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Published in:
Mindfulness

DOI:
[10.1007/s12671-020-01452-0](https://doi.org/10.1007/s12671-020-01452-0)

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Document Version
Publisher's PDF, also known as Version of record

Publication date:
2020

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Zhu, L., Wang, J., & Schroevers, M. J. (2020). Looking Beyond the Value of Individual Facets of Mindfulness: a Person-Centered Examination of Mindfulness. *Mindfulness*, 11(10), 2349-2359. <https://doi.org/10.1007/s12671-020-01452-0>

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Looking Beyond the Value of Individual Facets of Mindfulness: a Person-Centered Examination of Mindfulness

Lei Zhu¹ · Jun Wang¹ · Maya J. Schroevers²

Published online: 20 July 2020

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Abstract

Objectives This study aimed to (1) examine profiles of mindfulness in a large cohort from the general population by disentangling the level and shape effects of mindfulness, (2) identify the demographic predictors (i.e., age, gender, and educational level) of mindfulness profile membership, and (3) examine associations of mindfulness profiles with psychological outcomes (including both positive and negative indicators) and coping strategies (including positive reappraisal and rumination).

Methods This cross-sectional observational study included a large representative group of 1727 people from the general Dutch population. To separate the level and shape effects of mindfulness, the bifactor exploratory structural equation modeling (B-ESEM) and latent profile analyses (LPA) were performed. The factor scores of the B-ESEM were used as indicators of LPA.

Results Using a combination of B-ESEM and LPA, we identified three profiles that differed on global levels and configurations of mindfulness: profile 1 “average mindfulness” (78.4%), profile 2 “low to average mindfulness” (16.2%), and profile 3 “high non-judgmentally aware” (5.4%). These profiles differed significantly on age, gender, and educational level, with people in profile 3 being older, male, and lower educated. Compared with the other two profiles, people in profile 3 reported the best psychological outcomes and coping strategies.

Conclusions Findings provide evidence for the importance of looking at profiles of mindfulness in future observational and intervention studies. Research is needed to test the feasibility and effectiveness of more personalized mindfulness interventions, tailored to specific profiles of mindfulness.

Keywords Mindfulness profiles · Depressive symptoms · Negative affect · Positive affect · Rumination · Positive reappraisal

Mindfulness refers to the intentional awareness of the moment-to-moment experiences in the here-and-now, with an open, receptive, and non-judgmental attitude (Bishop 2004; Kabat-Zinn 2009). As such, mindfulness is believed to consist of different aspects, including regulating attention, holding an open and non-judging attitude, and being receptive rather than directly react to experiences (Baer et al. 2006). Higher mindfulness has been related to a better psychological functioning across different populations, including college students, community people, individuals with mental health problems, and people with chronic diseases (Keng et al.

2011). This result mostly comes from variable-centered research, which focused on overall levels of mindfulness or the values of distinct aspects of mindfulness. Recent research has examined the possibility of people with distinct mindfulness profiles based on a *combination* of various mindfulness skills, indicating that different types of being mindful can be distinguished.

One of the most common ways to assess mindfulness is by the Five Facets of Mindfulness Questionnaire (FFMQ). This questionnaire assesses five facets of mindfulness including the following: *acting with awareness* (i.e., focusing on experiences in the present moment), *non-judging* (i.e., a non-evaluative attitude toward experiences), *non-reactivity* (i.e., not getting carried away by one's feelings and thoughts), *describing* (i.e., labeling of one's experiences), and *observing* (i.e., paying attention to internal and external experiences) (Baer et al. 2006). So far, most research summed up the five facets of the FFMQ into an overall score of mindfulness. However, a number of studies, using a variable-centered

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approach, have reported that the facet of observing was negatively correlated with non-judging (Baer et al. 2006; Brown et al. 2015; Pearson et al. 2015b) and with acting with awareness (Fernandez et al. 2010; Roos et al. 2015). There were also studies performing factor analyses on the five facets of mindfulness and found that the observing facet fitted poorly (Baer et al. 2006; Pearson et al., 2015a). Given these findings, it seemed to be problematic to use an overall score of mindfulness. It is possible that people may vary in their combination of mindfulness skills and report distinct profiles of mindfulness (Bravo et al. 2016; Sahdra et al. 2017).

