

A Validation Study of the Mindful Attention Awareness Scale Adapted for Children

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Abstract Investigations of human potential and well-being recently have focused on mindfulness—a unique quality of consciousness that is defined as being aware of one’s thoughts and actions in the present moment. Previous research examining mindfulness among adults has found mindfulness to be positively related to indicators of well-being, such as optimism, positive affect, and self-regulation, and to be negatively related to indicators of maladjustment, such as depression and anxiety. Nonetheless, although much is known about the correlates of mindfulness in adult populations, the research examining mindfulness in children or adolescence is scant. The research is limited, in part, because of absence of measures that assess mindfulness in children and adolescents. The present investigation was designed to address this shortcoming by examining the reliability and validity of a modified version of the Mindful Attention Awareness Scale (MAAS)—a measure designed to assess mindfulness in adults. A total of 286 fourth to seventh grade children completed the modified version of the MAAS, the Mindful Attention Awareness Scale—Children (MAAS-C), as well as a battery of measures assessing a corpus of dimensions of well-being, including self-concept, optimism, positive and negative affect, school efficacy, classroom autonomy and supportiveness, depression, and anxiety. Results indicated that (1) the MAAS-C had high internal consistency (e.g., Cronbach’s alpha) and a one-factor solution, and (2) mindfulness, as assessed via the MAAS-C, was related in expected directions to indicators of well-being across the domains of

traits and attributes, emotional disturbance, emotional well-being, and eudaimonic well-being. These findings were in accord with those of previous research with the MAAS in adult populations. Theoretical considerations regarding early adolescent development are discussed.

Keywords Mindfulness · Children · Well-being · Measurement

Introduction

Mindfulness, that is the practice of being aware of one’s thoughts and actions in the present moment, has emerged as one focus of study within the area of well-being. Literature examining the benefits of mindfulness as both a positive individual trait and a therapeutic meditative practice has grown in recent years. To date, the vast majority of studies of mindfulness have been conducted with adults. A recent edition of *Child Development Perspectives* included a special section devoted to child development from the perspective of contemplative science. In their introduction to this special section, Roeser and Zelazo (2012) reviewed the exponential growth of both nationally-funded research grants and peer-refereed journals on the implementation of contemplative practices, including mindfulness. The authors’ comment that while growth in this area of research has risen dramatically, “relatively few studies have adopted a developmental perspective” (p. 143). While, it is encouraging that scholars and researchers are now turning their attention towards the developmental aspects of mindfulness-based approaches, there remains a primary focus on mindfulness within intervention research. In fact, to date, there are no studies examining mindfulness as a *trait* in child development. The questions around when mindfulness first emerges, how it develops in relation to other developmental tasks (e.g., cognitive changes) have not yet been

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investigated. Further, in order to conduct this line of research, a psychometrically sound instrument to measure mindfulness in children must be available. The present study offers a first step in this investigation by conducting a validation study of a measure of mindfulness for children.

Quality of Consciousness: Mindfulness and Well-being

The construct of mindfulness has been defined in more than one way within the literature; however, all definitions are in accord with the notion suggesting that mindfulness is a way of directing attention. It is considered to be a state of consciousness that incorporates self-awareness and attention with a core characteristic of being open, receptive and non-judgmental (Brown and Ryan 2003; Kabat-Zinn 1990; Segal et al. 2003). Within the literature concerning mindfulness-based interventions for therapeutic settings, mindfulness has been defined as “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” Kabat-Zinn 2003, p. 145).

Although attention and awareness are consistent features of normal functioning, Brown and Ryan (2003) describe mindfulness as “a quality of consciousness that is characterized by clarity and vividness of current experience and functioning and thus stands in contrast to the mindless, less ‘awake’ states of habitual or automatic functioning that may be chronic for many individuals” (p. 823). For example, when an individual is in the shower, he or she can be attuned to the moment–moment sensory experience of the warm water, while also being peripherally aware of the differing scents of shampoos and soaps. On the contrary, Brown and Ryan (2003) describe “mindlessness” as the relative absence of mindfulness. That is, consciousness that is constrained in some way (e.g., rumination on events in the past, anxieties about the future) pulls awareness away from the present experience. Mindfulness can also be compromised by dividing attention with multiple tasks (e.g., talking on the phone while watching television), preoccupation with concerns that limit focus on the present moment, and/or by refusing to acknowledge a thought, emotion, motivation or perceived object. Being mindful requires awareness and focus on current experience, versus “automatic pilot,” which involves engaging in behavior that is out of awareness and attention, that is compulsive or automatic (Kabat-Zinn 1990; Segal et al. 2002).

Trait and State Mindfulness

Kabat-Zinn (2003) posited that all individuals are likely capable of mindfulness, but may differ in regards to their propensity to be mindful. In a similar vein, Brown and Ryan (2003) investigated mindfulness as a naturally occurring characteristic, varying among individuals, and within individuals over

time. These investigations found mindfulness to be positively associated with a variety of well-being constructs (e.g., optimism, positive affect, and self-actualization) while being negatively related to indicators of psychological and emotional disturbance (e.g., negative affect, depression, anxiety, and rumination). Additionally, mindfulness was found to be positively related to the three fundamental needs outlined by self-determination theory. Self-determination theory (Deci and Ryan 1985; Ryan and Deci 2000) is an approach to motivation and personality that posits that humans have three innate psychological needs—autonomy, relatedness (belonging), and competence. Research guided by self-determination theory has revealed that when these three fundamental needs are satisfied, individuals exhibit enhanced self-motivation and mental health; conversely, not meeting these three needs is related to diminished motivation and well-being (Ryan and Deci 2000). Overall, high reports of mindfulness have been found to be related to enhanced self-awareness and are predictive of self-regulation and positive emotional states (Brown and Ryan 2003).

