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Testing the incremental validity of dispositional mindfulness over and above the Big Five in accounting for mental health: A facet-level structural-equation modeling and predictor communality and dominance approach

Ulrich S. Tran*, Juliane Wasserbauer, Martin Voracek*

Department of Basic Psychological Research and Research Methods, School of Psychology, University of Vienna, Vienna, Austria

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ABSTRACT

Dispositional mindfulness (i.e., its trait-like and universal component) and the Big Five personality dimensions empirically overlap on both the aggregate and facet levels. This overlap is strongest for neuroticism and conscientiousness, two major correlates of mental health. Associations of dispositional mindfulness with mental health could thus be due to underlying personality configurations. We investigated the latent structure and the incremental validity of dispositional mindfulness and the Big Five in accounting for mental health (perceived stress, anxiety, depression) in a community sample of $N = 430$ adults. Facets of dispositional mindfulness and the Big Five (using aggregate-level measures for openness, extraversion, and agreeableness) shared a common latent structure, which successfully recovered the Big Five. The incremental validity of mindfulness facets for mental health was small and negligible, only increasing in analyses of manifest (vs. latent) scores and when using aggregate (vs. facet-level) measures of neuroticism and conscientiousness. Predictor commonality and dominance analyses corroborated that the concurrent validity of dispositional mindfulness for mental health largely is qualified by personality dimensions. Emphasized are definitional overlaps of personality and dispositional mindfulness, and present-moment awareness as a possibly unique feature of dispositional mindfulness.

1. Introduction

Against the backdrop of an ever-increasing interest in mindfulness, researchers have called for a theoretical and empirical re-examination of the construct (e.g., Van Dam et al., 2018). Mindfulness has been noted to be hard to define (Chiesa, 2013). Currently, it is frequently defined as the purposeful and non-judgmental present-moment awareness (Kabat-Zinn, 2013), but, as of yet, no consensus definitions exist (Rau & Williams, 2016; Van Dam et al., 2018). Whereas mindfulness can be increased through mindfulness trainings and treatments (cultivated mindfulness), it is dispositional mindfulness (its trait-like, relatively stable, and universal component, considered as being distinct from cultivated mindfulness; Rau & Williams, 2016), which is of particular interest for personality research. Empirically, dispositional mindfulness overlaps with well-established constructs within the personality domain, such as trait affect and the Big Five (see meta-analyses of Giluk, 2009; Hanley & Garland, 2017; Rau & Williams, 2016). For the Big Five traits, associations are large ($r \approx -0.50$) and negative with neuroticism, medium-sized (≈ 0.30) with conscientiousness, and small-to-medium ($\approx$ 0.10–0.20) with openness, extraversion, and agreeableness.

One of the most comprehensive and widely used mindfulness scales is the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer & Toney, 2006). Building on five earlier scales, it purports five facets (Observe: attention to internal and external experiences; Describe: labeling of internal experiences; Acting with Awareness [Actaware]: being oriented to the present moment during activities; Nonjudging of Inner Experience [Nonjudge]: refraining from evaluating cognitive or emotional events; Nonreacting to Inner Experience [Nonreact]: refraining from [immediately] acting on aversive inner thoughts and feelings), which allow for fine-grained investigations into dispositional mindfulness.

Facet-level associations are largest for neuroticism with Nonjudge (≈ -0.50), Nonreact and Actaware (≈ -0.40); for conscientiousness with Actware (≈ 0.50); for openness with Observe (≈ 0.40); and for extraversion with Describe (≈ 0.30); whereas agreeableness is commensurably modestly (≈ 0.15) associated with all facets (Hanley & Garland, 2017). On the latent level, personality thus accounts for more than 40% of variance in mindfulness facets (Siegling & Petrides, 2014). Spinhoven, Huijbers, Zheng, Ormel and Speckens (2017) reported

* Corressponding authors.
E-mail addresses: ulrich.tran@univie.ac.at (U.S. Tran), martin.voracek@univie.ac.at (M. Voracek).

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among currently remitted depressed patients a common latent structure of mindfulness and personality facets (as assessed with the NEO-PI-R), which broadly recovered the Big Five. Therein, Actaware, Nonjudge, and Nonreactivity loaded on the same factor, as did most of the neuroticism facets; and, in similar vein, Observe and Describe loaded on the same factor, as did most of the openness facets.