Recent studies have used a person-centered approach to identify people with distinct profiles of mindfulness. In college students, four distinct mindfulness profiles were consistently identified: a “*non-judgmentally aware*” group of persons, reporting low levels of observing yet high levels of non-judgment and act with awareness, a “*judgmentally observing*” group of persons, showing high levels of observing but low levels of non-judgment and low act with awareness, and two groups characterized by either high levels of all mindfulness facets or low levels of all facets (Bravo et al. 2016, 2018; Kimmes et al. 2017; Pearson et al. 2015b). These four profiles were also found in a sample of cancer patients (Lam et al. 2018) and in a sample of age-diverse people (Ford et al. 2020). In addition, a study in patients with a history of recurrent depression also identified three of the four profiles (i.e., non-judgmentally aware, low, and high mindfulness profiles), but instead of a judgmentally observing profile, they found a profile characterized by very low scores on all five facets (Gu et al. 2020).

A major limitation of the above-mentioned person-centered studies is the conflation of the level effects (i.e., the overall low, medium, or high levels across five facets of mindfulness) and the shape effects (i.e., specific patterns with high, medium, or low levels on various mindfulness facets) in the mindfulness profiles. It is difficult to disambiguate the extent to which individuals would generally report high, medium, or low mindfulness across all dimensions from the extent that individuals could be relatively more mindful on some facets than others. As such, it remains unclear whether the identified profiles of mindfulness were due to the differences in overall levels of mindfulness or the configuration of the mindfulness profiles. In order to address this issue, a recent study has used a combination of Bifactor Exploratory Structural Equation Modeling (B-ESEM) and Latent Profile Analysis (LPA) to test the shape of mindfulness profiles after statistically disambiguating the overall levels of mindfulness in a representative sample from the general population (Sahdra et al. 2017). This study identified a “judgmentally observing” group but did not find profiles with high or low levels on all five facets of mindfulness.

After identifying people with distinct profiles of mindfulness, it is important to examine predictors of these profiles.

Regarding personal characteristics, previous variable-centered research has found that gender, education level, and age were predictors of mindfulness. Males reported lower levels on the facet of observing than females (Bränström et al. 2011; Fogarty et al. 2015; Josefsson et al. 2011). In comparison with lower educated people, highly educated people had higher levels of mindfulness (Bränström et al. 2011). Older people reported higher levels of mindfulness than younger people (Hohaus and Spark 2013; Mahoney et al. 2015; Prakash et al. 2015; Shook et al. 2019). Yet, the few studies that looked into the sociodemographic characteristics of distinct profiles of mindfulness present inconsistent findings. The picture that emerges is that in general, these characteristics are not strongly related to the profiles. In a representative sample of Americans, Sahdra et al. (2017) looked at gender and age distributions of the four different profiles and only found some evidence that younger people were relatively more likely to report a “judgmentally observing” profile. In people with cancer, the profiles did not differ on a wide range of sociodemographic and medical characteristics, with only some evidence that males or those highly educated were more likely to demonstrate the “non-judgmentally aware” profile (Lam et al. 2018).

It has been assumed that the mindfulness profiles derived from the person-centered approach have added predictive value in psychological outcomes than the mindfulness facets from a variable-centered approach (Pearson et al. 2015b). Yet, up till now, this assumption has only been examined in the study of Sahdra et al. (2017), in which the associations of mindfulness profiles with psychological outcomes were examined after accounting for the individual mindfulness facets. If the latent profile membership could not predict psychological outcomes in the models including mindfulness facet scores as control variables, then it could be argued that the person-centered approach did not have an added value to the variable-centered approach (Sahdra et al. 2017). They found that people with the “judgmentally observing” profile reported the most severe psychological symptoms but also the highest life satisfaction and effectiveness.

There is evidence showing that the distinct profiles are related to psychological outcomes, particularly negative outcomes. For instance, it has been shown that those in the “low mindfulness” or in the “judgmentally observing” profile reported relatively more psychological symptoms (Bravo et al. 2016, 2018; Kimmes et al. 2017; Lam et al. 2018; Pearson et al. 2015b), but to what extent mindfulness profiles would differ in terms of positive affect is unknown. Previous variable-centered research shows that some facets, such as non-judgment, are more strongly related to negative affect and that other facets, such as acting with awareness, are more strongly related to positive affect (Schroevers and Brandsma 2010).

Mindfulness is assumed to help an individual to be more aware of own internal and external states, which helps individuals to cope with stressors (Teper et al. 2013). Higher levels of overall mindfulness were related to a greater use of adaptive coping strategies (e.g., positive reappraisal) and less use of maladaptive coping strategies (e.g., rumination) (Hanley and Garland 2014; Perestelo-Perez et al. 2017; Querstret and Cropley 2013). Particularly, it has been shown that people with the “high mindfulness” and “non-judgmentally aware” profiles of mindfulness reported lower rumination, whereas the “low mindfulness” and “judgmentally observing” profiles had the highest levels of rumination in college students (Bravo et al. 2016, 2018).