Brown and Ryan (2003) investigated both state and trait (dispositional) mindfulness, positing that trait mindfulness is predictive of autonomous activity in daily life, whereas state mindfulness is linked to momentary positive experience and affect. Results from an experience-sampling study in which the researchers studied daily fluctuations in reports of mindfulness from samples of adult and undergraduate students supported this hypothesis, and also found that trait mindfulness predicted lower levels of unpleasant affect. Trait and state mindfulness were shown to be independent in that a mindful disposition had beneficial effects on emotional well-being and self-regulation, as did state experiences of mindfulness, independent of disposition. Finally, a relationship was found between state and trait mindfulness. Specifically, those who exhibited trait mindfulness were more likely to report experiences of state mindfulness. The present study is interested in investigating trait mindfulness in children, thus the MAAS, a trait measure of mindfulness for adults, was chosen for this investigation.

Mindfulness in Middle Childhood

Middle childhood is a developmental period marked as a time when children develop a sense of competence and personal self-esteem. Three areas have been identified as important for the development of confidence and task engagement in middle childhood: (1) cognitive changes that increase children’s ability to reflect on their personal achievements and failures, (2) a widening of children’s social worlds that include peers, adults and activities outside the family; and (3) an introduction to competition and social comparison within peer groups and classrooms. During middle childhood cognitive thinking and conceptual skills are refined and consolidated. This period

entails advances in understanding, meta-cognition and self-regulation. Children develop skills of self-awareness and gain the ability to take the perspectives of others (for a review see Eccles 1999).

When considering mindfulness and the developmental advancements in middle childhood, the skills around self-awareness, in particular meta-cognition and self-regulation, are of particular interest. Mindfulness encompasses an active process to attend to the present moment, which requires the ability to control attention and exercise executive functions. Examining items on the MAAS, a measure to assess trait mindfulness, there are clear links to these cognitive processes. For example, item 9, (*I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there*), is reflective of a lack of meta-cognition specific to the present task at hand. Item 1 (*I could be experiencing some emotion and not be conscious of it until some time later*), and item 5 (*I tend not to notice feelings of physical tension or discomfort until they really grab my attention*), tap into meta-awareness, or the ability of a child to have awareness of the self. According to developmental theory and research, middle childhood is a time where the processes necessary for the active components of mindfulness (i.e., meta-cognition) are developed. As such, children within this developmental period have the cognitive skills necessary to understand and respond to the questions on the MAAS. In addition, investigating the developmental trajectory of mindfulness within middle childhood is of interest in furthering understanding of the development and growth of cognitive processes.

Research Examining Mindfulness and Children

To date, there is a lack of published research investigating mindfulness as a trait in child development. The only available research on children and mindfulness is intervention-based. In fact, several reviews on the topic of mindfulness interventions with children and youth are presently available (for reviews, see Burke 2010; Greenberg and Harris 2012; Harnett and Dawe 2012). For example, a universal primary prevention program—the *Mindfulness Education* (ME) program—designed to foster children’s mindful awareness, problem solving ability, self-regulation, goal setting, conflict resolution and prosocial behaviors, was piloted in a sample of 246 fourth to seventh grade students attending six elementary schools in Canada during. Results from a quasi-experimental evaluation study revealed that children who participated in the ME Program, compared to children who did not, showed significant improvements on teacher-rated school behaviors (i.e., social emotional competence, behavioral dysregulation, attentional control, aggression). Program children also demonstrated increases from pretest to posttest in self-reported optimism, self-concept, reflection,

and mindful awareness attention in contrast to children in the comparison group, although for some of these constructs program effects demonstrated more positive benefits for girls (Schonert-Reichl and Lawlor 2010).

Broderick and Metz (2009) piloted the “Learning to BREATHE” program, a mindfulness-based program designed to support emotion regulation skill development implemented within a high school classroom setting. This pilot study examined results from 120 senior students (average age 17.4 years) against a control group from a private girls’ school. Results from this study indicated that relative to the control group, participants of the Learning to BREATHE program reported increased feelings of relaxation calmness, self-acceptance and reduced negative affect. Additionally, Learning to BREATHE participants noted significant improvements in emotion regulation and decreases in aches, pains and tiredness. Results indicated the program to be promising in the promotion of adolescent well-being.

Burke (2010) reviewed 15 intervention studies utilizing either the Mindfulness-based Stress Reduction (Kabat-Zinn 1990) or Mindfulness-based Cognitive Therapy program (Segal et al. 2002) that had been modified for use with children or adolescents. Burke’s review of the research supported the feasibility of the use of mindfulness-based interventions with children and adolescents, however, Burke commented that there was a lack of empirical evidence for the efficacy of these interventions with child and adolescent populations. The problems found in the reviewed studies was attributed to broad methodological issues, including a lack of large scale RCT designed studies with children and adolescents. Burke noted “no measures have as yet been validated for use with children and adolescents, leaving a gap in the field that needs attention” (p. 143). According to Burke, the lack of a measure of mindfulness for children with published data regarding reliability and validity was problematic, as most studies did not include a measure of mindfulness, and those that did faced the problem of uncertain results due to the use of unvalidated measurement tools of mindfulness for children.