While these associations have generally been taken as pointing to the utility of personality assessments for boosting clinical outcomes through tailored mindfulness interventions (Hanley & Garland, 2017), or that mindfulness might be a protective factor in the nexus of neuroticism and depression (Spinhoven et al., 2017), they also highlight inherent problems of construct validity of dispositional mindfulness. Associations of mental health with dispositional mindfulness (Baer et al., 2006; Brown & Ryan, 2003) might not be uniquely attributable to dispositional mindfulness proper, but possibly be rather due to simultaneous associations with neuroticism and conscientiousness (two major correlates of mental health; Kotov, Gamez, Schmidt & Watson, 2010; Malouff, Thorsteinsson & Schutte, 2005).

Currently, empirical studies on the incremental validity of dispositional mindfulness in accounting for mental health vis-à-vis the Big Five factors and their facets are lacking. Wenzel, von Versen, Hirschmüller and Kubiak (2015), and (on the facet level) Iani, Lauriola, Cafaro and Didonna (2017) reported mediating effects of mindfulness on the relationship between neuroticism and well-being. None of these two accounts did further examine the underlying incremental validity. Grevenstein, Aguilar-Raab and Bluemke (2018) examined the incremental validity of mindfulness for quality of life outcomes, but not on the facet level.

The present study set out to investigate the unique contribution (i.e., incremental validity) of FFMQ-assessed mindfulness facets in accounting for mental health (perceived stress, anxiety, depression) in a community sample, while controlling for the Big Five. Fig. 1 provides a graphical representation of the underlying conceptual model and the analysis plan.

Drawing on structural equation modeling (SEM) methods, we explored the common latent space of personality and dispositional mindfulness and conducted hierarchical regression analyses with factor scores as well as manifest scores. We contrasted facet scores of neuroticism and conscientiousness (the most salient correlates of dispositional mindfulness) with short aggregate-level measures of these constructs, and examined differences due to measurement and analytic approaches (latent vs. manifest level). To address the issue of multicollinearity in the regression analyses, we further utilized predictor commonality and dominance analyses (Nimon & Oswald, 2013).

This study thus contributes to a comprehensive and integrative examination of dispositional mindfulness vis-à-vis the Big Five within a multimodal framework (contrasting different self-report scales for the same constructs) and a multimethod framework as well (contrasting different analytic strategies).

2. Method

2.1. Participants and procedure

The analysis sample consisted of $N = 430$ German-speaking volunteers (73% women; age $M = 38.0$, $SD = 14.7$, range: 18–76 yr.). Most participants were Austrian (69%) or German (26%), and 5% from other (mostly Central European) countries. About 14% of participants had completed compulsory or vocational education, 37% upper secondary education, 49% some sort of tertiary education. Some regular (i.e., at least once a week) meditation practice was reported by 37%. This included various (mostly idiosyncratic) relaxation techniques and mindfulness meditation; the single most frequently reported practice was yoga (28%), followed by Zen (11%), and Qigong (8%). Meditation