In order to replicate and expand previous research, the present study was focused on a large representative sample from the general population. The first aim was to identify distinct mindfulness profiles by separating the level and shape effects of mindfulness using a combination of B-ESEM and LPA. It was expected to replicate the four profiles of mindfulness as found previously (i.e., “high mindfulness,” “low mindfulness,” “judgmentally observing,” and “non-judgmentally aware”). The second aim was to investigate whether age, gender, and educational level could distinguish people with mindfulness profiles. Given previous inconsistent findings, no hypotheses were formulated. The third aim was to examine the associations of the distinct mindfulness profiles with positive (i.e., positive affect) and negative psychological outcomes (i.e., depressive symptoms and negative affect) and coping strategies (i.e., positive reappraisal as adaptive coping and rumination as maladaptive coping) with accounting for the five facets of mindfulness. We hypothesized that people in the “high mindfulness” profile would report low levels of depression and negative affect, more positive affect, and more adaptive coping (in terms of less use of rumination and more use of positive reappraisal). It was also hypothesized that people in the “low mindfulness” profile would report high levels of depression and negative affect, less positive affect, and less adaptive coping (i.e., more use of rumination and less use of positive reappraisal). More insights into distinct profiles of mindfulness may add to our understanding of mindfulness, its benefits for well-being, and may point out steps for a more personalized approach to help people to become more mindful.

Methods

Participants

A total of 7492 persons were approached, of whom 24.4% agreed to participate and sent back the informed consent and self-report questionnaire. Participants that failed to complete 15% or more of the questionnaire package were excluded. A

total of 1736 adults constituted the final sample. Nine participants with missing values on mindfulness were excluded. The final sample included 1727 adults. Of the 1727 participants, the mean age was 55 years ($SD = 16.76$); 45.2% were female; 19.9% had low educational levels, 48.6% had moderate educational levels, and 31.5% had high educational levels; 76.3% were married or living together with a partner and 23.7% had other marital status; 48.8% had a paid work, 24.4% were retired, and 26.8% had other work status.

Procedures

A community-based sample was selected from the register offices of five municipalities in the Netherlands, based on the age and gender distribution of the general population in the Netherlands (in the time the data were collected: 50.5% of the Dutch total population was female, 33% was 20 to 40 years old, 47% was 41 to 65 years old, 15% was 66 to 80 years old, and 5% was 81 or more years old). This research was approved by the medical ethical committee of the University Medical Center Groningen. When having obtained the names and addresses from the municipalities, people were sent a letter with brief information about the focus of the study (i.e., understanding the role of mindfulness for quality of life), and with the invitation to participate by filling in a self-report questionnaire. They were also sent an informed consent, the self-report questionnaire, and a return envelope, so they could return the informed consent and questionnaire without any cost.

Measures

Socio-Demographic Variables

Age, gender, educational level, marital status, and work status were collected through self-reported questionnaire. Educational level was classified into low (i.e., primary schooling or lower vocational education), moderate (i.e., secondary schooling or middle vocational education), and high (i.e., university education, higher vocational education, or above). We only had limited information available on work status, which was an assessment by means of asking people to indicate whether they had a paid job, were retired, or other.

Mindfulness

The 39-item Five Facet Mindfulness Questionnaire (FFMQ) was used to measure mindfulness (Baer et al. 2006). The FFMQ measures five facets of mindfulness, including observing (e.g., “I intentionally stay aware of my feelings”), non-judging of inner experience (e.g., “I tend to evaluate whether my perceptions are right or wrong”), acting with awareness (e.g., “I rush through activities without being really attentive

to them”), describing (e.g., “My natural tendency is to put my experiences into words”), and non-reactivity to inner experience (e.g., “I watch my feelings without getting lost in them”). Each item was answered on a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). Items of the awareness and the non-judging facets were reverse-coded. Regarding each FFMQ facet, a higher score indicated a higher mindfulness skill. In this study, the Cronbach’s alphas of the FFMQ total score, awareness, non-judging of inner experience, non-reactivity to inner experience, describing, and observing were sufficient: 0.85, 0.84, 0.85, 0.74, 0.87, and 0.76, respectively.

Rumination

The 12-item rumination subscale of the Rumination Reflection Questionnaire short form (RRQ-SF) was used to measure rumination in the current study (Trapnell and Campbell 1999). Each item was answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An example item was “sometimes it is hard for me to shut off thoughts about myself”. Total scores can be calculated by summing up scores of the 12 items. A higher total score suggested a higher level of rumination. In this study, the Cronbach’s alpha of the rumination subscale was 0.89.