Despite the growing body of mindfulness related literature, a review of the extant research reveals that the research on the benefits of mindfulness, both as a trait and through intervention, has been primarily investigated with adult populations. While research that examines mindfulness with children is growing, a major limitation in this area revolves around measurement. To date, research with children has been hindered by a lack of psychometrically tested instruments to assess mindfulness within this population.

The Measurement of Mindfulness

The literature has provided evidence that mindfulness is a naturally occurring characteristic of consciousness that

varies between and within individuals. Nonetheless, prior to embarking on an investigation of the potential benefits of mindfulness, it is critically important to develop a measure of the construct of mindfulness that is reliable and valid. In recent years several self-report measures have been created in order to assess dispositional mindfulness in adults. Those measures include the Mindful Attention Awareness Scale (MAAS; Brown and Ryan 2003), the Freiburg Mindfulness Inventory (Buchheld et al. 2001), the Kentucky Inventory of Mindfulness Skills (Baer et al. 2004). Baer and her colleagues investigated the construct of mindfulness as assessed by the aforementioned measures along with two other assessments, the Cognitive and Affective Mindfulness Scale (Feldman et al. 2004; Hayes and Feldman 2004), and the Mindfulness Questionnaire (Chadwick et al. 2005). Using two samples of undergraduate students, the researchers conducted an exploratory factor analysis of the combined pool of mindfulness items from all measures. Results indicated a five-factor model of mindfulness. This factor structure informed the development of the Five Factor Mindfulness Questionnaire (Baer et al. 2006). Of interest to the present study is that all the items of the MAAS loaded on only one factor (Acting with awareness/automatic pilot/concentration/nondistraction) in the presence of other mindfulness measures.

A review of the self-report measures available reveals an issue regarding the conceptualization of mindfulness as noted by Brown and colleagues in the following comment, “the current mindfulness scales show considerable variation in content and structure according to theoretical conceptualization; such diversity is not inherently problematic, but it does suggest a lack of agreement on the meaning of the mindfulness construct” (Brown et al. 2007, p. 227). Across the literature, however, there does appear to be agreement that dispositional mindfulness “reflects a greater tendency to abide in mindful states over time” (Brown et al. 2007, p. 216). Citing the work of Schooler and Schreiber (2004) that examined how self-reports systematically covary with the behavioral, environmental, and physiological concomitants of experience in order to establish the correspondence between meta-consciousness and experience, Brown et al. noted that the validity of self-report mindfulness measures could be improved if they were found to converge with objective indicators of subjective experience. In line with this argument, reports on the MAAS have been shown to predict an objective indicator, that is, neural activation in brain regions that are theoretically linked to mindfulness (Creswell et al. 2007).

The MAAS assesses “individual differences in the frequency of mindful states over time” (Brown and Ryan 2003, p. 824). Brown and Ryan conducted their research on the MAAS with college students, adults in the general population, mindfulness practitioners, and an adult sample of cancer patients. Their research included conducting a series of

studies (correlational, quasi-experimental, and laboratory) that focused on examining both the reliability and validity of the MAAS. Their research findings yielded support for the notion that the MAAS measured a unique quality of consciousness that was related to a corpus of well-being constructs. Moreover, results indicated the MAAS to have (1) a clear unidimensional factor structure; (2) good test–retest reliability; and (3) evidence of convergent and discriminant validity.

Recently, Brown et al. (2011) conducted two validation studies of a modified version of the MAAS with a group of adolescents (aged 14–18) and a group of psychiatric adolescents (aged 14–18). The Mindful Attention Awareness Scale—Adolescent (MAAS-A) was found to have a single factor, high internal consistency, test–retest reliability and evidence for concurrent and internal validity. Scores of the MAAS-A were found to be related to indicators of well-being, displaying a similar pattern found in the original research on the MAAS with adult populations (Brown and Ryan 2003). In addition, an intervention study with the psychiatric group of adolescents showed increases in MAAS-A scores to be significantly related to positive changes in indicators of well-being (Brown et al. 2011). Their finding supported validity and reliability of the use of the MAAS-A with both psychiatric and general adolescent populations.

The Present Study

Despite the plethora of extant research on mindfulness in adult populations, there is limited available empirical research on this construct amongst child populations, with nothing published specific to trait mindfulness in children, most likely due to the absence of a reliable and valid instrument assessing mindfulness for this age group. Hence, the primary purpose of the study was to test the factor structure and internal consistency of a modified version of the MAAS (Brown and Ryan 2003) the MAAS-C that was adapted by Benn (2004). Scores from the MAAS-C, along with a battery of indicators of psychological well-being and self-exploration were analyzed to answer the following three questions: (1) Is the MAAS-C (Benn 2004) a reliable and psychometrically sound measure when used with a population of children? (2) Do scores on the MAAS-C differ across gender and grade? (3) Does the MAAS-C show evidence of convergent and discriminant validity?