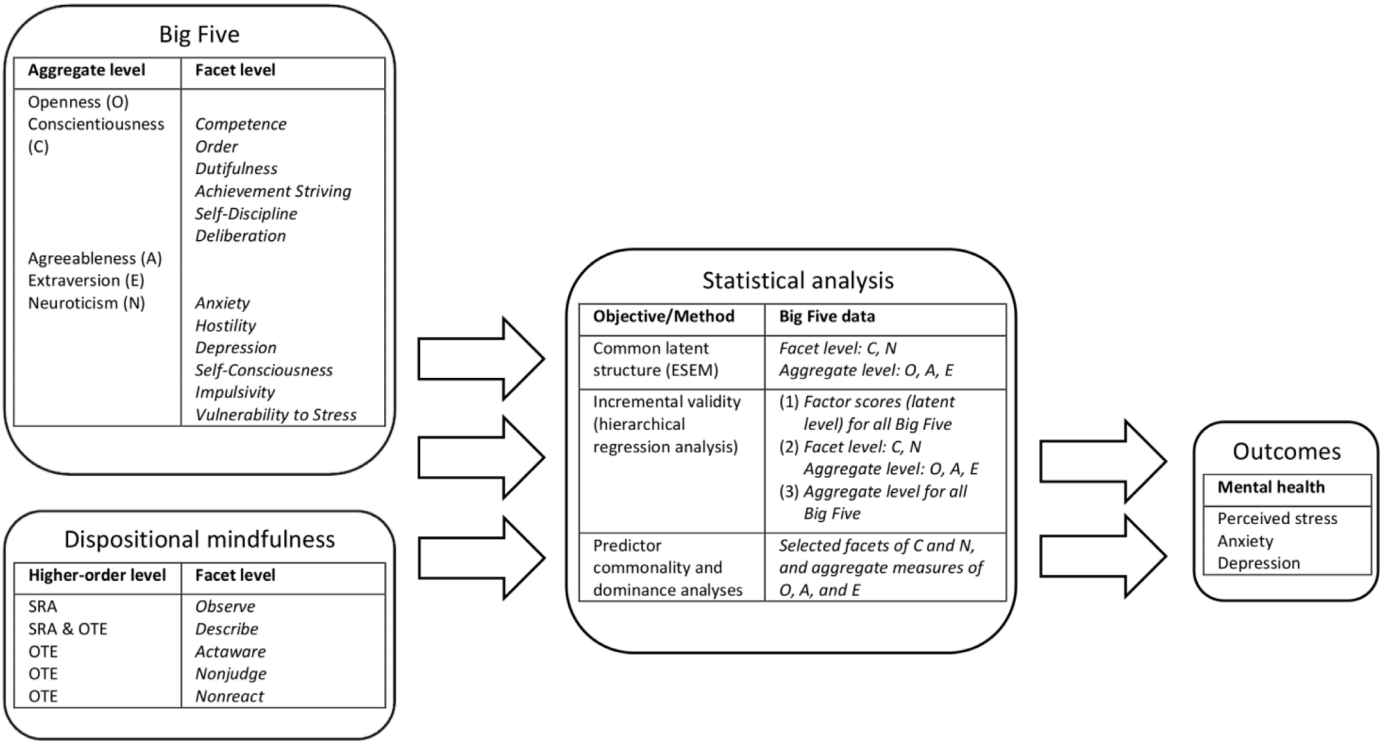

Fig. 1. Schematic representation of the underlying conceptual model and the analysis plan. Big Five aggregate and facet-level measures (for conscientiousness and neuroticism, which are major correlates of mental health and the two most salient correlates of dispositional mindfulness) were subjected to structural and validity analyses with the mindfulness facets, therein contrasting aggregate vs. facet-level, and latent vs. manifest, measures of the Big Five. For mindfulness, the mapping of facets onto two higher-order components of mindfulness (Bishop et al., 2004), as reported previously (Burzler et al., 2019), is also displayed in the diagram. The incremental validity of the Big Five and dispositional mindfulness was examined vis-à-vis three measures of mental health. SRA = Self-Regulated Attention, OTE = Orientation to Experience, ESEM = exploratory structural equation modeling.

practice was controlled for in analysis.

Participants were recruited via social media and social networks and had to be 18 years or older and proficient in the German language. All data were collected online. Study participation was voluntary and anonymous. As an incentive, three 20€ bookstore gift cards were raffled among participants. From the initially obtained sample (N = 434), four individuals were excluded due to missing responses. The dataset is provided on figshare.com (10.6084/m9.figshare.9913085).

2.2. Materials

German forms of the self-report measures were used throughout. Sample scale reliabilities were assessed with ω total (see Supplemental Materials, Tables S1–S3), using the R package userfriendlyscience (Peters, Verboon & Green, 2018), assuming ordinal item-response scales.

2.2.1. Big Five

The brief Big Five Inventory (BFI-K; Rammstedt & John, 2005) was used for the assessment of the Big Five (21 items; 1: *strongly disagree* 5: *strongly agree*). For the assessment of conscientiousness facets (Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, Deliberation) and neuroticism facets (Anxiety, Hostility, Depression, Self-Consciousness, Impulsivity, Vulnerability to Stress), the respective scales of the Revised NEO Personality Inventory (NEO-PI-R; Ostendorf & Angleitner, 2004) were administered (96 items in total [8 per facet]; −2: *strongly disagree*, +2: *strongly agree*).

2.2.2. Mindfulness

The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) was used for the assessment of the mindfulness facets Observe, Describe, Actaware, Nonjudge, and Nonreact (39 items; 1: *never true*, 5: *very often true*). Analysis was restricted to the 23 items of a short form which has better psychometric properties than the full FFMQ (e.g., Burzler, Voracek, Hos & Tran, 2019) and which in our sample produced the same correlational pattern with the Big Five as did the full FFMQ (see Results).

2.2.3. Mental health

Mental health was operationalized through measures of perceived stress, anxiety, and depression. Perceived stress was assessed with the Perceived Stress Questionnaire (PSQ; Fliege et al., 2005; 20 items, querying stress reactions and stressors during the last 4 weeks; 1: *almost never*, 4: *usually*), and anxiety and depression with the respective scales of the Brief Symptom Inventory-18 (BSI-18; Spitzer et al., 2011; 6 items each, querying symptom severity during the last seven days; 0: *not at all*, 4: *extremely*).