Positive Reappraisal

The 4-item subscale of the Cognitive Emotion Regulation Questionnaire (CERQ) was used to assess positive reappraisal in this study (Garnefski et al. 2001; Garnefski and Kraaij 2007). Each item was answered on a 5-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*). An example item was “I think I can learn something from the situation.” Total scores of positive reappraisal can be calculated by summing up the four items, with higher scores indicating more use of positive reappraisal strategies. In this study, the Cronbach’s alpha of the positive reappraisal subscale was 0.84.

Depressive Symptoms

The 20-item Center for Epidemiological Studies Depression (CES-D) was used to measure symptoms of depression (Radloff 1977). Participants were asked to specify the frequency of each depressive symptom during the last week (e.g., “I felt sad”) on a 4-point Likert scale ranging from 0 (*< 1 day*) to 3 (*5–7 days*). After reversing the four positively formulated items, a total score can be obtained by summing the scores of the 20 items. A higher score of CES-D total score indicated more severe depressive symptoms. In this study, the Cronbach’s alpha of the CES-D was 0.89.

Positive and Negative Affect

The 20-item Positive and Negative Affect Schedule (PANAS) was used to measure positive and negative affect in this study (Peeters et al. 1999; Watson et al. 1988). The PANAS consists of two 10-item scales measuring negative affect (i.e., subjective distress and unpleasant engagement) and positive affect (i.e., activeness, enthusiasm, and alertness). For each item, participants were asked to indicate the extent to which they experienced in the last week on a 5-point Likert scale ranging from 1 (*very slightly or not at all*) to 5 (*very much*). A higher total score suggested more positive and negative affect. In this study, we found Cronbach’s alphas of 0.70 for positive and negative affect.

Data Analyses

Participants’ levels of mindfulness, depressive symptoms, positive affect, negative affect, rumination, and positive reappraisal were described using means and standard deviations. Pearson correlations were performed to examine the inter-correlations between study variables.

We firstly conducted a set of LPA using the standardized scores of the five facets of FFMQ to replicate previous findings about mindfulness profiles (Bravo et al. 2016, 2018; Kimmes et al. 2017; Pearson et al. 2015b). A second set of LPA was then performed on the factor scores derived from the bifactor exploratory structural equation modeling (B-ESEM; Morin et al. 2016), in order to disambiguate the level and shape effects of the mindfulness profiles. In the B-ESEM, each FFMQ item was loaded onto two orthogonal factors: a global mindfulness factor (the G factor, representing the overall level of mindfulness) and a domain-specific factor (representing the deviations of the individual factors from an overall level of mindfulness across all facets). Cross-loadings across items were allowed and were constrained to be as close to zero as possible. The five-factor scores as well as the G factor obtained from the B-ESEM were then used as indicators in the LPA models. All the B-ESEM and the LPA models were applied in Mplus 7.5, with the WLSMV applying in the B-ESEM and the robust maximum likelihood estimation in the LPA (Muthén and Muthén 2017).

In both sets of analyses, we examined LPA models ranging from 2 profiles to 5 profiles. Several statistical and non-statistical criteria were used to determine the best-fitting model. We first checked the following statistical criteria: Akaike information criterion (AIC), Bayesian information criterion (BIC), bootstrapped likelihood ratio test (BLRT), Young-Lo-Mendell-Rubin adjusted likelihood ratio test (VLMR), and entropy. For the AIC and BIC, a smaller value indicated a better model fit, and for the BLRT and VLMR, a significant test suggested that a model with k

profiles was significantly better than a model with $k - 1$ profiles. A higher entropy value implied a better profile separation (at least higher than 0.6) (Nylund et al. 2007). The smallest profile of the model should constitute a substantial number of participants (at least 5%). Once the models have been selected based on these statistical criteria, we switched to the non-statistical, conceptual evaluation of the model. The addition of one extra profile should represent a distinct mindfulness profile than the LPA model with fewer profiles.

Based on the selected best model in the second set of LPA, the Bolck-Croon-Hagenaars (BCH) approach was applied to examine the relationships between the mindfulness profiles and sociodemographic characteristics in Mplus 7.5 (Bolck et al. 2004; Vermunt 2010). By using a weighted multiple group analysis, the BCH approach can take into account the probabilistic nature of profile membership, which allowed for both global and pairwise comparisons between each profile.

