



A latent profile analysis of the Big Five personality and mindfulness traits in the general population

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ABSTRACT

Understanding how personality and mindfulness traits influence responses to health and wellbeing interventions is important for improving their effectiveness, in particular since there is likely not a one-size-fits-all approach for mindfulness. While various interventions show overall benefits, individual differences likely determine optimal intervention types and doses. A multinational sample of 636 general population adults (57.2 % female) completed self-report measures of personality and mindfulness traits, and state positive and negative affect scales before being randomly assigned to a single mindfulness practice of 5-min, 20-min, or an active control, after which state scales were completed again. The personality and mindfulness data were subjected to latent profile analysis, revealing three profiles, labelled 1) Mindful-adaptive, 2) Reserved-disengaged, and 3) Ruminative-preoccupied. Secondary analyses showed significant medium to large effects for profile 3 (Ruminative-preoccupied) across all groups. For profile 2 (Reserved-disengaged), shorter mindfulness practice had a significant medium to large effect. No significant interactions were found for profile 1 (Mindful-adaptive). Findings suggest that personality-mindfulness profiles predict differential responses to brief interventions. This has practical implications for personalizing health and wellbeing interventions based on individual personality characteristics. Our study provides a novel person-centered approach to understanding intervention effectiveness through personality profiling.

1. Introduction

Big Five personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism predict wellbeing and psychological health (Costa & McCrae, 1997; Yoneda et al., 2023). Similarly, Five Facets of mindfulness, observing, describing, acting with awareness, non-judgemental attitude and non-reactivity are predictors of psychological health (Medvedev et al., 2021). The five personality mindfulness traits demonstrated stable networks of associations across cultures (Roemer et al., 2024). However, research investigating individual profiles of personality and mindfulness traits and differential responsiveness of such profiles to health and well-being interventions is lacking.

There has been a rapid increase in different types and doses of mindfulness-based programs (MBPs) and practices recently (Goldberg et al., 2018). An operational working definition of mindfulness is “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment.” (Kabat-Zinn, 2003, p. 145). Mindfulness can be

developed through formal meditation practices and more informal practices, and MBPs typically employ both to help improve participants’ wellbeing and/or alleviate psychological difficulties (e.g. Segal et al., 2013).

The effectiveness of MBPs and practices at improving wellbeing has been supported by research (Tumminia et al., 2020). However, researchers have found that mindfulness sometimes appears to be associated with statistically negligible adverse effects (Britton et al., 2021) and there can be relatively high dropout rates (Lam et al., 2022).

Mindfulness and personality traits are linked in a stable network (Roemer et al., 2024), with trait mindfulness inversely linked to neuroticism and positively linked to conscientiousness (Giluk, 2009; Hanley, 2016). Research started examining whether specific MBPs are more suitable for individuals with different personality and mindfulness profiles. In a Randomized Controlled Trial (RCT) of MBSR, de Vibe et al. (2015) found that more conscientious students experienced greater stress reductions, while those higher in neuroticism had greater improvements in mental distress and subjective wellbeing. Jagielski et al.

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(2020) found that higher neuroticism predicted greater distress improvement in women with breast cancer, but those with low conscientiousness benefited more from MBSR. Karl and Fischer (2022) found that non-judgmental acceptance and acting with awareness facets of mindfulness, but not attention or neuroticism, were related to negative affect reactivity. Moreover, extraversion has been linked to greater willingness to engage in interventions, leading to better outcomes (Mertens et al., 2022), while lower extraversion relates to lower social willingness to engage (Tuovinen et al., 2020). This raises the question of personalizing MBPs and practices based on participants' personality and mindfulness profiles to maximize efficacy (Tang & Braver, 2020), with one potential approach being adjusting the 'dose' of mindfulness practice (Strohmaier, 2020).

Previous research on MBPs showed mixed findings regarding dose-response effects. A large meta-regression found no significant dose-response relationship for psychological distress outcomes, but more intensive MBPs with greater facilitator contact were linked to improvements in trait mindfulness (Strohmaier, 2020). However, because dose variation was measured across studies, causal conclusions are limited, underscoring the need for controlled experiments.

In a tightly controlled study with participants new to mindfulness and no facilitator input, repeated 5-min mindfulness practices were more effective at increasing mindfulness and reducing stress than 20-min practices (Strohmaier et al., 2021; Strohmaier & Goldberg, 2024). Similarly, single-session mindfulness induction studies have been valuable for exploring mindfulness mechanisms by controlling practice doses (Tang et al., 2015). Evidence suggests that single mindfulness sessions improve state psychological distress and positive emotions compared to active controls (e.g., Johnson et al., 2015; Kiken & Shook, 2011; Leyland et al., 2019; Strohmaier et al., 2022). Additionally, computer- and/or online-delivered mindfulness inductions were helpful in improving state outcomes, which can in turn improve trait outcomes (Heppner & Shirk, 2018; Mahmood et al., 2016). However, higher-dose MBPs may contribute to dropout rates and, in some cases, become counterproductive (Britton, 2019).

This variability highlights that MBPs may not follow a "one-size-fits-all" model (Lenger et al., 2022), suggesting the need for personalized approaches that optimize dose based on individual needs. Early research into dose-response relationships and personality traits has begun: A study by Palmer et al. (2023) found no moderating effects of neuroticism on mindfulness practice doses and state mindfulness, but individuals higher in trait mindfulness experienced greater reductions in psychological distress. Yet, no study has directly explored whether personality or mindfulness profiles influence the effectiveness of different mindfulness practice doses.

The present study aimed to identify distinct personality-mindfulness profiles and examine whether they predict differential responses to varying doses of mindfulness practice, to understand whether such profiles exist, and what these look like by first of all examining this for single session doses. Using latent profile analysis with a large multinational sample, we sought to determine whether distinct configurations of personality-mindfulness traits could help explain individual differences in intervention response. Based on previous studies, we predicted that people with high neuroticism and low mindfulness would benefit more from shorter practices, while those with high trait mindfulness would respond better to longer practices due to their familiarity with mindful awareness. Additionally, we expected that individuals high in openness, conscientiousness, and agreeableness would show greater improvements with longer practices, consistent with their general capacity to engage with and learn new skills.

2. Method

2.1. Participants

A priori power analysis using G* Power for finding a small to medium

effect ($ES = 0.25$) with $\alpha = 0.05$ and power = 0.95 suggests a required sample size of 126, which was multiplied by five (for personality trait) arriving at a sample size of 630. It was recruited beyond this number to account for possible dropouts.

