

Mindfulness Facets and Depression in Adolescents: Rumination as a Mediator

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Abstract The present study examined the structure of the Five Facet Mindfulness Questionnaire (FFMQ) in adolescents and whether predictive associations between mindfulness facets and depressive symptoms are mediated by reduced rumination. A sample of 520 Spanish adolescents (mean age = 16.11, $SD = 0.98$, range = 13–19, 57.9 % girls) completed the FFMQ and measures of depression and rumination initially and after 4 months. In study 1, a confirmatory factor analysis supported a five-factor correlated model for the five facets, which are observing, describing, acting with awareness, non-reactivity, and non-judging. All five facets and the total FFMQ scores showed acceptable internal consistency, test-retest reliability, and convergent and discriminant validity. All the mindfulness facets other than observing correlated negatively with depressive symptoms. In study 2, a subsample of 461 adolescents was followed up to examine longitudinal associations between mindfulness facets, rumination, and depression. The results demonstrated that acting with awareness and non-reactivity predicted a reduction in depression over time, whereas observing predicted an increase in depression through the mediation of increased rumination. Thus, this research provides support for the adaptive role of acting with awareness and non-reactivity and suggests that observing might play a maladaptive role in adolescents.

Keywords Mindfulness · Depression · Rumination · Adolescents · FFMQ

Introduction

Depression rates increase in adolescence causing several negative outcomes in social, academic, and personal domains, such as self-concept, body image, and life satisfaction (Avenevoli, Knight, Kessler, and Merikangas 2008; Dekker et al. 2007). Moreover, depression in adolescence is a strong predictor of depression in adulthood (Rutter et al. 2006). Therefore, the identification of vulnerability and protective factors against depression at this stage is essential. An impressive body of research has examined the factors that increase the risk of depression in adolescence. For instance, the ruminative response style has been considered an important antecedent for depression. It involves responding to distress by focusing repetitively and passively on its symptoms, causes, and consequences (Nolen-Hoeksema et al. 2008). In contrast, research on protective factors that reduce the risk of depression during adolescence is scarce.

Recent studies have suggested that mindfulness might be a protective factor for depression in adolescence. Mindfulness is the awareness that emerges through purposefully paying attention at the present moment, in a non-judgmental manner, to the unfolding of moment-by-moment experiences (Kabat-Zinn 2003). Mindfulness can be considered a particular practice, the result of a practice, or a trait (Garland 2013). Several recent studies have examined the effects of mindfulness-based interventions on reducing depression in adolescents (e.g., Raes et al. 2014; Tan 2015). The promising results of these interventions have generated major interest in the mindfulness trait. However, research is still scarce.

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Several facets or dimensions of mindfulness have been proposed (Baer, Smith, Hopkins, Krietemeyer, and Toney 2006; Bishop et al. 2004; Coffey, Hartman, and Fredrickson 2010). For instance, Bishop et al. (2004) proposed a two-component model of mindfulness: self-regulation of attention (the recognition of mental events in the present moment and the maintenance of attention on immediate experience) and orientation towards one's experience in the present (curiosity, openness, and acceptance).

Baer et al. (2006) examined the mindfulness structure by means of exploratory and confirmatory factor analyses of items from several mindfulness questionnaires. They found that mindfulness was composed of five facets: *observing* (attending to or noticing internal or external experiences), *describing* (the use of 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 feelings and thoughts come and go, without getting caught up in them). These researchers developed the *Five Facet Mindfulness Questionnaire* (FFMQ) to assess these facets. They found that the structure that best fits the data was a four-factor hierarchical structure consisting of a second-order factor (mindfulness) that explained all lower level factors except 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. Their results suggested that the observing facet might play a different role depending on the mindfulness experience of the sample.

The FFMQ factor structure has been analyzed in several countries (Belgium: Heeren et al. 2011; China: Deng et al. 2011; Italy: Giovannini et al. 2014; Japan: Sugiura, Sato, Ito, and Murakami 2012; Norway: Dundas et al. 2013; Spain: Cebolla et al. 2012). Moreover, it has been examined in samples of meditators (Bruin et al. 2012) as well as in clinical samples (e.g., Bohlmeijer, ten Klooster, Fledderus, Veehof, and Baer 2011; Cebolla et al. 2012; Veehof, ten Klooster, Taal, Westerhof, and Bohlmeijer 2011). Overall, these studies concluded that a five-factor correlated structure was the one that fits the data best, compared to second-order structures (e.g., Bohlmeijer et al. 2011; Bruin et al. 2012). However, there is also support for alternative structures, such as a bifactor model with a general mindfulness factor and the five mindfulness facets (Aguado et al. 2015). Unfortunately, to our knowledge no studies have examined the structure of the FFMQ in adolescents, which is important for the understanding of how mindfulness facets are arranged at this developmental stage.

