Applied Research in Quality of Life (2025) 20:995–1009
https://doi.org/10.1007/s11482-025-10443-z

A Longitudinal Investigation of the Relative Temporal Association of Tranquility, Concentration, and the Five Facet Mindfulness Questionnaires (FFMQ) with Nonattachment and Mental Health

Ben C. L. Yu[1] · Winnie W. S. Mak[2] · Floria H. N. Chio[2] · Hin-Tak Sik[3] · Ryan M. K. Chan[2]

Received: 9 September 2024 / Accepted: 29 March 2025 / Published online: 22 April 2025

Abstract

The present study aims to investigate the relative temporal associations of different types of mindfulness-related qualities (i.e., observing, describing, acting with awareness, non-reactivity, nonjudging, tranquility, and concentration) at the dispositional level with well-being, psychological distress, and nonattachment by a 9-month longitudinal study over four-time points. Data from 274 participants (Age mean = 21.22; 78.5% women) who did not have any meditation experience were analyzed using linear regression models. Two-hundred and forty-two, 223, 216 participants were retained at three-month (88%), six-month (81%), and nine-month (79%) follow-up assessments, respectively. The results showed that among the seven qualities, tranquility was the most predictive quality to the outcome variables, including depressive symptoms, perceived stress, mental well-being, peacefulness, and nonattachment, after controlling for the outcome variables' scores measured at the previous time points and other qualities at baseline. Observing, describing, nonreactivity, and acting with awareness were also shown to be predictive of certain types of outcome variables. The present study might provide insights into which qualities could be specifically targeted in the practice of mindfulness for novices, aiming to optimize the benefits of practice on mental health.

Keywords Mindfulness · Tranquility · Concentration · Mental health · Nonattachment · Longitudinal

Hin-Tak Sik and Ryan M. K. Chan contributed equally to this work.

Extended author information available on the last page of the article

The construct *mindfulness* has drawn significant attention in science since the development of Mindfulness-Based Stress Reduction by Jon Kabat-Zinn in 1979. Over the years, researchers have investigated its conceptualization (Bishop et al., 2004; Bernstein et al., 2015; Dreyfus, 2013; Grabovac et al., 2011), its mechanisms in human functioning (e.g., Shapiro et al., 2006; Ho et al., 2022), its effectiveness in health promotion, illness prevention, and clinical treatment (Dawson et al., 2020; Goldberg et al., 2018; Spijkerman et al., 2016), and its theoretically relevant concepts derived from a Buddhist perspective (Fernández-Campos et al., 2021; Gu et al., 2020; Juneau et al., 2020; Rogers et al., 2021; Yu et al., 2020). Discussions about mindfulness have burgeoned over decades, with more than thirty definitions of mindfulness proposed in the literature (Nilsson & Kazemi, 2016). While this implies that mindfulness remains a hot topic in scientific investigation, it also indicates that a consensus on what mindfulness is has not been reached.

To date, an enormous amount of trait measures of mindfulness has been developed in the literature (e.g., Baer et al., 2006; Brown & Ryan, 2003; Buchheld et al., 2001; Feldman et al., 2007; Lau 2006). One of the most used scales is the Five Facets Mindfulness Questionnaire (FFMQ). FFMQ was constructed by factor-analyzing five existing trait mindfulness scales available in the 2000s. It consists of five factors, including observing, describing, acting with awareness, non-judging of inner experience, and non-reacting to inner experience. Specifically, the observing facet refers to the observation of internal and external experiences that happen in the present moment, such as thoughts, feelings, sensations, sights, sounds, and smells; the describing facet refers to the ability to label the cognized experiences with words; the acting with awareness facet captures the extent to which people can behave with awareness rather than in automatic pilot without consciousness on what they are doing; the non-judging of inner experience facet refers to approaching thoughts and feelings non-evaluatively; the non-reacting to inner experience facet taps into the capacity of one to allow their thoughts and feeling to come and go without getting caught up (See Baer et al., 2006 for details).