Lastly, we examined the extent to which the mindfulness profiles (as derived from the second set of LPA) added predictive value to psychological outcomes and coping strategies over the predictive value of the specific mindfulness factors. Following the suggestions of Sahdra et al. (2017), a more sensitive approach was employed, in which individual's estimated probability of membership for each profile was used as sampling probabilities. A total of 25 imputations of class membership were calculated and were combined with the 25 imputations from the original sample. Next, in order to examine the differences in the levels of psychological outcomes and coping strategies between distinct profiles, the delta method was applied (Fox and Weisberg 2018). Models of class membership predicting psychological outcomes and coping strategies were applied with controlling for the standardized scores of mindfulness facets as well as possible covariates. These analyses were conducted in R (Team, C 2017) using the packages, including car (Fox and Weisberg 2018), MplusAutomation (Hallquist and Wiley 2014), mitools (Lumley 2006), and miceadds (Robitzsch et al. 2016).

Results

Mean Levels and Intercorrelations Between Study Variables

The mean levels of study variables as well as their intercorrelations are shown in Table 1. Higher levels of mindfulness were significantly related to fewer symptoms of depression, more positive affect, less negative affect, more use of positive reappraisal, and less use of rumination.

Profiles of Mindfulness Based on the Standardized Scores of the FFMQ

The upper panel in Table 2 presents the fit indices of the 2-profile LPA model through the 5-profile LPA model. The AIC, BIC, BLRT, and VLMR all suggested that the 5-profile model was the best; however, the smallest profile of this 5-profile model only contained 4% of total sample. We therefore rejected the 5-profile model and compared the 4-profile model with the 3-profile model. In comparison with the 3-profile model, the 4-profile model had lower values of AIC and BIC, a higher value of entropy, and significant BLRT and VLMR. This suggested that the 4-profile model had a better quality. In addition, the smallest profile of the 4-profile model contained a substantial number of participants (i.e., 8% of total sample). Therefore, the 4-profile model was selected as best-fitting (labeled as *model A* in the following sections).

Figure 1 presents the standardized mean levels of the five factors of mindfulness of each profile of the 4-profile model. The largest profile ($n = 973$, 56%), profile 1, was named “*average mindfulness*,” with people having low to average scores on each facet of mindfulness (z ranged from -0.27 to 0.10). Profile 2 ($n = 416$, 24%) was labeled as “*high mindfulness*,” with people having relatively high scores on all five facets of mindfulness (z ranged from 0.44 to 0.82). Two other groups showed a distinct combination of individual facets of mindfulness. Profile 3 ($n = 205$, 12%) was labeled as “*non-judgmentally aware*,” with people reporting low levels of observing with high levels of holding a non-judgmental attitude ($z = 1.09$) and acting with awareness ($z = 0.78$). Profile 4, the smallest group ($n = 133$, 8%) showed an opposite of profile 3, with people reporting low levels of non-judging ($z = -1.38$) and acting with awareness ($z = -1.61$). This profile was labeled as “*judgmentally non-aware*.”

Profiles of Mindfulness Based on the Six Factor Scores From a B-ESEM of FFMQ as Indicators

The B-ESEM of FFMQ was firstly conducted, and the derived factor scores were used as indicators in the following LPA. The fit indices of the B-ESEM model were as follows: $\chi^2(522) = 1698.86$, $p < 0.001$, CFI = 0.94, TLI = 0.92, RESEM = 0.04 (90% CI: 0.03–0.04), indicating a good model-fitting according to the fit criteria of CFI/TLI ≥ 0.90 and RMSEA ≤ 0.06 (Hu and Bentler 1999; Kenny et al. 2015).

The bottom panel in Table 2 shows the fit indices of 2-profile LPA model through the 5-profile LPA model based on the factor scores of B-ESEM. The 4-profile model and the 5-profile model had relatively lowest AIC, BIC, and aBIC, the highest entropy, and significant VLMR and

Table 1 Pearson correlations between study variables

Variable	M (SD)	1	2	3	4	5	6	7	8	9	10	11
1. Observing	24.98 (5.56)	–										
2. Non-judging	29.03 (5.70)	–0.23**	–									
3. Acting with awareness	28.87 (5.14)	–0.06*	0.50**	–								
4. Describing	27.23 (5.75)	0.28**	0.13**	0.30**	–							
5. Non-reactivity	21.63 (4.36)	0.42**	–0.05	0.08**	0.35**	–						
6. Mindfulness total	131.71 (15.40)	0.48**	0.49**	0.64**	0.72**	0.57**	–					
7. Rumination	35.66 (8.30)	0.15**	–0.55**	–0.48**	–0.17**	–0.16**	–0.42**	–				
8. Positive reappraisal	11.84 (3.77)	0.32**	0.030	0.14**	0.35**	0.41**	0.43**	–0.18**	–			
9. Depressive symptoms	9.43 (8.31)	0.010	–0.43**	–0.50**	–0.22**	–0.19**	–0.46**	0.50**	–0.23**	–		
10. Positive affect	30.15 (7.37)	0.28**	0.09**	0.22**	0.35**	0.31**	0.42**	–0.17**	0.41**	–0.36**	–	
11. Negative affect	15.74 (5.91)	0.07**	–0.45**	–0.47**	–0.17**	–0.15**	–0.41**	0.48**	–0.12**	0.68**	–0.10**	–

* $p < 0.05$ ** $p < 0.01$

BLRT. But the smallest profile of these two models (i.e., 2.3 and 1.4%) did not contain a substantial number of participants. We therefore selected the 3-profile model (labeled as *model B* in the following sections) to compare the shape of the profiles observed in model A.