Method

Participants

Data for the present study were taken from a larger quasi-experimental study evaluating the effectiveness of a universal primary prevention program that was being implemented

in a large Western Canadian city. For the present investigation, only the pretest data were used. Classroom teachers were recruited through an information memorandum sent to elementary schools across the school district. Interested teachers were told about the research study at an information session. Children were recruited from classrooms in which the teachers expressed a willingness to participate.

Participants included a total of 286 fourth to seventh grade children attending six public elementary schools representative of a diverse range of socioeconomic statuses. The sample was comprised of 140 girls and 146 boys, with a mean age of 11.43 years ($SD=1.07$). The sample represented a diverse group of students with 14 different languages reported as the first language in which they learned. The majority of participants (58 %) identified English as the first language they learned, the next highest reported first language was Chinese (23 %). The remainder of the sample was dispersed among 12 other languages (e.g., Serbo-Croatian, Filipino, Ukrainian, Japanese, French, Vietnamese, Russian, Spanish, Korean, Polish, Italian, or “Other”). Participation in the study was voluntary and required both parental consent and student assent; the overall participation rate of students across classrooms was 82 %.

Measures

Demographic Information A demographic questionnaire was administered to each student to gather information about their gender, age, grade, first language learned at home, and family composition.

Mindfulness The original MAAS, as developed by Brown and Ryan (2003), assesses individual differences in the “frequency of mindful states over time.” In developing their measure, Brown and Ryan found “statements reflecting less mindlessness are likely more accessible to most individuals, given that mindless states are much more common than mindful states” (p. 826). Therefore, items on the MAAS reflect mindless states (e.g., “I could be experiencing some emotion and not be conscious until sometime later,” “I do jobs or tasks automatically without being aware of what I am doing,” “I snack without being aware of what I am eating”). The MAAS (Brown and Ryan 2003) is a 15-item scale with a response format that ranges from 1=*almost always*, 2=*very frequently*, 3=*somewhat frequently*, 4=*somewhat infrequently*, 5=*very infrequently*, and 6=*almost never*, with higher scores indicating higher levels of mindfulness. Items are distributed across cognitive, emotional, physical, interpersonal, and general domains.

Benn (2004) modified the MAAS to use with younger populations by (1) altering the language to be age appropriate and, (2) changing the six-point Likert-type scale to a more child friendly format, ranging from 1=*almost never*, 2=*not*

very often at all, 3=*not very often*, 4=*somewhat often*, 5=*very often*, and 6=*almost always*. Items were then reverse-scored and averaged with higher scores indicating higher mindfulness and lower mindlessness.

Brown and Ryan report the MAAS to be a reliable and valid instrument for adults with reported internal consistency of .85. Table 1 provides all of the items on the MAAS-C.

Traits and Attributes Three measures were used to assess attributes of self. Reports of self-concept were assessed via two subscales from the Self-Description Questionnaire (Marsh 1990)—General Self-Concept and School Self-Concept. Each subscale is comprised of seven items that are averaged to produce a total score in which higher scores reflect higher self-concept. An item example from the General Self-Concept subscale is, “In general, I like being the way I am.” An illustrative item from the School Self-Concept subscale is, “I enjoy doing work in all school subjects.” For the present study, reliability for both subscales was satisfactory (General self-concept, $\alpha=.83$; School self-concept, $\alpha=.87$). Optimism, a third measure of self that reflects an individuals’ generalized expectancy that positive outcomes are attainable, was assessed via the nine-item Optimism subscale from the Resiliency Inventory (Schonert-Reichl and Lawlor 2010; Song 2003). An illustrative item is, “More good things than bad things will happen to me.” Students were asked to rate each item on a five-point Likert-type scale ranging from 1=*not at all like me* to 5=*always like me*. Higher scores represent greater optimism. In the present study, Cronbach’s alpha for the Optimism scale was found to be satisfactory ($\alpha=.74$).

Internalizing Problems Two measures designed to assess children’s internalizing problems—depression and anxiety—were utilized in the present study. To assess children’s self-reports of depression, we used the Child Depression Inventory (CDI; Kovacs 1992). The CDI, designed for school-aged children and adolescents, is a 27-item self-report scale that assesses depressive symptoms. For each item, responses are rated on the following response format: 0 (absence of symptom), 1 (mild symptom); and 2 (definite symptom). By summing all 27 items, a total depression score is created, with higher scores indicating more severe depressive symptoms. The CDI is a widely used instrument with acceptable reliability, and criterion and concurrent validity. In the present investigation the internal, consistency as measured by Cronbach’s alpha was .89.