Regarding the association between mindfulness facets and depression, previous research suggests that some mindfulness facets might be more relevant than others as protective factors

against depression. When correlation coefficients are obtained, the findings indicate that, in general, all mindfulness facets except observing are negatively associated with depressive symptoms (Bohlmeijer et al. 2011; Cebolla et al. 2012; Desrosiers, Klemanski, and Nolen-Hoeksema 2013a). Moreover, Sugiura et al. (2012) found that the observing facet was positively associated with depression.

When controlling for covariances between the mindfulness facets, a more precise perspective emerges. In this case, non-judgment, acting with awareness, and non-reactivity are associated with fewer depressive symptoms (Bruin et al. 2012; Desrosiers et al. 2013a; Christopher et al. 2012). Moreover, research on the observing facet has produced mixed results (Christopher et al. 2012; Desrosiers et al. 2013a).

The only study to have examined the association between FFMQ and depressive symptoms in adolescents found that non-judgment, non-reactivity, and acting with awareness were negatively correlated with sadness (Ciesla et al. 2012). However, the study by Ciesla et al. (2012), which was conducted with a small sample of adolescents ($n=72$), did not include the other two mindfulness facets. Therefore, no information is available about the role of observing and describing in adolescents. Furthermore, the vast majority of studies have been cross-sectional. Hence, there is a need for longitudinal studies to examine whether mindfulness trait facets predict changes in depression.

How could the above mindfulness facets reduce depression? Some researchers have hypothesized that mindfulness facets might reduce the ruminative response (Barnhofer, Duggan, and Griffith 2011; Keng, Smoski, and Robins 2011; Williams, Teasdale, Segal, and Kabat-Zinn 2007). A reduction in rumination might in turn help to reduce the risk of depression (see Abela and Hankin 2008; Hankin, Snyder, and Gulley 2013). Accordingly, Nolen-Hoeksema et al. (2008) proposed that mindfulness helps individuals to break their habitual ruminative cycle by making them aware of their feelings and thoughts without judging them or getting trapped in them. In support of this hypothesis, various studies have demonstrated that training in mindfulness leads to reductions in rumination in adults (Deyo, Wilson, Ong, and Koopman 2009; Heeren and Philippot 2011). Moreover, the available evidence also indicates that trait mindfulness is associated with less rumination (Coffey et al. 2010; Desrosiers et al. 2013b; Hinterman, Burns, Hopwood, and Rogers 2012; Raes and Williams 2010).

Regarding the specific facets of mindfulness that may be relevant for rumination, facets such as non-judging, non-reactivity, observing, and acting with awareness could help to reduce rumination. However, evidence supporting this hypothesis is mixed. In adults, for instance, Bruin et al. (2012) found that rumination was negatively associated with all five mindfulness facets. Similarly, Dundas et al. (2013) reported a negative correlation between rumination and non-

reactivity, acting with awareness, and non-judgment. Moreover, in adolescents, Ciesla et al. (2012) found that rumination acted as a mediator between non-reactivity and non-judgment and depressive symptoms. They also found that non-reactivity, non-judgment, and acting with awareness (the only three facets that they measured) moderated the predictive association between stress and rumination and that rumination in turn predicted less sadness. Thus, although these findings provide preliminary support for the hypothesis that reduced rumination can mediate the association between mindfulness facets and depression, additional research is needed to determine which facets help to reduce depression through a reduction in rumination.

The present research was divided into two studies. The aim of study 1 was to examine the FFMQ structure in Spanish adolescents and compare several alternative models. The aim of study 2 was to test whether mindfulness facets predicted a decrease in depression over time and to determine whether this association is mediated by a reduction in the ruminative style. We also explored gender differences in longitudinal paths following previous studies that have indicated that depressive symptoms and ruminative style are more frequent in girls than in boys.

Study 1

Method

Participants

The participants were 520 adolescents (301 girls and 219 boys) from four secondary schools in Vitoria-Gasteiz (Spain) who voluntarily participated by completing the study measurements at two different times. The mean participant age was 16.11 (range=13–19 years, $SD=0.98$). There were no differences in age between the girls and boys, $t(518)=-0.36$; $p>.05$. Participant socioeconomic status (SES) was determined by parental occupation and education according to the Spanish Society of Epidemiology and Family and Community Medicine (2000). SES distribution was as follows: 12.1 % low status, 18.4 % low medium status, 32.2 % medium status, 26.8 % medium high status, and 10.5 % high status. Nearly all the adolescents were born in Spain (92.1 %), 4.1 % were born in South America, 1.5 % were born in other European countries, 1.5 % were born in Africa, and 0.8 % were born in Asia.