A total of 636 participants aged between 18 and 79, took part. The sample included an international, general population sample with most participants identifying as female (57.23%), white (72.5%), and British (55.5%), see Table 1. The general population was included as the sample since the largest evidence-base of the effectiveness of MBPs is for this group (Leyland et al., 2019), and this population being a good starting point for examining personality differences by excluding (as much as possible) the influence of clinical health difficulties. Additionally, this population has proven effective for similar dose-response research in the past (Berghoff et al., 2017; Strohmaier et al., 2021, 2022). Most participants did not have a past ($n = 421$) or current ($n = 539$) mindfulness practice. There was no significant difference in demographics, previous or current mindfulness practice experience between groups.

2.2. Procedure

Recruitment occurred via the platform Prolific (prolific.com), where participants were compensated GBP£6 (or equivalent). The study was approved by a university ethics panel (ID: HRE24-013) and all participants gave informed consent.

To investigate effects of different interventions on mindfulness-personality profiles, this single-blind, single-session, online randomized controlled experiment had three arms: group one being longer mindfulness practice (20-min), group two shorter mindfulness practice (5-min), and group three no mindfulness practice (active control). As has proven effective in a previous study (Strohmaier et al., 2021), to ensure that there was no length of time effect for the three groups, each group also listened to extracts from the same audiobook for five minutes (group one), 20 min (group 2), or 25 min (group 3), so that the total amount of time of listening was 25 min for all. An active control condition was chosen to reduce performance bias. Participants started with the audiobook excerpt and listened to the mindfulness practice instruction immediately after. Participants were unable to continue until the 25 min of audio had been completed. From Prolific, participants were automatically directed to the online survey software Qualtrics (<https://www.qualtrics.com>) where the study was created and hosted.

2.2.1. Mindfulness practice recordings

Mindfulness practices were mindfulness of the breath meditation practices closely following Mindfulness-Based Cognitive Therapy (MBCT) practice guidelines (Segal et al., 2013), which are adapted from MBSR (Hofmann & Gómez, 2018; Teasdale et al., 2000) and were recorded by a qualified mindfulness teacher registered on the British Association of Mindfulness-Based Approaches (BAMBA), the UK's primary professional body of mindfulness practitioners, teachers, and training courses (<https://bamba.org.uk/>). MBCT and its mindfulness of the breath meditation practices have been scientifically validated in various populations, including the general population (e.g. Querstret et al., 2020), thus has been scientifically validated for use of the participants taking part in this study. The specific practices employed in this study have successfully been used in a previous study with a similar sample of general population adults with limited prior mindfulness practice experience, which substantiated the effectiveness of these practices for improving wellbeing outcomes (Strohmaier et al., 2021). In line with MBCT mindfulness of the breath meditation practices (Segal et al., 2013), the recorded mindfulness practices invite participants to pay attention to the breath and the breath's sensations from moment to moment in non-judgmental awareness, and to bring attention back to the breath when the mind has wandered. Full transcripts of both mindfulness practice recordings are in the Supplementary Materials (SM.1).

Table 1
Demographics by group and comparison at baseline.

	Whole sample	Shorter practice	Longer practice	Control	Group comparison
<i>n</i>	636	212	211	213	
Age M (SD)	37.69 (12.79)	37.65 (12.14)	36.54 (11.62)	38.87 (11.62)	$\chi^2 = 0.79$ $p = 0.17$
Gender (% female)	57.2 %	59.4 %	56.9 %	55.4 %	$\chi^2 = 0.71$ $p = 0.54$
Ethnicity <i>n</i> (%)	White: 461 (72.5 %) Asian: 74 (11.6 %) Black: 54 (8.5 %) Mixed: 26 (4.1 %) Other: 21 (3.3 %)	White: 155 (73.1 %) Asian: 26 (12.3 %) Black: 16 (7.5 %) Mixed: 10 (4.7 %) Other: 5 (2.4 %)	White: 150 (71.1 %) Asian: 22 (10.4 %) Black: 19 (9 %) Mixed: 12 (5.7 %) Other: 8 (3.8 %)	White: 156 (73.2 %) Asian: 26 (12.2 %) Black: 19 (8.9 %) Mixed: 4 (1.9 %) Other: 8 (3.8 %)	$\chi^2 = 0.59$ $p = 0.56$
Nationality <i>n</i> (%)	UK: 353 (55.5 %) Canada/US: 80 (12.6 %) Australia/NZ: 72 (11.3 %) European: 31 (4.9 %) African: 23 (3.7 %) Other: 41 (6.4 %) Prefer not to say: 36 (5.6 %)	UK: 128 (60.4 %) Canada/US: 25 (11.8 %) Australia/NZ: 18 (8.5 %) European: 11 (5.2 %) African: 8 (3.8 %) Other: 9 (4.2 %) Prefer not to say: 13 (6.1 %)	UK: 104 (49.3 %) Canada/US: 22 (10.4 %) Australia/NZ: 30 (14.2 %) European: 8 (3.8 %) African: 11 (5.2 %) Other: 23 (10.9 %) Prefer not to say: 13 (6.2 %)	UK: 121 (56.8 %) Canada/US: 33 (15.5 %) Australia/NZ: 24 (11.3 %) European: 12 (5.6 %) African: 4 (1.9 %) Other: 9 (4.2 %) Prefer not to say: 10 (4.7 %)	$\chi^2 = 0.76$ $p = 0.76$

2.2.2. Audiobook recording

The 5-, 20-, and 25-min audiobook excerpts were from Bryson’s (2003), which has been found effective as an active control group in previous research (e.g. Strohmaier et al., 2021).

2.2.3. Randomization

To ensure that there was an equal distribution of participants scoring high and low in each of the five personality traits, participants were randomly allocated to 10 different surveys representing high (≥ 14) and not high (< 14) openness, conscientiousness, extraversion, agreeableness, and neuroticism. The content was the same in all ten surveys. Participants were then randomly allocated to the three different groups using block randomization with block sizes of six. Prior to

randomization, 23 participants withdrew. There was no difference in demographics between participants who withdrew and participants who remained. Fig. 1 shows the CONSORT diagram depicting participant flow.

2.3. Measures

Participants were asked to complete self-report measures before and after the mindfulness practice/audiobook, except for personality and trait mindfulness measures, which were only completed at baseline. Where psychometrically robust, shorter versions of questionnaires were selected to reduce participant burden (Galesic & Bosnjak, 2009).