2.3. Analysis

Analysis proceeded in three steps. First, the common latent structure of the Big Five (BFI-K scale scores of openness, extraversion, and agreeableness, and NEO-PI-R facet scores of conscientiousness and neuroticism) and the mindfulness facets was explored, using exploratory SEM (ESEM; Asparouhov & Muthén, 2009). ESEM is conceptually similar to exploratory factor analysis, but provides model-fit indices and allows for many structural tests (e.g., measurement invariance), as in confirmatory factor analysis. We fitted a 5-factor model on the scale and facet scores, using robust maximum-likelihood estimation and oblique GEOMIN rotation in Mplus 8.2. Model fit was evaluated via CFI and TLI values (>0.90 acceptable and > .95 good fit), and RMSEA values (<0.08 acceptable and <0.06 good fit; Hu & Bentler, 1999). Among others, ESEM has already been applied for investigating the factor structure of the Big Five (for an overview, see Booth & Hughes, 2014). ESEM estimates cross-loadings freely and, for complex factors structures, as expectable here, may provide more valid factor scores than confirmatory factor analysis.

For cross-validation, an exploratory 5-factor model was fitted on the personality facets and scales alone as well, estimating the mindfulness facet loadings in this factor space with extension analysis (e.g., Gorsuch, 1997). To evaluate the similarity of factors in models with and without the mindfulness facets, factor congruences (Burt, 1948) were also obtained, using the R package psych (Revelle, 2019) for both analyses.

In the second analytic step, the latent factor scores were used alongside the manifest mindfulness facet scores to predict perceived stress, anxiety, and depression in hierarchical regression models. This approach allowed estimating the unique contributions of mindfulness facets with regards to mental health optimally, as the factor scores controlled for both the common variance of mindfulness facets with the Big Five and for measurement error. The regression models included in a first step the control variables participant sex, age, and meditation experience (1: *regular*, 0: *not regular or none*), in a second step the factor scores, and in the final step the mindfulness facet scores. This analysis was repeated with (1) the manifest Big Five (BFI-K and NEO-PI-R) scale and facet scores, to get an impression which Big Five facets accounted for most of the attributable variance of mental health on the manifest level; and (2) with conscientiousness and neuroticism BFI-K scale scores, to investigate the effect of using short aggregate-level (BFI-K) vs. facet-level (NEO-PI-R) measures for these constructs.

In the final analysis step, all predictors of all foregoing regression models were subjected to commonality and dominance analyses (Nimon & Oswald, 2013). These analyses were utilized to examine the unique and common effects of individual predictors in accounting for outcome variance (commonality analysis), thus addressing and controlling for expected multicollinearity in the foregoing regression analyses, and the average incremental variance, when adding individual predictors to the model (dominance analysis). The resulting coefficients are based on all-possible-subsets analyses of regression predictors (2^p – 1 analyses for p predictors) and partition the total R^2 according to the predictors' average importance. The R package yhat (Nimon & Roberts, 2013) was used for these analyses. Significance was set to $p < .05$.

3. Results

Mindfulness facets were strongly associated with the Big Five (Supplemental Materials, Table S1, correlation matrix heatmap). The strongest correlations were observed for Observe with openness (positive), Describe with extraversion (positive) and neuroticism (negative), and Actaware, Nonjudge, and Nonreact with neuroticism (negative; these correlations were slightly smaller with BFI-K than with NEO-PI-R neuroticism scores). Actaware, Nonjudge, and Nonreact also showed medium-to-large positive correlations with conscientiousness, and medium correlations with agreeableness. Associations differed negligibly for the full and the short FFMQ; hence, the short FFMQ was used for further analysis.

With the personality facets (Supplemental Materials, Table S2, correlation matrix heatmap), Observe showed the smallest correlations ($rs \leq |.22|$); however, associations with the other mindfulness facets were sizable (absolute r values Mdn = 0.35). Overall, Actaware had the strongest associations with the conscientiousness facets ($Mdnr$ = 0.32; highest with Self-Discipline); and Actaware, Nonjudge, and Nonreact were strongly associated with the neuroticism facets ($Mdn\ r = -0.52$; highest with Anxiety, Depression, and Vulnerability to Stress). Overall, Order and Deliberation had the lowest correlations with the mindfulness facets.

3.1. ESEM analysis

The 5-factor ESEM fitted the data well, $\chi^2(100) = 229.01$, $p < .001$, CFI = 0.968, TLI = 0.940, RMSEA = 0.055, 95%

Table 1
Standardized factor loadings, communalities, and factor intercorrelations in the 5-factor ESEM analysis.