Procedure

After parental permission was requested by means of a consent form, the participants completed their measurements. The questionnaire was issued in the classroom; it took up to

40 min, and all participants had enough time to finish it. A random subsample of 247 adolescents completed the FFMQ-A again 4 months later.

Measures

The FFMQ (Baer et al. 2006) is a 39-item self-report questionnaire that measures five distinct facets of trait mindfulness: observing (e.g., “I notice the smells and aromas of things”), describing (e.g., “I am good at finding words to describe my feelings”), non-judging of inner experience (e.g., reverse-scoring item: “I disapprove of myself when I have irrational ideas”), acting with awareness (e.g., reverse-scoring item: “I am easily distracted”), and non-reactivity to inner experience (e.g., “I watch my feelings without getting lost in them”). The items are rated on a five-point Likert-type scale ranging from 1 (*never or rarely true*) to 5 (*very often or always true*). In this study, the Spanish version of the FFMQ was adapted to adolescents (Cebolla et al. 2012). For this reason, the wording of some items was slightly modified so it could be better understood by adolescents (see online [Supplemental Material](#)). Baer et al. (2006) concluded that five-facet scales had an adequate to good internal consistency with the following Cronbach coefficients: non-reactivity = .75, observing = .83, acting with awareness = .87, describing = .91, and non-judging = .87.

Mindful Attention Awareness Scale-Adolescents (MAAS-A; Brown, West, Loverich, and Biegel 2011; validated in the Spanish adolescent population by Calvete et al. 2014). The MAAS-A is a 14-item instrument for measuring mindfulness traits as a single factor (e.g., reverse-scoring item “I snack without being aware that I am eating,” “I find myself doing things without paying attention”). Its answers are arrayed in a Likert-type scale ranging from 1 (*almost never*) to 6 (*almost always*). Calvete et al. (2014) demonstrated the adequacy of this scale for use in Spanish adolescents between 14 and 18 years. In this study, the Cronbach alpha coefficient was .82.

The Center for Epidemiologic Studies-Depression (CES-D; Radloff 1977) was used to measure depressive symptoms. This is a 20-item questionnaire (e.g., “My appetite was poor,” “I feel depressed”) in which statements are rated on a four-point Likert-type scale ranging from 1 (*rarely*) to 4 (*all the time*). Previous research with Spanish adolescents has assessed its validity and factor structure (Calvete and Cardeñoso 1999). In this study, the Cronbach coefficient was .89.

Children’s Response Styles Scale (CRSS; Ziegert and Kistner 2002). A Spanish adaptation of ruminative responses from the CRSS was used to evaluate ruminative responses to sad moods in adolescents (Padilla and Calvete 2011). The CRSS is a 10-item self-rating scale. It includes items that describe a passive and contemplative attitude to problems and a tendency to compare real situations with ideal, unachieved ones (e.g., “I think about my feelings,” “I think,

‘Why can’t I stop feeling this way?’”). The participants must indicate on a scale from 1 (*almost never*) to 4 (*almost always*) how these items reflect what they do when they feel sad. The CRSS has good psychometric properties. In the present study, the alpha coefficient was .79.

Data Analyses

We conducted several confirmatory factor analyses to test the FFMQ measurement model. The analyses employed maximum likelihood (ML) estimation in LISREL 9.1 (Jöreskog and Sörbom 2013). The model’s goodness of fit was evaluated with the comparative fit index (CFI), the non-normative fit index (NNFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMS). Generally, a good fit is indicated by CFI and NNFI values of .90 or higher, RMSEA values lower than .08, and SRMS values lower than .08 (Little 2013). Three-item parcels were used as indicators of the latent variables to follow the same approach as Baer et al. (2006) and Cebolla et al. (2012). Item parcels are a common strategy in structural equation modeling (see Little 2013). The items were assigned to parcels after an exploratory factor analysis was conducted with all the items corresponding to a latent variable, so that factor loadings were balanced within parcels.