Children’s self-reports of anxiety were assessed via the Spence Children’s Anxiety Scale (SCAS; Spence et al. 2003). The SCAS is 47-item self-report measure designed to evaluate symptoms of anxiety and is comprised of six subscales: separation anxiety, social phobia, obsessive compulsive disorder, panic-agoraphobia, generalized anxiety, and fear of physical injury. Spence et al. (2003) report

Table 1 The Mindful Attention Awareness Scale modified for Children

	Almost never	Not very often at all	Not very often	Somewhat often	Very often	Almost always
I could be feeling a certain way and not realize it until later	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else	1	2	3	4	5	6
I find it hard to stay focused on what's happening in the present moment	1	2	3	4	5	6
Usually, I walk quickly to get where I'm going without paying attention to what I experience along the way	1	2	3	4	5	6
Usually, I do not notice if my body feels tense or uncomfortable until it gets really bad	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time	1	2	3	4	5	6
It seems that I am doing things automatically without really being aware of what I am doing	1	2	3	4	5	6
I rush through activities without being really attentive to them	1	2	3	4	5	6
I focus so much on a future goal I want to achieve that I don't pay attention to what I am doing right now to reach it	1	2	3	4	5	6
I do jobs, chores, or schoolwork automatically without being aware of what I'm doing	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time	1	2	3	4	5	6
I walk into a room, and then wonder why I went there	1	2	3	4	5	6
I can't stop thinking about the past or the future	1	2	3	4	5	6
I find myself doing things without paying attention	1	2	3	4	5	6
I snack without being aware that I'm eating	1	2	3	4	5	6

confirmatory and exploratory factor analyses supporting six factors consistent with the hypothesized subtypes of anxiety. For the purposes of the present study, only the total sum score was utilized ($\alpha=.92$).

Emotional-Subjective Well-Being One measure to assess affective arousal, the 24-item Positive and Negative Affect Schedule (Watson et al. 1988). Twenty-four emotion words (12 positive; 12 negative) are rated according how much the respondent has felt that emotion over the last week. Responses are rated from 1 *Not much* to 4 *Most of the time*. Internal consistency was found to be satisfactory for both the subscales of positive affect and negative affect average scores; $\alpha=.75$; $\alpha=.85$, respectively.

Autonomy, Belonging, and Competence Three measures were used to assess the three fundamental needs outlined by self-determination theory (Deci and Ryan 1985)—autonomy, relatedness, and competence. To assess children's perceptions of autonomy and relatedness in school, we utilized two subscales from the *Sense of Classroom as a Community Scale* (Battistich et al. 1997), that is the *Classroom Autonomy subscale* and the *Classroom Supportiveness subscale*. The *Classroom Autonomy subscale* comprises 10 items and assesses students' feelings of autonomy and influence in their classroom (e.g., "In my class students have a say in deciding what goes on"). The *Classroom Supportiveness subscale* is

comprised of 14 items and assesses the degree to which students feel that their classmates are supportive, helpful, and mutually concerned (e.g., "*Students in my class are willing to go out of their way to help someone*"). Items are rated on a five-point Likert-type scale that ranges from 1 *Never* to 5 *Always*. Internal consistency, as assessed via Cronbach's alpha, was found to be satisfactory for each of the subscales, ($\alpha=.87$ for each subscale).

Self-Exploration One measure was used to assess children's self-exploration, or self-attentiveness. The Ruminative-Reflection Questionnaire (RRQ; Trapnell and Campbell 1999; modified by Lawlor 2005) consists of two subscales to assess two aspects of self-awareness, rumination and reflection. The original 24-item RRQ includes 12-item subscale examining rumination and a 12-item subscale assessing reflection. The adapted RRQ used in this study modified the language of the items to be more age appropriate for children and deleted 5 items from the reflection subscale that were too sophisticated for a population of children. The adapted RRQ contains 12 items assessing rumination and 7 items assessing reflection. Scores on each of the subscales were averaged with higher scores reflecting higher levels of reflection and rumination. Cronbach's alpha computations revealed satisfactory internal consistencies for both subscales (rumination, $\alpha=.73$; reflection, $\alpha=.65$).

Finally, self-reports of children's perceived competence were collected via the Academic Goals Questionnaire (Roeser et al. 1996), which consists of two subscales assessing academic efficacy and academic goal orientation. Nine items are rated on a five-point Likert-type scale ranging from 1 *Not at all like me* to 5 *Always like me*. The internal consistency assessed via Cronbach's alpha was satisfactory for both subscales of the questionnaire (academic efficacy, $\alpha=.90$; academic goal orientation, $\alpha=.76$). Due to logistical time constraints during data collection not all 286 students were able to complete the measures for competence. A group of 178 students completed the additional measures for autonomy and competence. The correlations examining the relationships with competence represent $n=178$.

Procedure

At the onset of the research study, the purpose and the procedures of the study were explained to classroom teachers in order to solicit their participation. Subsequently, classroom visits were scheduled whereby the study was explained to the students and parental permission forms and student recruitment forms were given out to students. In order to ensure participants' proficiency in English to complete the questionnaire, participating teachers were asked to identify any of their students who did not have sufficient skills in reading English to complete our questionnaire, and no students were identified. On the day of data collection, students were given a student assent form wherein they were told that their participation was voluntary, and that there would be no consequences if they chose not to participate. The first author and one trained research administered the questionnaires during one 45-min class period. All items on the questionnaire were read aloud to students to control for differences in reading ability. Students were encouraged to answer honestly and to ask any questions if they did not understand any of the questions or items on the instruments. Students were also informed that their responses would be kept confidential, and only the researchers, not the teachers, parents, principal, etc., would see their completed questionnaires.

