other theoretically-related Buddhist concepts such as compassion, altruism, and social responsibility have been incorporated into the mindfulness field (Rau & Williams, 2015). Thus, the assessment of mindfulness in children and adolescents should be extended to include these aspects.

Conclusions

Research on the dispositional mindfulness measures in children and adolescents is promising. Most of the questionnaires have suitable psychometric properties. However, some improvements are still needed to better adapt these measures to youth. While most of the measures refer to mindfulness as a single factor, we now need to turn to the examination of the different dimensions of mindfulness. This will help to achieve a better understanding of the underlying mechanism of mindfulness-based interventions, as well as to examine the developmental perspective of mindfulness.

Conflict of interest

The authors declare that they have no conflict of interest.

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