Facet or scale	Factor Openness	Conscien-tiousness	Extraversion	Agreeable-ness	Neuroticism	h^2
Openness	**.80**	−0.02	.01	.08	.07	.63
Competence	.10	**.43**	.03	−0.06	**−0.55**	.67
Order	**−0.16**	**.74**	−0.09	−0.002	.01	.50
Dutifulness	−0.02	**.79**	.004	.06	−0.02	.63
Achievement Striving	**.13**	**.71**	**.11**	−0.02	.09	.56
Self-Discipline	**−0.06**	**.68**	.03	.02	**−0.33**	.71
Deliberation	.06	**.50**	**−0.50**	.004	−0.03	.44
Extraversion	.10	.03	**.75**	.16	−0.11	.71
Agreeableness	.04	.08	.03	**.76**	−0.02	.61
Anxiety	.05	**.12**	−0.02	−0.14	**.84**	.76
Hostility	.01	.02	**.26**	**−0.37**	**.63**	.71
Depression	.03	−0.04	−0.06	−0.07	**.84**	.80
Self-Consciousness	.01	.03	**−0.30**	−0.19	**.63**	.68
Impulsivity	−0.02	**−0.29**	**.38**	−0.15	**.35**	.41
Vulnerability to Stress	**−0.08**	**−0.07**	.00	**.20**	**.95**	.84
Observe	**.62**	.04	−0.02	.01	−0.06	.41
Describe	**.37**	.05	**.38**	−0.03	**−0.27**	.48
Actaware	−0.11	**.27**	−0.01	−0.01	**−0.54**	.44
Nonjudge	−0.02	.02	.08	.05	**−0.62**	.44
Nonreact	**.28**	−0.03	**−0.16**	−0.04	**−0.69**	.54
Factor intercorrelations						
Conscientiousness	.23***					
Extraversion	.14*	.14*				
Agreeableness	.004	.07	.08			
Neuroticism	−0.13*	−0.33***	−0.19	−0.43***		

Note. h^2 = communality. Significant ($p < .05$) factor loadings are printed boldface; loadings ≥ |.30| are shaded. *$p < .05$, ***$p < .001$.

CI = [.045, 0.064], and successfully retrieved the Big Five factors, labelled respectively (Table 1). Larger intercorrelations were observed between the agreeableness and conscientiousness factors with neuroticism (both negative). Observe had a salient (≥|.30|) positive loading on openness; Describe on openness and extraversion; and Actaware, Nonjudge, and Nonreact each had salient negative loadings on neuroticism. The communalities of the mindfulness facets ranged from 0.41 (Observe) to 0.54 (Nonreact), but did not reach the magnitude of communalities of most of the personality facets and scales (*Mdn* h^2 = 0.67). Results were broadly replicated with extension analysis; all factor congruences were ≥ 0.98 (Table S3). In the ESEM analysis, personality explained 46% of the mindfulness facets variance, whereas 26% in the extension analysis.

3.2. Hierarchical regression analyses

Competence, Self-discipline, and the neuroticism facets presented medium-to-large negative associations with all three mental health outcomes (Table S4, correlation matrix heatmap). Associations were small-to-medium for at least one of the outcomes with Order, Dutifulness, agreeableness, and extraversion. Describe had small-to-medium associations with all three outcomes, whereas Actaware, Nonjudge, and Nonreact medium-to-large associations.

The mindfulness facets accounted for noticeable portions of outcome variance only for anxiety scores, controlling for the ESEM factor scores (Table 2; see Table S5 for an analysis with separate factor scores for personality and mindfulness); i.e., the unique variance of the mindfulness facets did not predict mental health over and above the variance these facets had in common with the Big Five. The sole exception to this pattern was Actaware, which accounted for further 2% of variance in anxiety scores over and above the Big Five. The significant small positive association of Nonreact with perceived stress did not significantly increase explained variance. Extraversion and conscientiousness factor scores also had small positive associations with perceived stress and anxiety. Participant sex and age each were significant predictors in Step 1 (women scoring higher in perceived stress and anxiety, younger participants scoring higher in all outcomes), but lost their significance in Steps 2 and 3.

Table 2
Results of the hierarchical regression analyses (final step).