Given that these five facets are sensitive to mindfulness practice (Baer et al., 2008), they can be regarded as qualities that contemplative mindfulness practices help nurture. However, mindfulness training is not limited to cultivating these five facets alone. Other qualities, such as concentration and tranquility, have also been suggested to emerge from mindfulness meditations (Kabat-Zinn, 2013; Van Gordon et al., 2015; Guillaume et al., 2020). As suggested, contemporary mindfulness practices often integrate both focused attention (FA) and open monitoring (OM) meditation (Guillaume et al., 2020; Lutz et al., 2008). FA meditation involves sustaining attention on a chosen object, such as the breath, while OM meditation entails nonreactive monitoring of present-moment experiences without fixating on any particular stimulus. Studies suggest that both styles of meditations also influence sustained attention and concentration (Guillaume et al., 2020; Vago & Zeidan, 2016). It has also been proposed that a sense of tranquility or mental stillness arises when distortions and distractions are minimized, allowing for a sustained and effortless state of awareness. While mindfulness meditations often involve these attentional and psychological processes of concentration and a tranquil state of mind, many mindfulness-based interventions primarily assess changes in mindfulness using measures, such as the

FFMQ (Baer et al., 2006), that did not fully capture these qualities. The addition of concentration and tranquility in addition to the five facets of mindfulness may help unravel the differential mechanisms and effects that co-arise and directly result from mindfulness meditations process.

More recently, Chan et al. (2023) operationalized the constructs of tranquility and concentration, which are the qualities that could also arise during contemplative practices but have been under-investigated in the literature. Concentration is characterized by the focused and undivided attention of the mind, often described as one-pointedness and mental unification. This state involves the absence of wandering or distraction, with attention remaining continuous, sustained, and fixed on a singular object (Chan et al., 2023). Tranquility can be considered as the calmness of the mind (Chan et al., 2023). These two qualities are said to be co-arising with mindfulness during contemplative or mindfulness practices. In Chan et al. (2023), it was found that concentration and tranquility (i.e., ability to stay tranquil) at trait level were associated with higher attentional control and lower irritability, perceived stress, and psychological distress. In the same study, Chan et al. (2023) found that after controlling for concentration and composite score of observing, describing, and acting with awareness, tranquility at baseline remained significantly predictive to lower perceived stress and psychological distress at 2 weeks follow-up assessment. These findings highlighted the importance of accounting for these qualities in mindfulness research.

In examining the effects of mindfulness, past studies have investigated the five facets of mindfulness and their impact on mental health. According to the World Health Organization (WHO, 2004), mental health is not merely the absence of illness or infirmity but also includes positive functioning and overall well-being. Research has also investigated how mindfulness contributes not only to the reduction of distress but also to the enhancement of well-being (Carpenter et al., 2019; Mattes, 2019). For instance, a meta-analytic study has examined the cross-sectional association of the five facets with well-being (e.g., life satisfaction and eudemonic well-being) and distress-related variables (e.g., depression, perceived stress, negative affects) (Mattes, 2019). The study found that the five facets, except observing, were associated with better well-being and lower distress. While observing in general shared a weakly positive association with well-being indicators, it did not significantly correlate with most of the psychological distress indicators (Mattes, 2019). Longitudinally, another meta-analysis investigated the temporal association of each facet with depression and anxiety. The results showed that only acting with awareness and non-reacting predicted lower depressive and anxiety symptoms at the next time point, after controlling for the baseline scores (Prieto-Fidalgo et al., 2022). Moreover, Gómez-Odriozola and Calvete (2020) examined the bi-directional temporal associations among the five facets, maladaptive schemas, and depressive symptoms in adolescents over one year with three-time points. The results showed that the describing facet could consistently predict lower maladaptive schemas at the subsequent time points while acting with awareness at 6-month follow-up could predict lower depressive symptoms at 12-month follow-up (Gómez-Odriozola & Calvete, 2020). While such evidence was obtained from samples that contain largely non-meditators, they provided insights into which qualities could be specifically targeted in the practice of mindfulness for

novices, aiming to optimize the benefits of practice on mental health. In addition, while the five facets of mindfulness are often used to represent the mindfulness quality in general, its five facets have been found to have differential effects on the promotion of well-being and reduction of distress, as shown in the aforementioned studies. By adding concentration and tranquility, two other qualities that often co-arise and practiced in mindfulness interventions (Kabat-Zinn, 2013; Guillaume et al., 2020), together with the five facets of mindfulness, the relative effect of each component on mental health can be further be unraveled.