Results

General Descriptive Analyses and Gender Differences in FFMQ

Descriptive statistics for the FFMQ, MAAS-A, CRSS, and CES-D scores are displayed in Table 1. Table 2 presents gender differences for the scores. As shown, there were significant gender differences in the total FFMQ score, with higher

Table 1 Descriptive statistics in the sample for times 1 and 2

Variable	Time 1			Time 2		
	Number	Mean	SD	Number	Mean	SD
FFMQ total	501	116.35	16.16	247	112.78	16.42
Observing	501	23.15	6.20	247	21.46	6.02
Describing	501	23.55	6.37	247	22.87	5.71
Non-judging	501	26.03	6.63	247	25.99	6.86
ActAware	501	25.42	5.58	247	24.74	6.01
Non-react	500	18.24	4.51	247	17.73	4.27
MAAS-A	500	54.71	10.75			
Rumination	502	23.91	5.73	461	23.8	5.8
Depression	518	37.64	9.94	461	39.61	11.54

MAAS-A mindful awareness attention scale for adolescents, ActAware acting with awareness

scores for boys for describing and non-judging. Consistently, boys also scored higher in the MAAS-A. Girls scored higher for depression and rumination.

Table 3 displays the fit indexes for all of the models. The first model consisted of five inter-correlated latent variables that correspond to observing, describing, non-judging of inner experience, acting with awareness, and non-reactivity to inner experience. This model fits the data well at Satorra-Bentler scaled $\chi^2(80, N=507)=212, p<.001$, RMSEA=.06 (90 % CI=.05, .07), NNFI=.954, CFI=.965, and SRMR=.064. Second, a more parsimonious model was estimated in which a second-order latent variable (i.e., mindfulness) explained the associations between first-order factors. This hierarchical model increased χ^2 significantly, with Satorra-Bentler scaled $\Delta\chi^2(5, N=507)=77, p<.001$. Interestingly, although the five mindfulness dimensions loaded significantly in the general dimension of mindfulness as displayed in this model, the factor loadings for describing and acting with awareness were negative. These factors include items that were recoded negatively.

The third model was an alternative hierarchical model in which the describing, non-judging of inner experience, acting with awareness and non-reactivity to inner experience factors were explained by a second-order factor, whereas the observing factor remained isolated. It was this model that yielded the best fit indices in the studies by Baer et al. (2006) and Cebolla et al. (2012). In our sample, this model increased χ^2 significantly in comparison with model 1, Satorra-Bentler scaled $\Delta\chi^2(6, N=507)=114$ and $p<.001$. We observed that describing and acting with awareness loaded negatively in the general mindfulness factor. We therefore estimated a fourth model in which these two dimensions loaded in a second-order dimension (mindfulness 1) and the other three dimensions loaded in a different second-order dimension (mindfulness 2). This model also increased the χ^2 significantly in comparison with model 1, Satorra-Bentler scaled $\Delta\chi^2(4, N=507)=42$ and $p<.001$. Finally, we estimated a five non-correlated first-order dimension model and a one first-order dimension, which presented inadequate fit indexes (see Table 3).

Figure 1 displays the factor loadings for the first-order factors. Cronbach’s alpha coefficients ranged between .66 and .83. We estimated test-retest reliability in a subsample of 247 adolescents. Their intraclass correlation coefficients (ICC) were .56 for observing, .57 for describing, .63 for non-judging of inner experience, .54 for acting with awareness, .39 for non-reactivity to inner experience, and .57 for the total score of the FFMQ.

Correlations between FFMQ facets and other constructs are displayed in Table 4. We used Bonferroni’s method to correct for type I error and set a significant p value of .001. The inter-correlations showed that non-reactivity was not significantly correlated with non-judging and acting with awareness. The MAAS-A score correlated positively with acting with

Table 2 Descriptive statistics in the sample and differences between the mean values of boys and girls in the study variables

Time 1									
Variable	Girls			Boys			<i>P</i> value	<i>d</i>	T
	Number	Mean	<i>SD</i>	Number	Mean	<i>SD</i>			
FFMQ	294	114.04	15.92	207	119.62	15.96	.000	−0.35	−3.86**
Observing	294	23.51	5.97	207	22.65	6.49	.129	0.14	1.52
Describing	294	22.7	6.64	207	24.75	5.76	.000	−0.33	−3.69**
Non-Judging	294	24.76	6.67	207	27.83	6.14	.000	−0.47	−5.24**
ActAware	294	25.03	5.56	207	25.96	5.57	.067	−0.17	−1.84
Non-react	294	18.04	4.34	206	18.51	4.74	.252	−0–10	−1.15
MAAS-A	294	53.58	10.72	206	56.35	10.62	.004	−0.26	−2.88**
Rumination	294	25.56	5.45	208	21.58	5.3	.000	0.74	8.17**
Depression	300	39.53	10.59	218	35.05	8.32	.000	0.46	5.38**
Time 2									
Variable	Girls			Boys			<i>P</i>	<i>d</i>	T
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>			
T2 FFMQ	157	111.43	17.66	90	115.13	13.76	.069	−0.23	−1.83
T2 Observing	157	21.58	6.01	90	21.26	6.05	.685	0.05	0.41
T2 Describing	157	22.47	5.94	90	23.56	2.26	.152	−0.22	−1.44
T2 Non-Judging	157	25.18	7.15	90	27.39	6.1	.015	−0.32	0.19*
T2 ActAware	157	24.83	6.3	90	24.57	5.5	.737	0.04	0.34
T2 Non-react	157	17.36	4.2	90	18.37	4.31	.075	−0.24	−1.79
T2 Rumination	275	24.81	5.83	186	22.3	5.44	.000	0.44	4.67**
T2 Depression	275	41.21	12.2	186	37.24	10.04	.000	0.35	3.81**