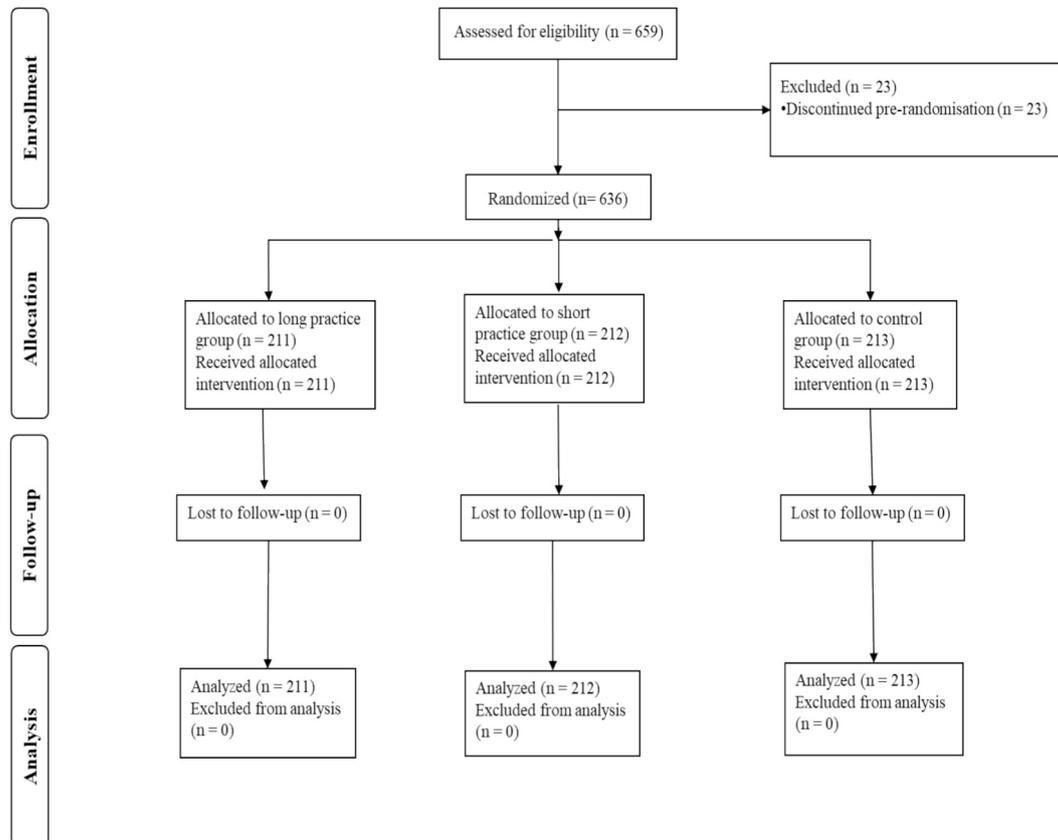


Fig. 1. CONSORT flowchart of participant flow through the study (Moher et al., 2001).

2.3.1. Five Facet Mindfulness Questionnaire (FFMQ-15; Baer et al., 2012)

The 15-item FFMQ-15 measures trait mindfulness with higher scores indicating greater trait mindfulness on a 5-point Likert scale. The total scale ($\alpha = 0.81$; $\omega = 0.81$) and four of the five subscales describe ($\alpha = 0.81$; $\omega = 0.82$), acting aware ($\alpha = 0.81$; $\omega = 0.82$), non-judging ($\alpha = 0.81$; $\omega = 0.75$), and non-reactivity ($\alpha = 0.74$; $\omega = 0.82$) showed good internal consistency in this sample, except for the observe subscale ($\alpha = 0.66$; $\omega = 0.67$). Research found the FFMQ-15 has high convergent validity and high reliability in a general population sample (Gu et al., 2016).

2.3.2. Positive and Negative Affect Schedule short form-state (PANAS-sf state; Watson et al., 1988)

The 20-item PANAS-sf measures state positive (10-items) and negative (10-items) affect with greater scores indicating greater positive or negative affect on a 5-point Likert scale with scores ranging between 10 and 50. In the current sample, there was good internal consistency for positive ($\alpha = 0.89$; $\omega = 0.91$) and negative affect ($\alpha = 0.92$; $\omega = 0.91$). Construct validity of the PANAS-sf state was supported in non-clinical samples (Crawford & Henry, 2004).

2.3.3. Mini-International Personality Item Pool (Mini-IPIP; Donnellan et al., 2006)

The 20-item Mini-IPIP measures personality traits on a 5-point Likert scale ranging between 5 and 20 for each trait with higher scores indicating greater openness, conscientiousness, extraversion, agreeableness, and neuroticism. In the current sample, there was good internal consistency across the five traits (openness: $\alpha = 0.71$, $\omega = 0.71$; conscientiousness: $\alpha = 0.72$, $\omega = 0.72$; extraversion: $\alpha = 0.84$, $\omega = 0.84$; agreeableness: $\alpha = 0.79$, $\omega = 0.79$; neuroticism: $\alpha = 0.73$, $\omega = 0.74$). The Mini-IPIP has shown good convergent, content and discriminant validity in the general population (Martínez-Molina & Arias, 2018).

2.4. Data analyses

Descriptive statistics and correlations between study variables were computed first. Latent profile analyses were completed across the five personality traits and the five facets of trait mindfulness using the *snowRMM* (Seol, 2023) and *tidyLPA* (Rosenberg et al., 2021) R packages in *The Jamovi Project* (2025). As suggested by previous research (Nylund et al., 2007), a sample of $n = 500$ is adequate for one to five classes LPA models, while our sample is greater. As has been recommended (Bravo et al., 2016), to arrive at the number of classes needed, the Akaike Information Criterion (AIC; Akaike, 1974; Sakamoto et al., 1986) as well as the Bayesian Information Criterion (BIC, Schwarz, 1978) were examined, along with the statistical significance of the bootstrapped likelihood ratio test (BLRT, Rosenberg et al., 2021). Following latent profiles, frequencies were computed to determine the number of participants across each of the latent profiles. When choosing profiles, those with at least 10 % of participants loading on a profile were selected.

After Latent Profile Analysis, the data was subject to 2 (time: pre and post) \times 3 (group: short mindfulness practice, long mindfulness practice, and control) \times 3 (latent profiles) factorial ANOVA to identify if there is a significant relationship between the above three factors. This was followed by post hoc analysis using Tukey to identify significant relationships. Tukey was chosen as the post hoc test due to being a powerful test where there are a large number of comparisons (Lee & Lee, 2018), as is the case here. ANOVAs were completed while controlling for previous and current mindfulness practice experience.

3. Results

3.1. Descriptive statistics

Table 1 shows participant demographics. There were no significant

differences in demographics or mindfulness practice experience, past or present, between groups, suggesting successful randomization. Similarly, there was no significant difference in personality traits allocated to groups. Bivariate correlations between variables at baseline presented in Table 2 show small to medium relationships between personality, mindfulness, and positive and negative affect. Outcome data for state mindfulness, positive and negative affect at pre and post is shown in Table 3, indicating an increase in positive affect, and a significant decrease in negative affect after mindfulness practice compared to control.