In addition to mental health-related variables, nonattachment is considered an important outcome to be cultivated by mindfulness practice. Nonattachment is defined as a "flexible, balanced way of relating to one's experiences without clinging to or suppressing them" (Sahdra et al., 2016). The Buddhist Psychological Model suggests that individuals often become attached to feelings they find pleasant and resist those they find unpleasant (Grabovac et al., 2011). This attachment or repulsion can lead to a mental proliferation of the initial psychological events, causing distress. Mindfulness, from a Buddhist psychological viewpoint, is intended to facilitate individuals to recognize these habitual patterns of attachment and resistance, and to detach from them to reduce suffering. Therefore, tranquility, concentration, and the five facets of mindfulness that are practiced and cultivated during mindfulness practice should be conducive to the development of nonattachment. This speculation has been supported by past studies that observed significantly positive associations among these variables (Chan et al., 2023; Ho et al., 2022; Sahdra et al., 2016; Yu et al., 2025).

Whereas previous studies have provided both cross-sectional and longitudinal evidence on how the five facets might be associated with mental health, they did not account for the effects of tranquility and concentration, which are also important qualities that could arise from mindfulness practice. Moreover, in the longitudinal studies that examined the relative effects of FFMQ facets (e.g., Gómez-Odriozola & Calvete, 2020), the outcome variables primarily focused on psychological distress or symptoms. Positive outcomes, such as well-being and nonattachment, were rarely the focus. Given that mental health is not merely the absence of distress but also includes positive functioning and psychological flourishing (WHO, 2004), incorporating well-being as an outcome can provide a more comprehensive understanding of how different mindfulness qualities contribute to mental health. This approach not only helps unravel the distinct roles of mindfulness-related qualities in shaping both positive and negative mental health outcomes but also offers preliminary insights into which specific qualities should be emphasized in interventions aimed at enhancing well-being or reducing distress. To address these research gaps, the present study explored the relative associations of the five facets of FFMQ, concentration, and tranquility with well-being, indicators related to psychological distress, and nonattachment across four-time points over 9 months.

Participants

Three-hundred and thirty-six participants expressed interest and provided informed consent to participate in the study. Thirty-one participants who did not pass the validation check were excluded from the analyses. The validation check consists of five questions. A sample question is, "Please choose 'Strongly Agree' for this question." Submissions that had any of these five questions answered incorrectly were regarded as invalid. As the present study primarily focused on individuals without meditation experience, an additional 31 participants were excluded, resulting in a final sample size of 274 at baseline. Two-hundred and forty-two, 223, 216 participants were retained at three-month (88%), six-month (81%), and nine-month (79%) follow-ups respectively. The participants' ages ranged from 18 to 38 years old (Mean = 21.22, SD = 2.92); 238 (86.9%) were female; 215 (78.5%) indicated their education level as undergraduate, and 11 (4%) as postgraduate; 196 (71.5%) had no religious affiliation, while 7 (2.6%) were Buddhist and 69 (25.2%) were Christian or Catholic. All people reported that they do not have any mindfulness practice experience.

Procedure

The present study is part of a larger research project aimed at promoting mindfulness and mental health among young adults in Hong Kong. Participants were recruited through a mass email from the university and posts on social media. After providing informed consent, participants were required to complete four sets of questionnaires at the beginning of the study (T1), at 3 months (T2), 6 months (T3), and 9 months (T4) after the T1 assessment, from March 2020 to November 2020, respectively. This period coincided with the first to fourth waves of Covid-19 in Hong Kong. Upon completing the questionnaires, participants received coupons valued up to HK$160. For the first two time points, participants received a HK$50 coupon for each set of questionnaires, and two HK$30 coupons were given if participants completed the remaining two sets of questionnaires (US$1 ≈ HK$7.8). Ethics approval was obtained from the ethics committee of the second author's institute before data collection.