MAAS-A mindful attention awareness scale for adolescents, *ActAware* acting with awareness, *Non-react* non-reactivity

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

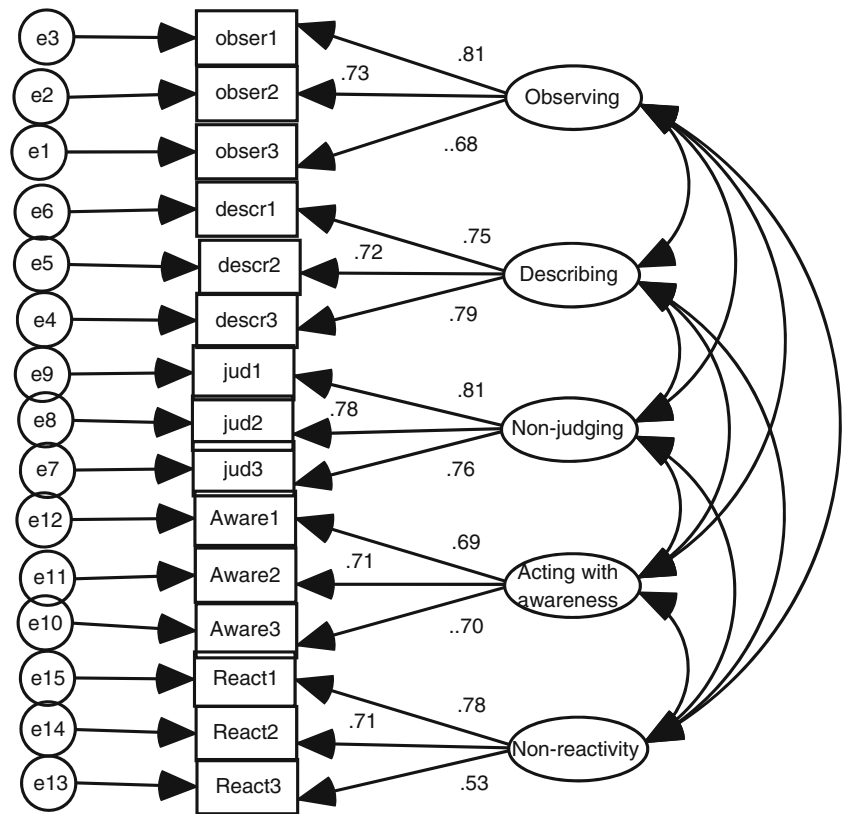
awareness, non-judging, and total score FFMQ and negatively with observing. All correlations with depression were

negative, except for observing and non-reactivity, which were non-significant. Finally, correlations with rumination were

Table 3 Fit indexes for the estimated models

Model	Fit indexes
Five inter-correlated first-order dimensions	Satorra-Bentler scaled $\chi^2(80, N = 507) = 212$, $p < .001$, RMSEA = .06 (90 % CI = .05, .07), NNFI = .954, CFI = .965, SRMR = .064
Five first-order dimensions explained by a second-order dimension	Satorra-Bentler scaled $\chi^2(85, N = 507) = 303$, $p < .001$, RMSEA = .08 (90 % CI = .07, .08), NNFI = .929, CFI = .942, SRMR = .10
Four first-order dimensions explained by a second-order dimension plus an isolated first-order dimension (observing)	Satorra-Bentler scaled $\chi^2(86, N = 507) = 330$, $p < .001$, RMSEA = .08 (90 % CI = .07, .09), NNFI = .921, CFI = .935, SRMR = .11
Five first-order dimensions explained by two second-order dimensions	Satorra-Bentler scaled $\chi^2(84, N = 507) = 262$, $p < .001$, RMSEA = .07 (90 % CI = .06, .08), NNFI = .941, CFI = .953, SRMR = .074
Five independent first-order dimensions	Satorra-Bentler scaled $\chi^2(90, N = 507) = 499$, $p < .001$, RMSEA = .10 (90 % CI = .08, 1.07), NNFI = .873, CFI = .891, SRMR = .17
One first-order dimension	Satorra-Bentler scaled $\chi^2(90, N = 507) = 1374$, $p < .001$, RMSEA = .18 (90 % CI = .18, .19), NNFI = .602, CFI = .661, SRMR = .17

Fig. 1 Factor loadings for first-order factors



negative for non-judging, acting with awareness, and total FFMQ, and they were non-significant for non-reactivity and positive for the observing facet.