3.2. Latent profile analysis

Table 4 presents fit statistics for 2- to 6-class solutions from latent profile analysis (LPA) with equal variances. The bootstrapped Likelihood Ratio Test (BLRT) indicated that a 2-class solution fit significantly better than a 1-class solution (BLRT = 590.73, $p = 0.01$), with 38.4 % of participants in profile 1 and 61.6 % in profile 2. However, the 2-class solution produced unequal clusters and lacked sufficient differentiation, prompting further exploration of additional classes.

A 3-class solution (BLRT = 171.29, $p = 0.01$) fit the data significantly better than the 2-class solution. In this model, profile 1 (“Mindful-adaptive”) included 41.5 % of participants, characterized by high scores on all mindfulness facets, openness, conscientiousness, and agreeableness, and low neuroticism. Profile 2 (“Reserved-disengaged”) accounted for 18.2 % of participants and was defined by low openness, extraversion, and agreeableness, along with low scores on the observe, describe, and non-react mindfulness facets. Profile 3 (“Ruminative-preoccupied”) comprised 40.3 % of participants and showed very low scores on acting with awareness and non-judging facets of mindfulness, along with high neuroticism.

A 4-class solution (BLRT = 101.61, $p = 0.01$) improved fit over the 3-class solution, but one profile had fewer than 100 participants, and overlapping profiles in the latent profile plot made conceptual distinction difficult. Similarly, a 5-class solution (BLRT = 75.13, $p = 0.01$) and a 6-class solution (BLRT = 33.06, $p = 0.01$) fit the data better but introduced additional small and overlapping profiles, with three profiles in each solution containing fewer than 100 participants. These issues complicated interpretation and practical application.

Despite better fit statistics for models with 4, 5, or 6 profiles, the 3-class solution was selected as the optimal model. Entropy, AIC, and BIC values decreased steadily with more than three profiles, and BLRT improvements diminished markedly (from over 100 for 4 profiles to below 100 for 5 and 6 profiles). Additionally, larger numbers of profiles created practical challenges, such as difficulty distinguishing between clusters and allocating participants to meaningful groups. Compared to the binary differentiation of the 2-class solution, the 3-class solution provided more nuanced and interpretable profiles. The latent profile plot (Fig. 2) illustrates the patterns of mindfulness and personality traits across the three profiles. As a confirmatory check, LPA was repeated using varying variances for 2- to 6-class solutions, and the 3-class solution remained preferable. These supplementary results are in SM.1.

3.3. Dose-response effects across latent profiles

A factorial mixed ANOVA (group [shorter practice, longer practice, control] \times time [pre, post] \times profile [3]) revealed significant group \times time, group \times profile, and time \times profile interactions for negative affect, controlling for current meditation practice (Table 5). Post hoc repeated measures t -tests demonstrated that profile 3 (“Mindful-adaptive”) showed significant medium-to-large reductions in negative affect across all three groups, indicating that interventions with audio components were effective for this group. For profile 2 (“Reserved-disengaged”), shorter mindfulness practice led to significant medium-to-large reductions in negative affect, suggesting brief practices are particularly beneficial for these participants. No significant effects were observed for

Table 2
Bivariate correlations and descriptive statistics for all study variables at baseline.

	1	2	3	4	5	6	7	8	9	10	11	12	M	SD
1 Openness													14.66	3.35
2 Conscientiousness	-0.08												14.27	3.4
3 Extraversion	0.24**	0.11**											10.48	4.01
4 Agreeableness	0.29**	0.11**	0.35**										15.41	3.29
5 Neuroticism	-0.05	-0.25**	-0.17**	-0.30									38.84	7.03
6 Mindfulness	0.2**	0.40**	0.22**	0.22**	-0.57**								9.82	2.69
7 Observe	0.24**	0.17**	0.15**	0.27**	-0.06	0.28*							9.78	2.47
8 Describe	0.28**	0.29**	0.31**	0.37**	-0.33**	0.71**	0.29**						9.82	2.69
9 Act aware	0.08	0.39**	0.07	0.08	-0.38**	0.71**	0.14**	0.34**					9.32	2.62
10 Non-judge	0.04	0.21**	0.12**	0.05	-0.46**	0.67**	-0.01	0.25**	0.36**				10.46	2.8
11 Non-react	0.16**	0.17**	0.1*	0.1*	-0.35**	0.57**	0.36**	0.28**	0.17**	0.13**			9.24	2.41
12 Positive affect	0.12**	0.32**	0.24**	0.19**	-0.3*	0.4**	0.36**	0.36**	0.33**	0.11**	0.29**		22.58	6.75
13 Negative affect	-0.10*	-0.17**	-0.12**	-0.10*	0.35**	-0.36**	0.01	-0.25**	-0.17**	-0.41**	-0.12**	-0.08	11.93	5.36

Table 3

Outcome data at baseline and post for shorter mindfulness practice, longer mindfulness practice, and control.

Outcome	Shorter practice		Longer practice		Control	
	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)
Positive affect	22.36 (6.89)	23.25 (7.4)	22.26 (6.92)	23.46 (8.49)	22.83 (6.46)	23.04 (7.31)
Negative affect	12.08 (5.43)	9.89 (3.68)	12.41 (5.73)	10.45 (4.59)	11.29 (4.85)	10.24 (4.2)

M = mean, SD = standard deviation.

profile 1 (“Mindful-adaptive”). For positive affect, no significant interactions were found (Table 5). Fig. 3 depicts the time × profile interaction plots for negative affect across groups (Table 6).

4. Discussion

This study developed latent profiles of individuals based on personality and mindfulness traits and examined whether people are responsive to different doses of a single mindfulness practice based on profile membership. Three distinct personality-mindfulness profiles showed differential responsiveness to different mindfulness practice doses. The identification of Mindful-adaptive, Reserved-disengaged, and Ruminative-preoccupied profiles advances our understanding of how personality and mindfulness traits naturally cluster together, extending previous findings showing stable interconnections between these traits across cultures (Roemer et al., 2024).

The Mindful-adaptive profile, characterized by high conscientiousness and trait mindfulness alongside low neuroticism, showed consistent benefits regardless of practice length. This finding corresponds with research finding that individuals with higher habitual trait mindfulness are more likely to benefit from mindfulness practices (Shapiro et al., 2011), but further extends this finding when combined with personality traits, particularly high conscientiousness, which has previously been linked to performance (Poropat, 2009), and tested this empirically after single mindfulness practices doses.