The right panel of Fig. 1 presents the six factor scores based on the B-ESEM of each profile in model B. The three profiles differed on the global factor, with profile 1 ($n = 1354$, 78.4%) reporting average global level of mindfulness ($z = 0.21$), profile 2 ($n = 280$, 16.2%) the lowest level ($z = -0.96$), and profile 3 ($n = 93$, 5.4%) the highest global level ($z = 1.14$). As for the configurations, the shape of profile 3 in

model B was similar to the shape of profile 3 (“non-judgmentally aware”) in model A, with low levels on observing ($z = -0.99$) and non-reactivity ($z = -1.67$) but high on non-judging ($z = 0.52$), and acting with awareness ($z = 0.40$). Profile 3 in model B was therefore labeled as “high non-judgmentally aware.” The shapes of the other two profiles in model B were relatively flat: people in profile 1 reported average levels across the five facets of mindfulness (z ranged from 0.01 to 0.20), and those in profile 2 reported slightly lower levels than the average (z ranged from -0.11 to -0.21). We therefore named profile 1 as “average mindfulness” and profile 2 as “low to average mindfulness”.

Table 2 Results of latent profile analyses using the standardized scores of FFMQ as indicators (the top block) and the factor scores of the B-ESEM of FFMQ as indicators (the bottom block)

No. of classes	AIC	BIC	aBIC	Entropy	LMR	BLRT	Class prevalence					
							1	2	3	4	5	
LPA models using the standardized scale scores of FFMQ as indicators												
1	23,913.53	23,968.01	23,936.24	n/a	n/a	n/a	100%					
2	23,406.92	23,494.09	23,443.26	0.830	− 11,946.763***	− 11,946.763***	10.5%	89.5%				
3	22,777.91	22,897.78	22,827.88	0.676	− 11,687.460***	− 11,687.460***	13.0%	36.9%	50.1%			
4	22,605.17	22,757.73	22,668.77	0.700	− 11,366.956***	− 11,366.956***	7.8%	24.1%	11.7%	56.4%		
5	22,487.59	22,672.84	22,564.82	0.657	− 11,274.587*	− 11,274.587***	8.9%	41.2%	4.1%	22.7%	23.1%	
LPA models using the factor scores of a B-ESEM of FFMQ as indicators												
1	26,675.21	26,740.66	26,702.54	n/a	n/a	n/a	100%					
2	26,429.41	26,533.04	26,472.68	0.929	− 13,325.607***	− 13,325.607***	95.1%	4.9%				
3	26,360.92	26,502.73	26,420.13	0.656	− 13,195.703	− 13,195.703***	16.2%	5.4%	78.4%			
4	26,320.06	26,500.05	26,395.21	0.728	− 13,154.461*	− 13,154.461***	11.2%	5.6%	2.3%	80.9%		
5	26,282.37	26,500.54	26,373.00	0.735	− 13,127.032	− 13,127.032***	12.3%	5.6%	2.8%	77.9%	1.4%	

* $p < 0.05$ *** $p < 0.001$

Fig. 1 The standardized scores of mindfulness facets in each profile in model A (the left panel) and the standardized scores of the six factors of B-ESEM in model B (the right panel)

Profile 4 (“judgmentally non-aware”) in model A could not be replicated in model B.

Associations of Mindfulness Profiles With Sociodemographic Characteristics

As for the three profiles in model B, the BCH results suggested that age, gender, and educational level distinguished people with the three profiles of mindfulness (see Table 3). In comparison with people in profile 1 and profile 2, people in profile 3 “high non-judgmentally aware” were more likely to be older, male, and lower educated ($ps < 0.001$). There were no significant differences on age, gender, or educational level between profile 1 and profile 2 (all $ps > 0.05$).

Associations of Mindfulness Profiles With Psychological Outcomes and Coping Strategies

In models of class membership predicting psychological outcomes and coping strategies, the standardized scores of mindfulness facets as well as age, gender, and educational level were controlled for. Figure 2 presents the 90% CI and the point estimates of the psychological outcomes and coping strategies of model B.