Predictor	Perceived stress	Anxiety	Depression
Step 1: Sociodemographics			
Sex	.001	−0.04	−0.05
Age	−0.03	−0.07	−0.07
Meditation experience	−0.06	−0.04	.02
Adjusted R^2	.092	.093	.111
ΔR^2	.098	.099	.117
F(3424)	15.44***	15.61***	18.79***
Step 2: Personality			
Openness FS	.10	.03	.07
Conscientiousness FS	.11*	.14**	−0.04
Extraversion FS	.14**	.05	−0.05
Agreeableness FS	.05	.05	.07
Neuroticism FS	.72***	.65***	.69***
Adjusted R^2	.403	.399	.517
ΔR^2	.315	.311	.409
ΔF(5419)	45.06***	44.21***	72.20***
Step 3: Mindfulness			
Observe	−0.04	.09	−0.004
Describe	−0.02	.01	.08
Actaware	−0.09	−0.15**	−0.04
Nonjudge	−0.02	−0.03	−0.08
Nonreact	.13*	.10	.03
Adjusted R^2	.408	.411	.519
ΔR^2	.012	.018	.007
ΔF(5404)	1.74	2.65*	1.32

Note. FS = factor scores. Numbers are standardized regression coefficients (β). All variance inflation factors (VIFs) were ≤ 5.06. *$p < .05$, **$p < .01$, ***$p < .001$.

On the facet level of personality, Achievement Striving, Self-Discipline, Anxiety, Depression, Self-Consciousness, and Vulnerability to Stress were significant predictors for at least one of the three mental health outcomes (Table S6). Actaware also accounted for ≈1% variance over and above personality in depression scores, and Observe positively predicted anxiety scores.

Using aggregate-level measures (BFI-K scale scores; Table S7) for

conscientiousness and neuroticism, the regression weights for neuroticism became smaller, and for the mindfulness facets Actaware and Nonjudge larger. Overall, the models accounted for less variance, but the increments of the mindfulness facets became larger (about 5–7%) and significant for all three outcomes.

3.3. Commonality and dominance analyses

Tables S8 to S11 contain the coefficients obtained from the predictor commonality and dominance analyses (with heatmaps; due to constraints of computational feasibility, four predictors with negligible incremental validities had to be excluded from the analysis of the personality facets, see Table S10). Neuroticism (and its facets) shared the most variance with other predictors in accounting for mental health, but also had the highest uniqueness coefficients and dominance weights across all analyses. Actaware, Nonjudge, and Nonreact accounted for comparatively lower increments of outcome variance and exhibited smaller unique effects. This suggests that, overall, the personality dimensions (especially neuroticism) largely dominated the mindfulness facets in accounting for mental health. Of all mindfulness facets, Actaware mostly had the highest uniqueness coefficients and dominance weights.

4. Discussion

This study set out to investigate the incremental validity of dispositional mindfulness vis-à-vis the Big Five, using methods of exploratory structural equation modeling and hierarchical regression analysis, investigating both the latent and the manifest level, and contrasting facet-level and short aggregate-level measures of conscientiousness and neuroticism. The mindfulness facets mapped onto a factor space which recovered the Big Five. While this structure did not fully account for the variance in the mindfulness facets, mindfulness-based increments in predicting perceived stress, anxiety, and depression over and above the Big Five generally were small, if not negligible. Increments increased when using aggregate-level measures of conscientiousness and neuroticism. Of all mindfulness facets, Actaware (and to a lesser extent Nonjudge) appeared to contain at least some variance relevant to mental health, which was not already accounted for by the Big Five. This suggests that Actaware in particular could be a unique component of dispositional mindfulness with relevance to mental health.

Our results broadly replicated recent findings about the common latent structure of personality and dispositional mindfulness (Spinhoven et al., 2017), generalizing these to the nonclinical domain. This common structure highlights obvious, but often underappreciated, links and definitional overlaps between dispositional mindfulness and personality (Rau & Williams, 2016). Emotional instability, the frequent experience of, and preoccupation with, aversive thoughts and feelings, and the tendency to interpret ordinary situations and experiences in a (more) negative way (i.e., the core of neuroticism) logically all need to go along with less present-moment awareness (Actaware), apparent lower capability of “letting go” (Nonreact), and less cause and room for a non-judgmental point of view (Nonjudge). Similarly, self-regulatory tendencies and diligence (conscientiousness) logically need to be reflected in these facets as well. Yet, it is interesting to note that only Actaware loaded directly on the conscientiousness factor, whereas, for the other mindfulness facets, associations with conscientiousness only came about through neuroticism being negatively related to conscientiousness. Further, the loading pattern of Observe and Describe is compatible with recent evidence (Burzler et al., 2019) for a two-component structure of mindfulness (Bishop et al., 2004), wherein Observe only loads on, and defines, Self-Regulated Attention (SRA; Orientation to Experience being the other component), whereas Describe loads on both. SRA thus likely exhibits close links with openness, which appear to be driven by associations with the Aesthetics, Feelings, and Ideas facets (Spinhoven et al., 2017). These observations should be followed-up in future research.