Contrastingly, the Reserved-disengaged profile responded significantly better to shorter practices. This finding has important implications for intervention design, suggesting individuals with lower extraversion and mindfulness may be better served by briefer initial practices, aligning with research on engagement patterns among more introverted individuals (Tuovinen et al., 2020). The Ruminative-preoccupied profile, marked by high neuroticism and low mindfulness, showed significant improvements with both practice lengths, supporting earlier findings about benefits of mindfulness for highly neurotic individuals (de Vibe et al., 2015). This research further extends de Vibe’s findings, by demonstrating that a single, remotely-delivered mindfulness practice can already be found helpful to alleviate distress.

These results extend previous research examining personality and mindfulness separately (Giluk, 2009), demonstrating that considering combined profiles can better inform intervention personalization. The identification of distinct response patterns challenges the one-size-fits-all approach to wellbeing interventions such as mindfulness training (Lenger et al., 2022) and provides empirical support for tailoring practice lengths to individual personality-mindfulness profiles.

A deeper examination of the Reserved-disengaged profile reveals important insights about intervention accessibility. The superior effectiveness of shorter practices for this profile aligns with research on personality-based engagement patterns in therapeutic interventions (Mertens et al., 2022) and extends understanding of how introversion influences intervention preferences. While previous studies have focused primarily on social engagement (Tuovinen et al., 2020), our findings suggest that practice duration itself may be crucial in intervention adherence for reserved-disengaged individuals. This has

Table 4
Latent Profile Analysis (LPA) fit statistics for 2 to 6 class solutions with equal variances.

Fit statistics	Number of classes				
	2	3	4	5	6
BLRT	590.73**	171.29**	101.61**	75.13**	33.06**
AIC	31,551	31,401.79	31,322	31,269	31,258
BIC	31,689	31,588.91	31,558.2	31,554	31,592
Entropy	0.68	0.68	0.67	0.62	0.65
Smallest <i>n</i>	244	116	88	48	53

BLRT = bootstrapped likelihood test; ** < 0.01; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; *n* = number of participants.

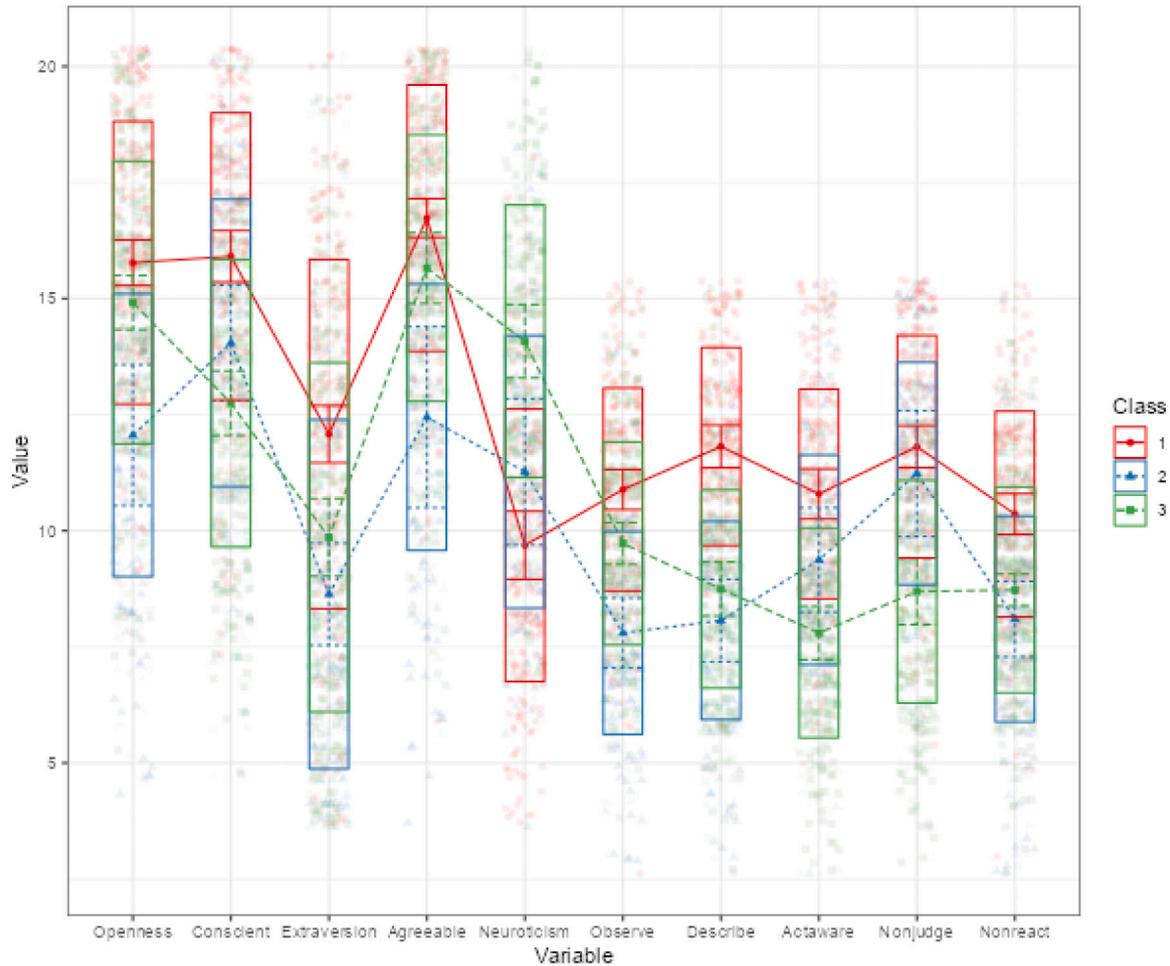


Fig. 2. Latent Profile plot for three profiles for the five personality and five mindfulness traits.
Note: Class = Profile; Variables = Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism, Observe, Describe, Act-aware, Non-judge, Non-react.

Table 5
Results of factorial ANOVA for group, time, and profile interactions for positive and negative affect outcomes.

Outcome	Group x time x profile	Time x profile	Group x time	Group x profile
Positive Affect	$F(4,626) = 0.75$	$F(2,626) = 1.82$	$F(2,626) = 2.11$	$F(4,626) = 1.03$
Negative Affect	$F(4,627) = 0.91$	$F(2,627) = 15.39^{***}$	$F(2,627) = 3.24^*$	$F(4,627) = 3.59^{**}$

*** $p < 0.001$.
** $p < 0.01$.
* $p < 0.05$.

particular relevance given the typically high dropout rates in MBPs (Lam et al., 2022), suggesting that initial shorter practices might serve as a more effective entry-point.