Measure

Mindfulness-related qualities Five-Facet Mindfulness Questionnaire—Short Form (Hou et al., 2014) was used to measure five types of mindfulness practice-related qualities, including observing, describing, acting with awareness, non-judging, and non-reacting to inner experience on a 5-point Likert-type scale from 1 (never or very rarely true) to 5 (very often or always true). A higher score on the scale reflects a higher level of the respective quality. The internal consistency for observing, describing, acting with awareness, non-judging, and nonreactivity at T1 were 0.78, 0.82, 0.90, 0.72, and 0.65, respectively. The 4-item Concentration Scale (Chan et al., 2023) was used to measure concentration on a 6-point Likert-type scale from 1 (never) to 6 (always). A sample item includes "When listening to a person speaking, I am not distracted by things going on around me (e.g., noise)". A higher score indicated a

higher level of concentration. Acceptable internal consistency of the scale at T1 was found (Cronbach's α = 0.69) in the present study. The 4-item Tranquility Scale (Chan et al., 2023) was used to measure the ability to stay tranquil on a 6-point Likert-type scale from 1 (very untrue of me) to 6 (very true of me) for 3 items and from 1 (never) to 6 (always) for 1 item. Sample items include "I can stabilize my emotion to create a feeling of calmness". A higher score indicates a higher level of tranquility. The T1 score of the scale showed satisfactory internal consistency (Cronbach's α = 0.78) in the present study.

Nonattachment. The 8-item Nonattachment Scale-Short form (NAS-SF; Chio et al., 2018; Sahdra et al., 2010) was used to assess nonattachment on a 6-point Likert scale from 1 strongly disagree to 6 strongly agree. A higher score indicates a higher level of nonattachment. Sample item is "I can accept the flow of events in my life without hanging onto them or pushing them away". The short form of the scale was derived from the Nonattachment Scale by Sahdra et al. (2010) and validated in Hong Kong (Chio et al., 2018). The internal consistency of the scale for all four time points was excellent in the current study (Cronbach's αs ranging from 0.93 to 0.94).

Mental well-being The 5-item World Health Organization Well-Being Index (WHO-5) (WHO, 1998) was used to measure general well-being on a 6-point Likert scale from 0 (never) to 5 (always) in the last 2 weeks. A higher score indicates a higher level of wellbeing. Sample item is "I have felt active and vigorous". The internal consistency of the scale across time points were excellent in the present study (Cronbach's αs ranging from 0.91 to 0.95).

Eudaimonic well-being The Chinese version of 21-item Questionnaire for Eudaimonic Well-Being (QEWB; Waterman et al., 2010) was used to examine the general levels of eudaimonic well-being covering six dimensions, including self-discovery, purpose and meaning in life, perceived development of potentials, intense activities involvement, significant effort investment, and enjoyment of activities on a 5-point Likert scale from 0 strongly disagree to 4 strongly agree. Higher composite score indicates higher levels of overall eudaimonic well-being. Sample item is "I can say that I have found my purpose in life." The internal consistency of the scale across time points was satisfactory in the present study (Cronbach's α = 0.84 to 0.88).

Peacefulness The Chinese version of the 7-item Peace of Mind Scale (PoM; Lee et al., 2013) was used to measure participants' peacefulness on a 5-point Likert scale from 1 not at all to 5 all the time. A higher score indicates a more frequent experience of low arousal positive affect. A sample item is "My mind is free and at ease". The scale showed satisfactory internal consistency across time points in the current study (Cronbach's αs = 0.91 to 0.93).

Depressive symptoms The Chinese version of the 9-item Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001; Yeung et al., 2008) was used to measure depressive symptoms on a 4-point Likert scale from 0 not at all to 3 nearly every day in the past 2 weeks. A higher score indicates a greater level of depressive symptoms. A sample item is "Feeling down, depressed, or hopeless". The internal consistency of the scale across time points was satisfactory in the current study (Cronbach's αs = 0.90 to 0.92).

Anxiety The Chinese version of the 7-item Generalized Anxiety Disorder Scale (GAD-7; He et al., 2010; Spitzer et al., 2006) was used to measure anxiety symp-

toms on a 4-point Likert scale from 0 not at all to 3 nearly every day in the past 2 weeks. Higher scores indicate a greater frequency of experiencing anxiety symptoms. A sample item is "Feeling nervous, anxious or on edge". The internal consistency of the scale across time points in the present study is satisfactory (Cronbach's αs = 0.95).