Discussion

Study 1 supports the five-factor-correlated model of the FFMQ. Consistent with previous studies in adults, our results do not support a hierarchical factor structure for the FFMQ overall (e.g., Bohlmeijer et al. 2011; Bruin et al. 2012). Test-

retest was adequate, suggesting that individual differences are stable over time. The internal consistency was slightly lower than the results obtained by Cebolla et al. (2012) in the Spanish version for adults, but similar to other studies (Sugiura et al. 2012). 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., Fernandez et al. 2010; Sugiura et al. 2012).

Table 4 Inter-correlations between FFMQ and correlations with other measurements

	1	2	3	4	5	6
1. FFMQ	.78					
2. Observing	.47**	.75				
3. Describing	.71**	.28**	.83			
4. Non-judging	.47**	-.26**	.14**	.82		
5. ActAware	.53**	-.14	.20**	.36**	.75	
6. Non-reactivity	.56**	.45**	.29**	-.09	.02	.66
7. MAAS-A	.41**	-.13**	.16	.40**	.64**	.03
8. Depression	-.38**	.07	-.18**	-.41**	-.34**	-.16
9. Rumination	-.24**	.23**	-.06	-.52**	-.33**	.05

MAAS-A mindful attention and awareness scale, ActAware acting with awareness, Alpha coefficients are displayed on the diagonal

***p* < .001

Study 2

Method

Participants

The sample of study 2 consisted of 461 students (275 girls and 186 boys) from study 1, who recompleted the rumination and depression measurements after a 4-month interval. Eighty-nine percent of the students completed their measurements at both times (attrition rate = 11 %). The differences between the participants who failed to provide the second measurement (*N* = 59) and the rest of the sample (*N* = 461) were examined with Mann-Whitney *U* and chi-square analyses. The differences were significant for gender, $X^2(1, 520) = 5.165, p = .023$; country of origin, $X^2(3, 518) = 15.405, p = .004$;

and age, $U=11142.5$, $p=.019$. There were no differences for SES, with $\chi^2(4, 456)=5.492$, $p<0.01$.

Procedure

The procedures were similar to those described for study 1. A code that was only known to the participants was used to match questionnaires T1 and T2.

Measures

Study 2 used the FFMQ (Baer et al. 2006), the CES-D (Radloff 1977), and the CRSS (Ziegert and Kistner 2002) (see study 1 for a description). Alpha coefficients for the FFMQ at time 2 (T2) were the same as in study 1. Alpha coefficients for the CES-D and the CRSS at T2 were .92 and .84, respectively.

Data Analyses

Longitudinal associations between mindfulness facets, rumination, and depressive symptoms were examined using path analysis with LISREL 9.2. Multi-group comparisons were used to assess whether the mediational model was equivalent

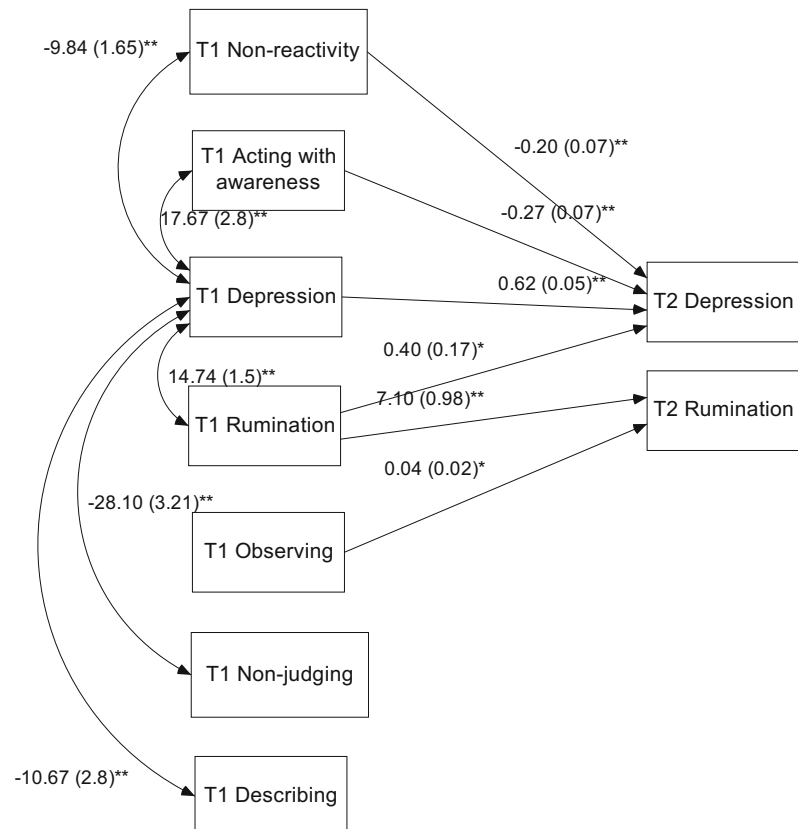
in boys and girls. The models were tested and compared using a corrected chi-square difference test (Cole and Maxwell 2003; Satorra and Bentler 2001).