The Ruminative-preoccupied profile’s positive response to both practice lengths represents an encouraging finding, especially given the established links between neuroticism and psychological distress (Costa & McCrae, 1997). The effectiveness of both shorter and longer practices suggests that the commonly reported benefits of mindfulness for emotion regulation (Tumminia et al., 2020) may be accessible through various practice lengths, including single practices (Strohmaier et al., 2022). This flexibility in practice duration could be valuable for ruminative-preoccupied individuals, who often experience heightened psychological symptoms that can make longer practices challenging (Britton et al., 2021). These add nuance to previous research on mindfulness dosage (Strohmaier, 2020; Strohmaier et al., 2021) by

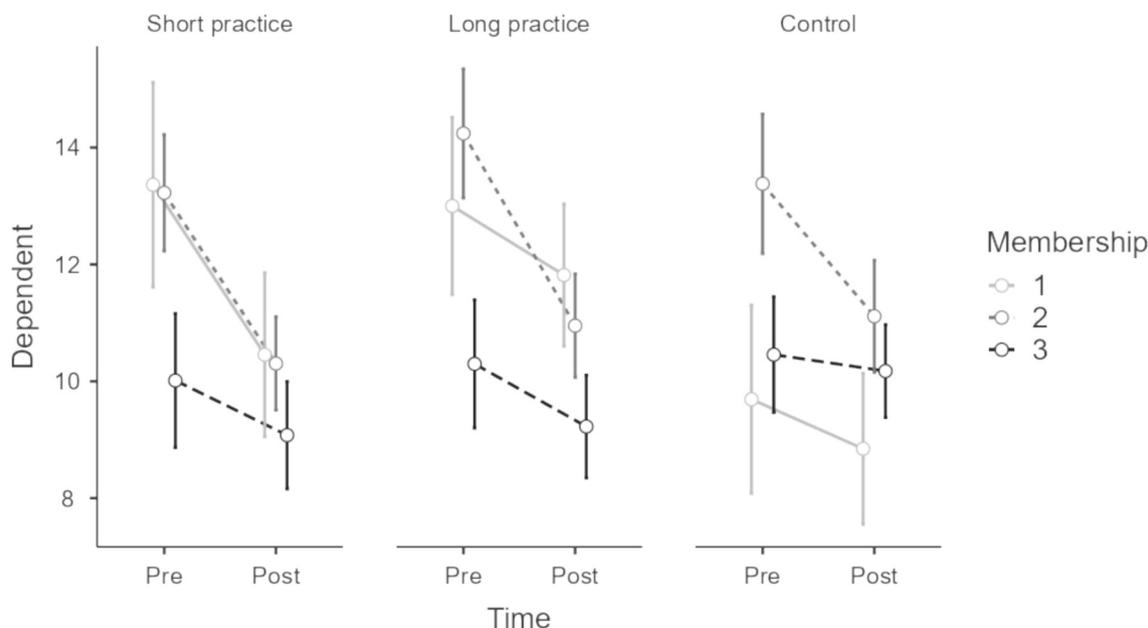


Fig. 3. Time by profile graphs for short mindfulness practice, long mindfulness practice, and control for the negative affect outcome.

Table 6
Results of repeated measures (pre vs. post) t-tests for each profile and each group for negative affect outcome.

Profile	Short mindfulness practice			Long mindfulness practice			Control		
	1	2	3	1	2	3	1	2	3
<i>n</i>	77	33	102	84	44	83	103	39	71
<i>t</i>	1.48	3.32**	5.57***	1.86	1.45	5.93***	0.39	0.97	3.87***
<i>d</i>	0.17	0.58	0.55	0.2	0.22	0.65	0.04	0.16	0.46

t = *t*-statistic; *d* = Cohen's *d* effect size; 1 = Mindful-adaptive; 2 = Reserved-disengaged; 3 = Ruminative-preoccupied.

*** *p* < 0.001.

** *p* < 0.01.

demonstrating that high-neuroticism individuals may benefit from a more flexible approach to practice duration.

4.1. Limitations and future research

While this study provides important insights into personality-mindfulness profiles and practice responsiveness, several limitations should be noted. Our findings are based the general population, which limits generalizability to clinical populations where personality-mindfulness profiles may manifest differently. Clinical populations often show distinct patterns of personality traits and mindfulness capacities (Jagielski et al., 2020), suggesting profile configurations and practice responses might differ substantially.

The online delivery and single-session nature, while methodologically necessary, present inherent limitations. Although online mindfulness inductions have shown promise (Johnson et al., 2015; Kiken & Shook, 2011; Leyland et al., 2019; Strohmaier et al., 2022), the absence of direct teacher guidance may influence how different personality profiles engage with and benefit from practices. However, this limitation highlights a practical reality: most people begin practice through self-guided methods, making our findings particularly relevant for understanding initial engagement patterns (Tang et al., 2015). Additionally, mindfulness inductions provide a cost-effective way of understanding mindfulness mechanisms which can inform the design of multi-session MBPs.

Furthermore, although findings could be due to possible placebo effects or response bias, this was counteracted by randomizing participants, and making sure all listening exercises were the same length of

25-min, with participants unable to continue with the study and post-intervention questionnaires until after listening exercises were completed.

High dropout rates commonly observed in MBPs underscore the importance of findings regarding profile-specific practice preferences. They, particularly at the crucial initial engagement stage, could inform strategies to improve program retention. The Reserved-disengaged profile's shorter practice preference suggests that traditional program structures may need modification to better serve certain personality types.

Future research should examine how personality-mindfulness profiles evolve during longer interventions and whether profile membership remains stable across delivery formats. The established relationship between facilitator contact and mindfulness outcomes (Strohmaier, 2020) warrants investigation through the lens of these distinct profiles. Additionally, exploring how different profiles respond to various types of practices beyond breath awareness could provide valuable insights for program customization.

These findings have important practical implications for MBP design and delivery. While MBPs show benefits, potential adverse effects exist (Britton et al., 2021), often relating to practice intensity and duration. Our profile-based approach offers a framework for personalizing practice recommendations, potentially reducing adverse effects while maximizing benefits. As the field moves away from one-size-fits-all approaches, understanding the interaction between personality-mindfulness profiles and practice parameters becomes crucial for developing more effective, personalized interventions. Therefore, this study has contributed to existing literature by having created

personality and mindfulness trait profiles for the general population, and tested dose effects. These findings inform future research where these profiles can be tested for different MBPs (including multi-session programs), with different populations, where individuals can choose the best dose of a practice based on their personality and mindfulness trait combination.

CRedit authorship contribution statement

Sarah Strohmaier: Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Oleg N. Medvedev:** Writing – review & editing.