Results

Results report on the analysis conducted to examine the psychometric properties of the modified MAAS. We performed an exploratory factor analysis, reliability testing, and item analysis to answer the questions, (1) is the revised MAAS (Brown and Ryan 2003, modified by Benn 2004) a reliable and psychometrically sound measure when used with a population of children? and, (2) are there individual

differences in scores on the MAAS-C among individual children and are there differences across age and between gender? We performed a series of correlations performed between the MAAS-C and indicators of well-being and self-exploration to answer the third research question, (3) Does the modified MAAS-C show evidence of convergent and discriminant validity?

Psychometric Properties of the Modified Mindful Attention Awareness Scale

Descriptive Statistics Table 2 includes the descriptive statistics of the sample including age, gender and grade; additionally the means and standard deviations of the total score on the 15-item MAAS-C are presented.

Exploratory Factor Analysis We examined the factor structure of the MAAS-C using exploratory factor analysis (EFA) in the total sample of 286 children. We used EFA (rather than confirmatory factor analysis) as the factor structure of this modified version of the MAAS-C has not previously been examined with children. To determine the number of factors parallel analysis was utilized, which is considered one of the most accurate factor retention methods (Hayton et al. 2004). The EFA was performed in MPlus (version 6, Muthén and Muthén 2010) on the polychoric correlation matrices to accommodate the Likert-type data, with the mean and variance adjusted weighted-least squares estimation method. Based on the parallel analysis one factor was identified. The unidimensional model also showed adequate fit with a root mean square error of approximation of 0.06 (cf. Vandenberg and Lance 2000). The factor loadings of the

Table 2 Means and standard deviations by grade and gender for the modified Mindful Attention Awareness Scale

<i>n</i>	Gender	Grade	<i>M</i>	<i>SD</i>
32	Boy	4	4.41	.98
50		5	4.74	.76
41		6	4.47	.71
23		7	4.23	.66
146		Total	4.51	.80
30	Girl	4	4.62	.82
49		5	4.46	.95
34		6	4.34	.78
27		7	4.12	.59
140		Total	4.40	.83
62	Total	4	4.51	.90
99		5	4.60	.87
75		6	4.41	.74
50		7	4.17	.62
286		Total	4.46	.81

items are provided in Table 3. With the exception of one item (*I do jobs, chores, or schoolwork automatically without being aware of what I'm doing*) all items had loadings $>.40$ on the first factor, a cut-off that is commonly used to identify items to be included in a scale (e.g., Pedhazur and Schmelkin 1991). The first eigenvalue in our data was 5.36; the second eigenvalue was 1.12. A parallel analysis identified 1 factor (the second random factor had an eigenvalue of 1.31, which is larger than the second eigenvalue in our dataset). Examination of the factor loadings for each item revealed that item 3 (*I find it hard to stay focused on what's happening in the present moment*), item 7 (*It seems that I am doing things automatically without really being aware of what I am doing*), item 8 (*I rush through activities without being really attentive to them*), item 9 (*I focus so much on a future goal I want to achieve that I don't pay attention to what I am doing right now to reach it*), item 12 (*I walk into a room, and then wonder why I went there*), item 13 (*I can't stop thinking about the past or the future*), and item 14 (*I find myself doing things without paying attention*), exhibited the highest factor loadings ($>.60$). Conversely, item 1 (*I could be feeling a certain way and not realize it until later*), item 5 (*Usually, I do not notice if my body feels tense or uncomfortable until it gets really bad*), item 6 (*I forget a person's name almost as soon as I've been told it for the first time*), item 10 (*I do jobs, chores, or schoolwork automatically without being aware of what I'm doing*), item 11 (*I find myself listening to someone with one ear, doing something else at the same time*), and item 15 (*I snack without being aware that I'm eating*) had somewhat lower factor loadings ($<.50$). This pattern of factor loadings suggests that items assessing cognitive

and general domains are more highly related to the latent factor than items assessing emotional and physical domains.

Reliability As the results of the EFA indicate unidimensionality of the MAAS-C, the internal consistency was computed on the basis of the scores of the 15 items. The internal consistency (Cronbach's alpha) was .84 for the total group ($n=286$). Additionally, we computed separate Cronbach's alphas for gender. Cronbach's alpha for boys was .837 ($n=139$); 7 male subjects were excluded for the reliability testing due to missing values. Cronbach's alpha for girls was .851 ($n=133$); 7 female subjects were excluded for the reliability testing due to missing values.

Our analysis revealed similar alpha's for each grade level: fourth grade=.85, fifth grade=.87, sixth grade=.84, and seventh grade=.74. These findings indicate a high internal consistency for the modified MAAS when used with a population of children.

Scale and Item Statistics To examine whether this population of children exhibited variability reporting on the MAAS-C, we examined the means and standard deviations for each item on the scale. Additionally, we examined the item-total statistics (mean and variance) for each item if it were deleted from the scale. Results indicate there was satisfactory variability reported on the MAAS-C.