Slight differences in the incremental validity of mindfulness facets for mental health on the manifest vs. latent level, and in comparison of short aggregate-level vs. facet-level measures of the Big Five, suggest that data-analytic strategies and measurement issues matter to some extent with regards to the results obtained. Mental health is most strongly associated with neuroticism in the NEO-PI-R (Malouff et al., 2005). Hence, variance in incremental validity is to be expected for other Big Five measures. Neuroticism in the NEO-PI-R contains Depression, Anxiety, and Vulnerability to Stress facets, all of which are closely related with, and nearly identical in item content to, the mental health outcomes assessed in the current study. These neuroticism facets were also strongly correlated with the mindfulness facets Actaware, Nonjudge, and Nonreact. Yet, switching to a 4-item aggregate-level measure of neuroticism (BFI-K) did not substantially alter results. The concurrent validity of dispositional mindfulness was still largely qualified by personality.

We anticipate similar results for measures of dispositional mindfulness other than the FFMQ. Even though there is variance in their associations with the Big Five (Hanley & Garland, 2017; Rau & Williams, 2016), most of them are strongly mutually interrelated. This is demonstrated by the FFMQ itself, which is an amalgam of five existing scales. Still, future research needs to examine whether other scales contain additional aspects of dispositional mindfulness not already captured by the Big Five, and also needs to investigate other scales than the NEO-PI-R and the BFI-K, as well as further constitutive parts of mental health.

Study limitations pertain to the sample type (convenience community sample), the skewed sex ratio and high educational levels therein, and the possibility of common-method variance effects through the self-report data source. Future studies would thus benefit from investigating more heterogeneous and sex-balanced samples and from drawing on further data sources, but also from exploring all Big Five factors on the facet-level, as the mixing of facet-level and aggregate measures may have affected the current structural analyses. Additional insight into underlying causal associations will need longitudinal designs.

In conclusion, the findings suggest that the Big Five dimensions and dispositional mindfulness share a common latent structure, and that the concurrent validity of dispositional mindfulness for mental health is largely constrained by these personality dimensions. Reported associations of dispositional mindfulness with mental health thus might be largely due to underlying personality configurations. Definitional overlaps between dispositional mindfulness and the Big Five need to be taken into account, and avoided in future developments and conceptual redefinitions of the construct (see Van Dam et al., 2018). From a psychometric point of view, present-moment awareness (Actaware) may well be a unique ingredient of dispositional mindfulness, with relevance to mental health. Conversely, the idea of potential malleability of neuroticism through (mindfulness-based) interventions (see Barlow, Sauer-Zavala, Carl, Bullis & Ellard, 2014; Brown & Ryan, 2003) might also need reconsideration.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.paid.2019.109769.

References

Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling, 16*, 397–438. https://doi.org/10.1080/10705510903008204.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45. https://doi.org/10.1037/t05514-000.

Barlow, D. H., Sauer-Zavala, S., Carl, J. R., Bullis, J. R., & Ellard, K. K. (2014). The nature,