Results

The hypothesized model included the following: (a) cross-sectional associations between depressive symptoms, ruminative style, and mindfulness facets at T1; (b) autoregressive paths between depressive symptoms and ruminative style at T1 and T2; (c) predictive path from mindfulness facets at T1 and ruminative style at T2; (d) predictive path from ruminative style at T1 and depressive symptoms at T2; and (e) predictive paths from mindfulness facets at T1 to depressive symptoms at T2.

This initial model displayed adequate fit indexes except for RMSEA, at Satorra-Bentler scaled $\chi^2(6, N=460)=28$, $p<.001$, RMSEA=.09 (90 % CI=.06, .01), NNFI=.923, CFI=.987, and SRMR=.03. Figure 2 displays significant paths. Regarding cross-sectional associations at T1, the results indicated that depressive symptoms were significantly associated with higher scores for ruminative style and with lower scores for describing, acting with awareness, non-judging, and non-reactivity to inner experience. Ruminative style was

Fig. 2 Meditational model for mindfulness, rumination, and depressive symptoms. Note: for the sake of clarity, only significant cross-sectional paths between depression at T1 and mindfulness facets are shown. * $p<.05$, ** $p<.01$



Note: for the sake of clarity, only significant cross-sectional paths between depression at T1 and mindfulness facets are shown. * $p<.05$, ** $p<.01$.

positively associated with observing and negatively associated with acting with awareness and non-judging.

Regarding the longitudinal predictive paths, autoregressive paths were statistically significant. Observing predicted an increase in ruminative style at T2, and the ruminative style at T1 predicted an increase in depressive symptoms at T2. In addition, both acting with awareness and non-reactivity predicted a statistically significant reduction in depressive symptoms over time. Overall, these cross-lagged predictive paths represented small effects.

The model was estimated again by disregarding the paths that were non-significant. The new model yielded excellent fit indexes at Satorra-Bentler scaled $\chi^2(6, N=460)=34, p<.001, RMSEA=.06$ (90 % CI=.04, .08), NNFI=.969, CFI=.988, and SRMR=.04. Figure 2 displays the final model. The indirect effect of observing on depressive symptoms at T2 via rumination was tested through 10,000 bootstrapping samples (Shrout and Bolger 2002) for which the paths from observing at T1 to rumination at T2 and from rumination at T1 to depressive symptoms at T2 were estimated. The result was statistically significant [95 % CI (.054 to .057)].

Finally, we tested whether the model was different for boys and girls. We examined an unconstrained model including both girls and boys. This model provided an adequate fit to the data as follows: $\chi^2(12, n=460)=11.59, NNFI=1, CFI=1, RMSEA=.03, 90\% CI [.0, .07],$ and SRMR=.027. Finally, the unconstrained model was compared with a model that constrained the pattern of paths between the variables to make them equal for both subsamples (i.e., girls and boys). According to the corrected chi-square difference test (Crawford and Henry 2003), this imposition did not increase the value of the chi-square significantly, at $\Delta\chi^2(8, n=460)=11.83, p=.158.$ Our results indicated that the general pattern of relations between mindfulness facets, rumination, and depressive symptoms was similar for girls and boys.

Discussion

The longitudinal results did not support our hypothesis that mindfulness facets reduce rumination over time and that this reduction in rumination acts as a mediator between mindfulness and reduced depression. Furthermore, the observing facet at T1 in this study was a predictor of increased rumination at T2 and rumination at T1 was a predictor of increased depression at T2. Thus, the observing factor displayed a maladaptive role in adolescents. These results are consistent with the findings of Baer et al. (2006, 2008) and Christopher et al. (2012). Moreover, longitudinal analyses indicated that only acting with awareness and non-reactivity predicted a reduction in depressive symptoms over time.