Gender and Grade Differences To examine for gender and grade differences in mindfulness as measured by the MAAS-C, we performed a 2 (gender) \times 4 (grade) analysis of variance. The main effect for gender was not significant. There was, however, a significant main effect for grade, $F(3, 278)=3.31, p=.02$,

Table 3 Factor loadings of the items of the Mindful Attention Awareness Scale modified for Children

Items	Factor 1
1. I could be feeling a certain way and not realize it until later.	.41
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.	.58
3. I find it hard to stay focused on what's happening in the present moment.	.64
4. Usually, I walk quickly to get where I'm going without paying attention to what I experience along the way.	.51
5. Usually, I do not notice if my body feels tense or uncomfortable until it gets really bad.	.48
6. I forget a person's name almost as soon as I've been told it for the first time.	.44
7. It seems that I am doing things automatically without really being aware of what I am doing.	.73
8. I rush through activities without being really attentive to them.	.61
9. I focus so much on a future goal I want to achieve that I don't pay attention to what I am doing right now to reach it.	.65
10. I do jobs, chores, or schoolwork automatically without being aware of what I'm doing.	.35
11. I find myself listening to someone with one ear, doing something else at the same time.	.46
12. I walk into a room, and then wonder why I went there.	.62
13. I can't stop thinking about the past or the future.	.61
14. I find myself doing things without paying attention.	.73
15. I snack without being aware that I'm eating.	.47

Table 4 Correlations of the MAAS with measures of well-being

Scale	Correlation
Traits and attributes	
Self-Description Questionnaire	
School self-concept	.22**
General self-concept	.11
Resiliency Inventory (optimism subscale)	.34**
Emotional disturbance	
Spence Anxiety Scale	−.39**
Child Depression Inventory	−.47**
Emotional-subjective well-being	
PANAS Positive Affect	.19**
PANAS Negative Affect	−.52**
Autonomy, belonging, and competence	
Classroom as Community scale (Autonomy subscale)	.18*
Classroom as Community scale (supportiveness subscale)	.11
Academic goals questionnaire	
Academic efficacy	.16*
Personal achievement	.16*
Goals	
Self-exploration	
Reflection subscale	.10
Rumination subscale	−.56**

PANAS Positive and Negative Affect Schedule

$n=286$ for all variables with the exception of the following subscales: Classroom as Community scale—Autonomy, Academic Efficacy and Personal Achievement Goals in which $n=174$

* $p<.05$; ** $p<.01$

$\eta_p^2=.034$. Effect size indicted a moderate effect. Post-hoc (Tukey) analyses indicated that fifth graders scored higher on mindfulness than seventh graders. The grade by gender interaction was not significant.

Convergent and Discriminant Validity Evidence for the Modified MAAS

Table 4 displays the correlations between the MAAS-C and measures assessing convergent and discriminant validity. As expected, children's scores on the MAAS-C were positively and significantly related to their school self-concept, optimism, positive affect, perceived classroom autonomy, academic efficacy, and personal achievement goals. Additionally, children's scores on the MAAS-C were found to be negatively and significantly related to depression, anxiety, and negative affect. The adapted MAAS-C was not statistically significantly correlated to the self-reflection, but was significantly and negatively related to rumination.

The pattern of relations is in accord with those results found by Brown and Ryan (2003) in their research with

adult populations using similar constructs and measures. That is, as was found by Brown and Ryan's 2003 study, results of the present investigation reveal that the MAAS-C is related to both positive and negative indicators of well-being in consistently expected directions.

Discussion

The present study examined the psychometric properties of the MAAS-C, an adapted version of the Mindful Attention Awareness Scale designed to assess the quality of consciousness, mindfulness. Results offer preliminary evidence that the MAAS-C is a psychometrically sound instrument when used with a population of children in grades 4–7. In particular, the EFA returned a unidimensional factor structure, thereby replicating previous research on the MAAS in adult samples that have shown the unidimensionality of the measure (e.g., Brown and Ryan 2003).

Reliability testing revealed high internal consistency for the scale. Exploration of the item scale statistics showed satisfactory variability of responses on the scale. The correlation patterns show that overall, high scorers on the MAAS-C tended to report better psychological adjustment across the domains of traits and attributes, emotional disturbance, emotional well-being and eudaimonic well-being. Conversely, the MAAS-C was not significantly related to self-reflection or rumination. These correlations offer evidence for convergent and discriminant validity of the measure. In addition, the MAAS-C's positive relationship to measures of well-being, are in accord with findings with adult research suggesting mindfulness could be an important element of positive child development.

The variability we found among this group of children suggests that mindfulness may not be static across later childhood. Of particular interest, is that mindfulness was found to be higher in younger children than in older children. This finding may be explained by the increases in risk that children face as they move through later childhood and into early adolescence (grades 6 and 7). This period marked by tremendous change across cognitive, social and biological areas of functioning (Eccles 1999). However, despite increases in competencies, research has shown that as children move through early adolescence both their sense of optimism and self-concept decline (Eccles et al. 1989; Schonert-Reichl 2007; Wigfield et al. 1991). This decline can partially be explained by (1) increases in cognitive ability, which facilitate reflection on successes and failures, (2) children's widening contexts which incorporate peers, adults and activities outside their immediate families, and (3) the introduction of social comparison and competition.

The systematic difference in the results MAAS-C in seventh grade students compared to students in grades 4–6

may be better understood by considering the expansion of cognitive ability, including such things as social comparison, future orientation and reflection including more elaborate thoughts and feelings (Eccles 1999). This may lead to more mind wandering, which occurs when an individual's attention is away from the present moment, and is focused on the past or the future (see Smallwood and Schooler 2006), thus prompting a potential for greater fragmentation of attention. Changes in cognitive, contextual, and social domains may help explain lower self-reported mindfulness, due to the additional demands for these students. One possible contributor to a possible increase in concern with the future for this sample of grade 7 students may have been the major transition they were anticipating—specifically, the transition to high school that follows their grade 7 year. This may have brought forth more stress and preoccupation.