Ethics approval

This study was reviewed and approved by the Victoria University Melbourne Research Ethics committee (ID: HRE24-013). All participants gave informed consent.

Declaration of Generative AI and AI-assisted technologies in the writing process

No artificial intelligence tools were used for writing this article.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2025.113287>.

Data availability

The authors do not have permission to share data.

References

- Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19, 716–723. <https://doi.org/10.1109/TAC.1974.1100705>
- Baer, R. A., Carmody, J., & Hunsinger, M. (2012). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology*, 68(7), 755–765. <https://doi.org/10.1002/jclp.21865>
- Berghoff, C. R., Wheelless, L. E., Ritzert, T. R., Wooley, C. M., & Forsyth, J. P. (2017). Mindfulness meditation adherence in a college sample: Comparison of a 10-min versus 20-min 2-week daily practice. *Mindfulness*, 8, 1513–1521. <https://doi.org/10.1007/s12671-017-0717-y>
- Bravo, A. J., Boothe, L. G., & Pearson, M. R. (2016). Getting personal with mindfulness: A latent profile analysis of mindfulness and psychological outcomes. *Mindfulness*, 7(2), 420–432. <https://doi.org/10.1007/s12671-015-0459-7>
- Britton, W. B. (2019). Can mindfulness be too much of a good thing? The value of a middle way. *Current Opinion in Psychology*, 28, 159–165. <https://doi.org/10.1016/j.copsyc.2018.12.011>
- Britton, W. B., Lindahl, J. R., Cooper, D. J., Canby, N. K., & Palitsky, R. (2021). Defining and measuring meditation-related adverse effects in mindfulness-based programs. *Clinical Psychological Science*, 9(6), 1185–1204. <https://doi.org/10.1177/2167702621996340>
- Bryson, B. (2003). *A Short History of Nearly Everything*. Corgi Audio Books.
- Costa, P. T., & McCrae, R. R. (1997). Stability and change in personality assessment: The revised NEO Personality Inventory in the year 2000. *Journal of Personality Assessment*, 68(1), 86–94. https://doi.org/10.1207/s15327752jpa6801_7
- Crawford, J. R., & Henry, D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 43, 245–265. <https://doi.org/10.1348/0144665031752934>
- de Vibe, M., Solhaug, I., Tysen, R., Friberg, O., Rosenvinge, J. H., Sørlie, T., ... Bjørndal, A. (2015). Does personality moderate the effects of mindfulness training for medical and psychology students? *Mindfulness*, 6, 281–289. <https://doi.org/10.1007/s12671-013-0258-y>
- Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The Mini-IPIP scales: Tiny-yet-effective measures of the Big Five factors of personality. *Psychological Assessment*, 18(2), 192–203. <https://doi.org/10.1037/1040-3590.18.2.192>
- Galesic, M., & Bosnjak, M. (2009). Effects of questionnaire length on participation and indicators of response quality in a web survey. *Public Opinion Quarterly*, 73(2), 349–360. <https://doi.org/10.1093/poq/nfp031>
- Giluk, T. L. (2009). Mindfulness, Big Five personality, and affect: A meta-analysis. *Personality and Individual Differences*, 47(8), 805–811. <https://doi.org/10.1016/j.paid.2009.06.026>
- Goldberg, S. B., Tucker, R. P., Greene, P. A., Davidson, R. J., Wampold, B. E., Kearney, D. J., & Simpson, T. L. (2018). Mindfulness-based interventions for psychiatric disorders: A systematic review and meta-analysis. *Clinical Psychology Review*, 59, 52–60. <https://doi.org/10.1016/j.cpr.2017.10.011>
- Gu, J., Strauss, C., Crane, C., Barnhofer, T., Karl, A., Cavanagh, K., & Kuyken, W. (2016). Examining the factor structure of the 39-item and 15-item versions of the five facet mindfulness questionnaire before and after mindfulness-based cognitive therapy for people with recurrent depression. *Psychological Assessment*, 28(7), 791. <https://doi.org/10.1037/pas0000263>
- Hanley, A. W. (2016). The mindful personality: Associations between dispositional mindfulness and the Five Factor Model of personality. *Personality and Individual Differences*, 91, 154–158. <https://doi.org/10.1016/j.paid.2015.11.054>
- Heppner, W. L., & Shirk, S. D. (2018). Mindful moments: A review of brief, low-intensity mindfulness meditation and induced mindful states. *Social and Personality Psychology Compass*, 12(12), Article e12424. <https://doi.org/10.1111/spc3.12424>
- Hofmann, S. G., & Gómez, A. F. (2018). Mindfulness-based interventions for anxiety and depression. *Psychiatric Clinics of North America*, 40(4), 739–749. <https://doi.org/10.1016/j.psc.2017.08.008>
- Jagielski, C. H., Tucker, D. C., Dalton, S. O., Mrug, S., Würtzen, H., & Johansen, C. (2020). Personality as a predictor of well-being in a randomized trial of a mindfulness-based stress reduction of Danish women with breast cancer. *Journal of Psychosocial Oncology*, 38(1), 4–19. <https://doi.org/10.1080/07347332.2019.1626524>
- Johnson, S., Gur, R. M., David, Z., & Currier, E. (2015). One-session mindfulness meditation: A randomized controlled study of effects on cognition and mood. *Mindfulness*, 6(1), 88–98. <https://doi.org/10.1007/s12671-013-0234-6>
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. <https://doi.org/10.1093/clipsy.bpg016>
- Karl, J. A., & Fischer, R. (2022). The relationship between negative affect, state mindfulness, and the role of personality. *Mindfulness*, 13, 2729–2737. <https://doi.org/10.1007/s12671-022-01989-2>
- Kiken, L. G., & Shook, N. J. (2011). Looking up: Mindfulness increases positive judgments and reduces negativity bias. *Social Psychological and Personality Science*, 2(4), 425–431. <https://doi.org/10.1177/1948550610396585>
- Lam, S. U., Kirvin-Quamme, A., & Goldberg, S. B. (2022). Overall and differential attrition in mindfulness-based interventions: A meta-analysis. *Mindfulness*, 13, 2676–2690. <https://doi.org/10.1007/s12671-022-01970-z>
- Lee, S., & Lee, D. K. (2018). What is the proper way to apply the multiple comparison test? *Korean Journal of Anesthesiology*, 71(5), 353–360. <https://doi.org/10.4097/kja.d.18.00242>
- Lenger, K. A., Mitchell, E., Garcia, D. J., Amer, Z., Shorter, R. L., & Gordon, K. C. (2022). Is mindfulness one-size-fits-all?: Consulting community members and stakeholders to adapt mindfulness for communities with low-income and economic marginalization. *Complementary Therapies in Clinical Practice*, 49, Article 101664. <https://doi.org/10.1016/j.ctcp.2022.101664>
- Leyland, A., Rowse, G., & Emmerson, L. M. (2019). Experimental effects of mindfulness inductions on self-regulation: Systematic review and meta-analysis. *Emotion*, 19(1), 108–122. <https://doi.org/10.1037/emo0000425>
- Mahmood, L., Hopthrow, T., & de Moura, R. G. (2016). A moment of mindfulness: Computer-mediated mindfulness practice increases state mindfulness. *PLoS ONE*, 11(4), Article e0153923. <https://doi.org/10.1371/journal.pone.0153923>
- Martínez-Molina, A., & Arias, V. B. (2018). Balanced and positively worded personality short-forms: Mini-IPIP validity and cross-cultural invariance. *PeerJ*, 6, Article e5542. <https://doi.org/10.7717/peerj.5542>
- Medvedev, O. N., Cervin, M., Barcaccia, B., Siegert, R. J., Roemer, A., & Krägeloh, C. U. (2021). Network analysis of mindfulness facets, affect, compassion, and distress. *Mindfulness*, 12(4), 911–922. <https://doi.org/10.1007/s12671-020-01555-8>
- Mertens, E. C. A., Deković, M., Van Londen, M., & Reitz, E. (2022). Personality as a moderator of intervention effects: Examining differential susceptibility. *Personality and Individual Differences*, 186, Article 111323. <https://doi.org/10.1016/j.paid.2021.111323>
- Moher, D., Schulz, K. F., & Altman, D. G. (2001). The CONSORT statement: Revised recommendations for improving the quality of reports of parallel-group randomized trials. *Annals of Internal Medicine*, 134, 657–662. <https://doi.org/10.1186/1471-2288-1-2>
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, 14(4), 535–569.