General Discussion

The FFMQ version for adolescents presents adequate psychometric properties. This is important because adequate measures of mindfulness facets at this stage are necessary due to the recent expansion of mindfulness-based interventions for adolescents (Kallapiran, Koo, Kirubakaran, and Hancock 2015). Our findings support a structure consisting of five facets. However, it is important to emphasize that not all facets are consistently associated. Namely, observing tends to correlate negatively with other facets such as non-judging and acting with awareness.

Interestingly, two of the factors (describing and acting with awareness) loaded negatively in the general mindfulness factor. All items in acting with awareness and some items in describing facets are negatively worded. Van Dam et al. (2009) found that negatively worded items in FFMQs function differently for meditators and non-meditators. Non-meditators generally have lower levels of meta-consciousness and more difficulties in recognizing attention lapses than meditators. This finding might suggest that adolescents have lower attention levels and that the response format could have a higher effect than it would in adult samples. However, despite this potential response bias, both subscales (describing and acting with awareness) functioned adequately and were associated with the other variables in the study in a consistent manner with theory and with previous studies.

Test-retest of the FFMQ was adequate, which indicates that individual differences are stable over time. However, studies addressing test-retest reliably in adults yielded higher coefficients (e.g., Deng et al. 2011; Giovannini et al. 2014; Heeren et al. 2011). Convergent validity was addressed by correlations with the MAAS-A. These results showed significant positive correlations for the total FFMQ, non-judging, and acting with awareness. The correlation was significantly negative for observing.

As mentioned before, our results suggest that the observing facet 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, the findings of study 2 indicate that, in contrast to the beneficial effects of other mindfulness facets, observing predicts an increase in depressive symptoms by increasing/being a vulnerability/risk factor for ruminative responses in adolescents.

In addition, the findings from study 2 indicate that non-reactivity and acting with awareness are significant predictors of reductions in depression. Acting with awareness and non-reactivity were also predictors of less sadness in the study by

Ciesla et al. (2012). These researchers also found that non-judging predicted less sadness, but their study did not control for the covariance between mindfulness facets as our study did.

Contrary to our hypothesis, the protective role of mindfulness facets was not mediated by a reduction in ruminative style. Our results differ from those of Alleva et al. (2014), who found that rumination mediated the associations between acting with awareness, non-judging, and depressive symptoms. However, they used a cross-sectional study, whereas our study used a longitudinal design, which is more appropriate for examining the directionality of mediational paths. Our results also contrast with those obtained by Paul et al. (2013), who found that non-reactivity was negatively associated with rumination following a stress induction condition (Paul et al. 2013). Additional research is needed to explore alternative mechanisms to explain the beneficial effects of these mindfulness facets for the prevention of depression. Another promising line of research would be to examine other potential mediators, such as improvements in self-esteem, feelings of self-efficacy, optimism, and other positive cognitions.

Boys scored higher than girls for describing, non-judging, and the MAAS-A. Our results were similar to those of previous research showing that male individuals have higher levels of trait mindfulness compared to female individuals in both samples of adults (Josefsson, Larsman, Broberg, and Lundh 2011) and adolescents (Calvete et al. 2014). However, despite these differences, the longitudinal associations between mindfulness, rumination, and depressive symptoms were similar for boys and girls.

Limitations and Clinical Implications

This research had several limitations. First, the participants only completed the questionnaire twice through study 1 and 2, while evidence recommends that this should be done three times for mediation analyses (Cole and Maxwell 2003). Second, the interval between measurements was relatively short. Therefore, future studies should include longer intervals to better capture changes in depressive symptoms. Third, only self-report measures were employed. Although self-reports are adequate for assessing mindfulness, rumination, and depressive symptoms, the validity of the study would be improved by adding other sources of information such as parental reports of depression and behavioral indicators of mindfulness. Finally, we did not ask about the participants' previous meditation experience. However, because of the characteristics of the sample and their ages, we can assume that the majority had had no meditation experience.

Despite these limitations, to our knowledge this is the first research project to have examined the structure of FFMQ in adolescents. Our findings suggest that the structure of mindfulness is established in adolescence and that all mindfulness

facets except observing are associated with fewer symptoms of depression. This is one of the few longitudinal studies to have examined predictive associations between trait mindfulness, rumination, and depression. The results indicate that non-reactivity and acting with awareness predict a reduction in depression. Therefore, mindfulness-based interventions may help to reduce depression by strengthening these facets. Mindfulness provides an alternative way of thinking and responding to negative moods in adolescents and might help individuals to develop attentional control, thus enabling depressive thoughts to enter and leave their consciousness without them getting engaged in these thoughts and subsequently being able to avoid depressive rumination.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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