Neuroscience research may also help provide some insight into the developmental changes experienced by early adolescents. Research by Way et al. (2010), for example, examined dispositional mindfulness using the adult MAAS (Brown and Ryan 2003) and revealed an association between inattentiveness and chronic overreactivity of the limbic system leading to hyper-reactivity to affective stimuli. The limbic system is an area of the brain beneath the cerebrum that functions in the areas of memory, behavior, motivation and emotions. It has been considered to be the emotional center of the brain, and responds to stress and threat. This finding may help to explain the increase in negative affectivity in early adolescence, and provide some clues as to what may be happening neurologically as children move into early adolescence.

In addition, internalizing disorders, namely anxiety and depression, are dependent on developmental trends and first appear in later childhood, with an average age of onset for anxiety disorders of 7.2 years, and depression disorders appearing slightly later with an average age of onset of 8.4 years (Kovacs and Devlin 1998). Studies have revealed that stable within-person traits may predispose an individual to an internalizing disorder, specifically, negative affectivity, which is the tendency towards sensitivity to negative stimuli (Clark et al. 1994). Kovacs and Devlin (1998) proposed that negative affectivity reflects a temperament–personality characteristic that constitutes impairment in the ability to regulate negative mood or emotion. Because early adolescence is marked by an increase in reports of negative affect (Larson and Ham 1993; Larson and Lampman-Petratis 1989), this is a particularly vulnerable period for those exhibiting a tendency for negative affectivity to develop anxiety or depression. Mindfulness may help hinder the development of anxiety and depression by decreasing the tendency towards rumination and absorptive states of consciousness. Specifically, “when individuals deliberately stay in the present moment, they can respond to current events

with a full awareness or their automatic tendencies, but can make choices that are not necessarily constrained by these. A greater non-judgmental awareness of one's own impulses and thought patterns should result in a decreased emotional reactivity and vulnerability” (Thompson and Gauntlett-Gilbert 2008 p. 396).

Two important findings arose from the results from this study. First, preliminary evidence offers support that the MAAS-C is a psychometrically sound instrument when used with a population of children. Results suggest the MAAS-C is an appropriate measure for use with this population, and offers preliminary evidence that mindfulness may be a naturally occurring quality of consciousness differing among children across ages. The second important finding is that preliminary data suggests mindfulness within this population is related to indicators of well-being across the domains of traits and attributes, emotional disturbance, emotional well-being and eudaimonic well-being in accordance with Brown and Ryan's (2003) findings with an adult sample. Indeed, these findings offer important insight into the role mindfulness may play in positive child development. Further research is needed to both ascertain the developmental trajectory of mindfulness in children, and also investigate the viability of other modified assessments of mindfulness, such as the Five Facet Mindfulness Questionnaire (Baer et al. 2006).

Some generalizability of the findings of this study is possible because we used a relatively large and ethnically diverse sample of children residing in Canada. The sample size also enabled us to perform an EFA on the one factor modeled proposed by Brown and Ryan (2003) for the MAAS-C. The present investigation utilized measures to assess the relevant constructs that had good psychometric properties and are widely used within the literature. In our design, we were able to match the majority of constructs in the domains of traits and attributes, emotional disturbance, emotional-subjective well-being and eudaimonic well-being to the ones that Brown and Ryan (2003) used in their validation study of the original MAAS.

Limitations of this study include the sole use self-report measures, which can introduce bias regarding under or over-reporting. Our sample, although a satisfactory size, was ethnically and socio-economically diverse, which complicates our ability to generalize findings to specific homogeneous populations. Additionally, the cross-sectional and correlational design of this study limits the interpretations that can be made regarding our findings. Although the results suggest significant relationships between mindfulness and several indicators of well-being, they cannot be interpreted causally. Longitudinal studies are required to ascertain any causal relationship between mindfulness and adolescent development and well-being.

Despite the aforementioned limitations, this study provides initial evidence of validation for the use of the

modified MAAS-C, and offers preliminary insight into the role mindfulness may play in the psychological adjustment and well-being of this population. These findings highlight the importance of further investigation of the construct of mindfulness and its measurement in child development and well-being. In future research, it would be of interest to cross-validate the factor structure of the MAAS-C using confirmatory factor analysis. Further, future research that uses a multi-measure, multi-informant, and/or longitudinal approach is imperative in order to better understand, describe and operationalize the construct of mindfulness in childhood. Future research would also benefit from a greater understanding of the relationship between the trajectories of trait mindfulness across development and neural anatomy in children and adolescents. For example, research has shown an increase in volume in the limbic area of the brain with age. Specifically, Giedd et al. (1996a, b) found amygdala volume increased significantly for males, which hippocampal volume increased significantly with age in females. These changes in the limbic region of the brain may impact the propensity to be mindful in early adolescence. Brain imaging studies examining the relation between dispositional mindfulness and neural anatomy in early adolescence may help to further answer questions relating to the trend in our data revealing a decrease in mindfulness as reported by older children as compared to younger children.

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