The large group of people in profile 1 “average mindfulness” reported good psychological outcomes (i.e., lower levels of depression and negative affect and highest positive affect) and adaptive coping (lower rumination and higher positive reappraisal).

In contrast, people in profile 2 “low to average mindfulness” reported the worst psychological outcomes (i.e., highest levels of depression and negative affect and lowest positive affect) as well as non-adaptive coping (i.e., highest rumination and lowest positive reappraisal).

The small group of people in profile 3 “high non-judgmentally aware” reported the best psychological outcomes (i.e., lowest levels of depression and negative affect and high positive affect) and coping strategies (i.e., low levels of rumination and high levels of positive reappraisal).

Discussion

The current study aimed to identify distinct profiles of mindfulness by disentangling the level and the shape effects of mindfulness in a large representative group from the general population. Three distinct profiles of mindfulness were identified: “average mindfulness” (78.4%), “low to average

Table 3 Associations of age, gender, and educational level with mindfulness profiles in model B

	Profile 1 Average mindfulness, mean (SD)	Profile 2 Low to average mindfulness, mean (SD)	Profile 3 High non-judgmental aware, mean (SD)
Age	54.84 (16.43)	51.51 (17.42)	64.99 (15.49)
Gender	%	%	%
Male	46.50%	33.90%	61.30%
Female	53.50%	66.10%	38.70%
Education level			
Low	17.40%	22.10%	50.50%
Moderate	47.80%	54.30%	43.00%
High	34.80%	23.60%	6.50%

Fig. 2 Associations of mindfulness profiles in model B with psychological outcomes and coping strategies controlling for factors of mindfulness. Note. The figure presents the standardized z scores and 90% confidence intervals of each profile on psychological outcomes and

coping strategies. The overlapped standardized errors between profiles mean the non-significant differences, and the non-overlapped standardized errors indicate significant differences between pairs of profiles

mindfulness” (16.2%), and “high non-judgmentally aware” (5.4%). These profiles differed significantly on age, gender, and educational level, with people in profile 3 being more likely to be older, male, and lower educated. People in profile 2 “low to average mindfulness” reported the worst psychological outcomes and least adaptive coping strategies, whereas the small group of persons in profile 3 “high non-judgmentally aware” had the best psychological outcomes and coping strategies.

The identified three profiles differed on both global levels of mindfulness (i.e., low, average, and high mindfulness) and the configurations of mindfulness profiles (i.e., the non-judgmentally aware profile and the average profile). In a previous study using similar analyses, Sahdra et al. (2017) found four profiles of mindfulness based on a short version of the FFMQ: a group showing low mindfulness with “*judgmentally non-aware*” profile, a group showing average levels of mindfulness with a similar non-judgmentally aware pattern, and two other groups showing average mindfulness but different global levels. In the present study, we partly replicated these previous findings, except that we did not find a “judgmentally non-aware” profile. It should be noted that our sample, although relatively large, was still far smaller than the sample size of the study of Sahdra et al. (2017), which contained 7884 people. This might be the reason why we did not find a “judgmentally non-aware” profile. Moreover, differences in educational levels could be another reason for these different findings. In the study of Sahdra et al. (2017), more than half of their participants had a high level of education (i.e., higher than a college diploma), whereas only one-third of our study sample reported high levels of education (i.e., higher than

college). In addition, the use of different versions of the FFMQ (short or full version) could be another possible reason. Future research in different samples is warranted to further examine this issue.

As shown in model A, the current research replicated findings in college students and demonstrated a general existence of four distinct profiles of mindfulness with similar group sizes as follows: the “average mindfulness,” the “high mindfulness,” the “non-judgmentally aware,” and the “judgmentally non-aware” as the smallest (Bravo et al. 2016, 2018; Kimmes et al. 2017; Pearson et al. 2015b). Notably, the “average mindfulness” and the “judgmentally non-aware” profiles are comparable with the “low mindfulness” and the “judgmentally observing” profiles as identified in previous research. After disentangling the level and the shape effects of mindfulness profiles in model B, the “non-judgmentally aware” profile could be replicated. Persons with the “non-judgmentally aware” profile can be described as being mindful in the sense that they do not tend to judge and evaluate thoughts or feelings as right or wrong and they do not rush through activities and function on automatic pilot. Yet, at the same time, they also report little awareness of sensations and feelings, and that they may get lost in experiences.