diagnosis, and treatment of neuroticism: Back to the future. *Clinical Psychological Science, 2*, 344–365. https://doi.org/10.1177/2167702613505532.
Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241. https://doi.org/10.1093/clipsy/bph077.
Booth, T., & Hughes, D. J. (2014). Exploratory structural equation modeling of personality data. *Assessment, 21*, 260–271. https://doi.org/10.1177/1073191114528029.
Brown, K. W., & Ryan, R. M. (2003). The benefit of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848. https://doi.org/10.1037/0022-3514.84.4.82.
Burt, C. (1948). The factorial study of temperamental traits. *British Journal of Statistical Psychology, 1*, 178–203. https://doi.org/10.1111/j.2044-8317.1948.tb00236.x.
Burzler, M. A., Voracek, M., Hos, M., & Tran, U. S. (2019). Mechanisms of mindfulness in the general population. *Mindfulness, 10*, 469–480. https://doi.org/10.1007/s12671-018-0988-y.
Chiesa, A. (2013). The difficulty of defining mindfulness: Current thought and critical issues. *Mindfulness, 4*, 255–268. https://doi.org/10.1007/s12671-012-0123-4.
Fliege, H., Rose, M., Arck, P., Walter, O. B., Kocalevent, R.-D., Weber, C., et al. (2005). The Perceived Stress Questionnaire (PSQ) reconsidered: Validation and reference values from different clinical and healthy adult samples. *Psychosomatic Medicine, 67*, 78–88. https://doi.org/10.1097/01.psy.0000151491.80178.78.
Giluk, T. L. (2009). Mindfulness, Big Five personality, and affect: A meta-analysis. *Personality and Individual Differences, 47*, 805–811. https://doi.org/10.1016/j.paid.2009.06.026.
Gorsuch, R. L. (1997). New procedure for extension analysis in exploratory factor analysis. *Educational and Psychological Measurement, 57*, 725–740. https://doi.org/10.1177/0013164497057005001.
Grevenstein, D., Aguilar-Raab, C., & Bluemke, M. (2018). Mindful and resilient? Incremental validity of sense of coherence over mindfulness and Big Five personality factors for quality of life outcomes. *Journal of Happiness Studies, 19*, 1883–1902. https://doi.org/10.1007/s10902-017-9901-y.
Hanley, A. W., & Garland, E. L. (2017). The mindful personality: A meta-analysis from a cybernetic perspective. *Mindfulness, 8*, 1456–1470. https://doi.org/10.1007/s12671-017-0736-8.
Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55. https://doi.org/10.1080/10705519909540118.
Iani, L., Lauriola, M., Cafaro, V., & Didonna, F. (2017). Dimensions of mindfulness and their relations with psychological well-being and neuroticism. *Mindfulness, 8*, 664–676. https://doi.org/10.1007/s12671-016-0645-2.
Kabat-Zinn, J. (2013). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness.* New York: Bantam Dell.
Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "Big" personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin, 136*, 768–821. https://doi.org/10.1037/a0020327.
Malouff, J. M., Thorsteinsson, E. B., & Schutte, N. S. (2005). The relationship between the five-factor model of personality and symptoms of clinical disorders: A meta-analysis. *Journal of Psychopathology and Behavioral Assessment, 27*, 101–114. https://doi.org/10.1007/s10862-005-5384-y.
Nimon, K., & Roberts, J.K. (.2013). yhat: Interpreting regression effects (R package version 2.0-0) [Computer software].Retrieved fromhttp://CRAN.R-project.org/web/packages/yhat.
Nimon, K. F., & Oswald, F. L. (2013). Understanding the results of multiple linear regression: Beyond standardized regression coefficients. *Organizational Research Methods, 16*, 650–674. https://doi.org/10.1177/1094428113493929.
Ostendorf, F., & Angleitner, A. (2004). *NEO-Persönlichkeitsinventar nach costa und mccrae, revidierte fassung (NEO-PI-R).* Göttingen: Hogrefe.
Peters, G.-J., Verboon, P., & Green, J. (2018). userfriendlyscience: Quantitative analysis made accessible (R package version 0.7.2) [Computer software]. Retrieved fromhttp://CRAN.R-project.org/web/packages/userfriendlyscience.
Rammstedt, B., & John, O. P. (2005). Short version of the Big Five Inventory (BFI-K): Development and validation of an economic inventory for assessment of the five factors of personality. *Diagnostica, 51*, 195–206. https://doi.org/10.1026/0012-1924.51.4.195.
Rau, H. K., & Williams, P. G. (2016). Dispositional mindfulness: A critical review of construct validation research. *Personality and Individual Differences, 93*, 32–43. https://doi.org/10.1016/j.paid.2015.09.035.
Revelle, W. (2019). psych: Procedures for psychological, psychometric, and personality research (R package version 1.8.12) [Computer software]. Retrieved fromhttps://cran.r-project.org/web/packages/psych/psych.pdf.
Siegling, A. B., & Petrides, K. V. (2014). Measures of trait mindfulness: Convergent validity, shared dimensionality, and linkages to the five-factor model. *Frontiers in Psychology, 5*, 1164. https://doi.org/10.3389/fpsyg.2014.01164.
Spinhoven, P., Huijbers, M. J., Zheng, Y., Ormel, J., & Speckens, A. E. M. (2017). Mindfulness facets and Big Five personality facets in persons with recurrent depression in remission. *Personality and Individual Differences, 110*, 109–114. https://doi.org/10.1016/j.paid.2017.01.045.
Spitzer, C., Hammer, S., Löwe, B., Grabe, H. J., Barnow, S., Rose, M., et al. (2011). The short version of the brief symptom inventory (BSI-18): Preliminary psychometric properties of the German translation. *Fortschritte der Neurologie und Psychiatrie, 79*, 517–523. https://doi.org/10.1055/s-0031-1281602.
Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., et al. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science, 13*, 36–61. https://doi.org/10.1177/1745691617709589.
Wenzel, M., von Versen, C., Hirschmüller, S., & Kubiak, T. (2015). Curb your neuroticism: Mindfulness mediates the link between neuroticism and subjective well-being. *Personality and Individual Differences, 80*, 68–75. https://doi.org/10.1016/j.paid.2015.02.020.