- Palmer, R., Roos, C., Vafaei, N., & Kober, H. (2023). The effect of ten versus twenty minutes of mindfulness meditation on state mindfulness and affect. *Scientific Reports*, *13*, 20646. <https://doi.org/10.1038/s41598-023-46578-y>
- Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin*, *135*, 322–338. <https://doi.org/10.1037/a001499>
- Querstret, D., Morison, L., Dickinson, S., Cropley, M., & John, M. (2020). Mindfulness-based stress reduction and mindfulness-based cognitive therapy for psychological health and well-being in nonclinical samples: A systematic review and meta-analysis. *International Journal of Stress Management*, *27*(4), 394–411. <https://doi.org/10.1037/str0000165>
- Roemer, A., Cervin, M., Medvedeva, A., Barov, A. J., & Medvedev, O. N. (2024). Big five of mindfulness and personality: Cross-cultural network analysis. *Mindfulness*, *15*, 37–47. <https://doi.org/10.1007/s12671-023-02293-3>
- Rosenberg, J., Beymer, P., Anderson, D., Van Lissa, C., & Schmidt, J. (2021). tidyLPA: Easily carry out latent profile analysis(LPA) using open-source or commercial software.[R package]. <https://CRAN.R-project.org/package=tidyLPA>.
- Sakamoto, Y., Ishiguro, M., & Kitagawa, G. (1986). *Akaike information criterion statistics*. D.Reidel.
- Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, *6*, 461–464. <https://doi.org/10.1214/aos/1176344136>
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2013). *Mindfulness-based cognitive therapy for depression* (2nd ed.). Guilford Press.
- Seol, H. (2023). snowRMM: Rasch mixture, LCA, and test equating analysis. (version 5.6.0) [jamovi module]. <https://github.com/hyunsooseol/snowRMM>.
- Shapiro, S. L., Brown, K. W., Thoresen, C., & Plante, T. G. (2011). The moderation of mindfulness-based stress reduction effects by trait mindfulness: Results from a randomized controlled trial. *Journal of Clinical Psychology*, *67*(3), 267–277. <https://doi.org/10.1002/jclp.20761>
- Strohmaier, S. (2020). The relationship between doses of mindfulness-based programs and depression, anxiety, stress, and mindfulness: A dose-response meta-regression of randomized controlled trials. *Mindfulness*, *11*(6), 1315–1335. <https://doi.org/10.1007/s12671-020-01319-4>
- Strohmaier, S., & Goldberg, S. B. (2024). Longitudinal increases in mindfulness practice quality are associated with changes in psychological outcomes and not vice versa – A brief report. *Current Psychology*, *43*, 18517–18520. <https://doi.org/10.1007/s12144-024-05644-y>
- Strohmaier, S., Jones, F. W., & Cane, J. E. (2021). Effects of length of mindfulness practice on mindfulness, depression, anxiety, and stress: A randomized controlled experiment. *Mindfulness*, *12*, 198–214. <https://doi.org/10.1007/s12671-020-01512-5>
- Strohmaier, S., Jones, F. W., & Cane, J. E. (2022). One-session mindfulness of the breath meditation practice: A randomized controlled study of the effects on state hope and state gratitude in the general population. *Mindfulness*, *13*, 162–173. <https://doi.org/10.1007/s12671-021-01780-9>
- Tang, R., & Braver, T. S. (2020). Towards an individual differences perspective in mindfulness training research: Theoretical and empirical considerations. *Frontiers in Psychology*, *11*, 818. <https://doi.org/10.3389/fpsyg.2020.00818>
- Tang, Y.-Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, *16*(4), 213–225. <https://doi.org/10.1038/nrn3916>
- Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, *68* (4), 615–623. <https://doi.org/10.1037/0022-006X.68.4.615>
- The Jamovi Project. (2025). Jamovi (Version 2.6) [Computer software]. Retrieved from <https://www.jamovi.org>.
- Tumminia, M. J., Colaianne, B. A., Roeser, R. W., & Galla, B. M. (2020). How is mindfulness linked to negative and positive affect? Rumination as an explanatory process in a prospective longitudinal study of adolescents. *Journal of Youth and Adolescence*, *49*, 2136–2148. <https://doi.org/10.1007/s10964-020-01238-6>
- Tuovinen, S., Tang, X., & Salmela-Aro, K. (2020). Introversion and social engagement: Scale validation, their interaction, and positive association with self-esteem. *Frontiers in Psychology*, *11*, 1–11. <https://doi.org/10.3389/fpsyg.2020.590748>
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS Scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Yoneda, T., Graham, E., Lozinski, T., Bennett, D. A., Mroczek, D., Piccinin, A. M., Hofer, S. M., & Muniz-Terrera, G. (2023). Personality traits, cognitive states, and mortality in older adulthood. *Journal of Personality and Social Psychology*, *124*(2), 381–395. <https://doi.org/10.1037/pspp0000418>