When examining sociodemographic characteristics of the three profiles of mindfulness, age, gender, and educational levels were found to differentiate between the three profiles of mindfulness. People in profile 3 “high non-judgmentally aware” (with a generally high global mindfulness level but low on observing) were more likely to be older, male, and lower educated than people in the other two profiles. These

findings are generally in line with previous variable-centered studies. Particularly, males tended to report lower levels of observing than females (Bränström et al. 2011; Fogarty et al. 2015; Josefsson et al. 2011). Highly educated people (Bränström et al. 2011) and older people (Hohaus and Spark 2013; Mahoney et al. 2015; Prakash et al. 2015; Shook et al. 2019) reported higher overall levels of mindfulness. Our findings were somewhat different from findings in person-centered studies. Sahdra et al. (2017) found that the “non-judgmentally aware” group (comparable with our profile 3) did not differ on age or gender. But it should be noted that the abovementioned findings of Sahdra et al. were performed on FFMQ and non-attachment. It remained unclear to what extent the addition of the non-attachment would have influenced the associations of demographic characteristics with mindfulness profile memberships. The abovementioned comparison should be therefore interpreted with caution. Given the small number of studies on the characteristics of profiles of mindfulness and the mixed findings, it remains difficult to draw definite conclusions. More research is needed for a better understanding of whether profiles differ given people’s sociodemographic characteristics.

Regarding the question on how distinct profiles of mindfulness relate to psychological outcomes, people in profile 3 “high non-judgmentally aware” reported the best psychological outcomes and coping strategies, followed by people in profile 1 “average mindfulness,” and people in profile 2 “low to average mindfulness” reported poor psychological outcomes and more use of rumination. The small group of people with “high non-judgmentally aware” profile differed from people with “low to average mindfulness” in levels of awareness and non-judgmental attitude, as well as in the overall global level of mindfulness. Such differences might be the reason why these two profiles differed on both psychological outcomes and coping strategies. Our findings added to previous research (Bravo et al. 2016, 2018; Kimmes et al. 2017; Pearson et al. 2015b; Sahdra et al. 2017), by showing that the distinct profiles of mindfulness related not only to negative outcomes as they pointed out but also to positive psychological outcomes as well as different ways of coping with stress. Overall, the present study found that people may be mindful in different ways, based on skills regarding acting with awareness in daily activities, holding a non-judgmental accepting attitude, and being non-reactive. The most vulnerable group in terms of psychological functioning consisted of people reporting globally low level on mindfulness with an average mindfulness profile.

Limitations and Future Research Directions

Several limitations should be considered when interpreting these findings. First, the observational nature of the present study precludes drawing conclusions about the (in)stability of profiles of mindfulness and trends over time and about the

causality of the relationships between profiles of mindfulness and psychological outcomes and coping strategies. Future studies with an experimental design are needed to examine the causal associations of mindfulness profiles and outcomes. Second, all study variables were assessed via self-report, which only provided subjective information about how people themselves were aware and experienced their affect and ways of coping and what they would like to report (with possibilities of under- and over-report), at the moment they filled out the questionnaire. Future research may consider using more objective measures to assess individual’s levels of mindfulness. Third, as our research included a representative community sample of the Dutch population, findings may not be able to generalize into populations from other countries and cultures, neither to populations suffering from a somatic or mental condition. Studies are needed to replicate our findings in other populations. Lastly, we did not assess participants’ prior meditation experience in this study, which made it impossible to examine how prior meditation experiences would influence profiles of mindfulness. Previous variable-centered studies have shown differences in the construct of mindfulness between meditators and non-meditators (Baer et al. 2006, 2008). Moreover, there were also person-centered studies showing how meditation would influence profiles of mindfulness. For example, meditation experiences were related to distinct profiles of mindfulness in the general population (Sahdra et al. 2017). Using meditators and non-meditator samples, another study also identified similar profiles of mindfulness, although with somewhat subtle differences (Bravo et al. 2016). Future research is needed to further check the impact of meditation on profiles of mindfulness.

Notwithstanding the above-mentioned limitations, findings of the present study added to the existing literature by showing the existence of distinct mindfulness profiles (disentangled the level and shape effects of mindfulness) with differential associations with psychological outcomes and use of coping strategies with stress. As such, our findings warrant against using a global indicator of overall mindfulness. Our findings may inform mindfulness trainers and serve as the first step to develop targeted mindfulness-based interventions. Future intervention research is needed to examine the efficacy and cost-effectiveness of mindfulness-based interventions targeted on specific profiles.

Author Contributions LZ executed the study and wrote the paper. JW analyzed the data and wrote the paper. MJS collaborated in the study design and editing of the final manuscript. All authors approved the final version of this manuscript.

Compliance with Ethical Standards

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

Ethical Approval All procedures were approved by the ethics committee at the University Medical Center Groningen and were in accordance with the 1964 Helsinki Declaration and its later amendments.

Informed Consent Written informed consent was obtained from all participants included in the study.

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