Perceived stress The Chinese version of the 10-item Perceived Stress Scale (PSS-10; Cohen & Williamson, 1988; Glei et al., 2013) was used to assess levels of perceived stress on a 5-point Likert scale from 0 never to 4 very often in the last month. Higher scores indicate higher levels of perceived stress. A sample item is "In the last month, how often have you been able to control irritations in your life". The internal consistency of the scale in the current study is satisfactory (Cronbach's alphas = 0.86 to 0.89).

Data Analysis

Independent t-tests (for continuous variables) and chi-square tests (for categorical variables) were first conducted to test the baseline differences in the variables of interest and demographic variables between retained and dropped-out participants in three months (T2), six months (T3), and nine months follow-up assessment (T4).

Moreover, linear regression analyses were conducted to examine the relative associations of all the mindfulness-related qualities with different types of well-being and psychological distress-related variables and nonattachment over time. Specifically, the mindfulness-related qualities at baseline were entered as the independent variables while the well-being and psychological distress-related variables and nonattachment measured at baseline T1, T2, T3, and T4 were entered as the dependent variables. Autoregressive paths from the previous time points of DVs to subsequent time points of DVs were structured. This enabled an investigation of the predictability of the baseline IVs on the changes in levels of DVs across time points. In total, seven separate regression models were conducted with each including one DV. Missing data was handled by full maximum likelihood estimations. The regression analyses were performed using Mplus version 8.9 while the descriptive statistics were all analyzed using SPSS version 25. Figure 1 shows the conceptual model to be tested.

Results

Results of independent t-tests and chi-square tests showed that, for T2, the only significant difference was observed on baseline levels of tranquility, with retained participants showing higher levels of tranquility (mean difference = 0.35, p = .009). For T3, significant differences were observed on baseline levels of tranquility, describing, and acting with awareness. Specifically, participants who were retained in the study showed lower levels of describing (mean difference = -0.30, p = .014) and acting with awareness (mean difference = -0.28, p = .035) at baseline. They also showed higher levels of tranquility at baseline (mean difference = 0.22, p = .045). For T4, the only significant difference was observed in tranquility at baseline (mean difference = 0.21, p = .042).

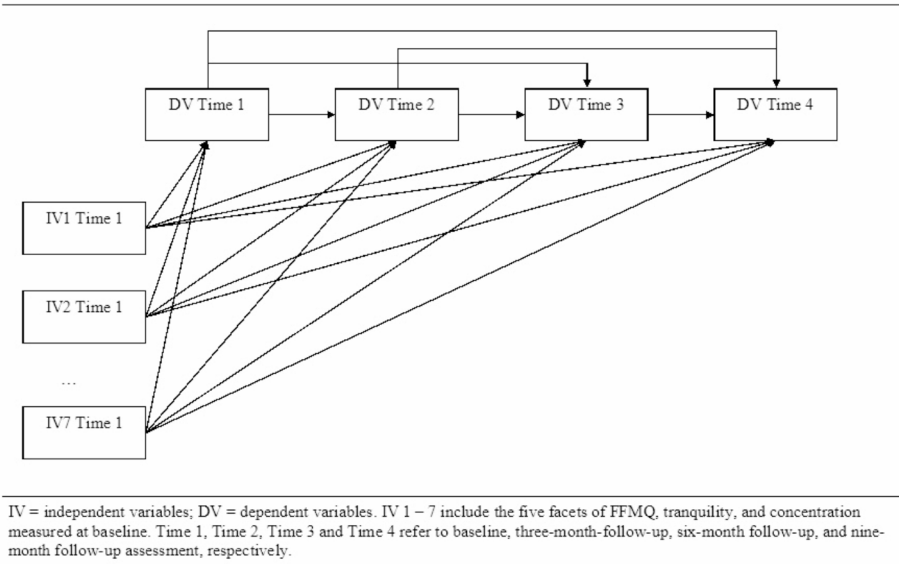

Fig. 1 Conceptual model tested in the present longitudinal study

Supplementary Document 1. shows the zero-order correlations among the IVs and the DVs across time points. The IVs were significantly associated with most of the DVs with a few exceptions that, for example, the observing facet was not significantly associated with most of the variables related to psychological across time points. Age and gender shared close-to-zero correlations with outcome variables.

Table 1 shows the standardized results of the regression coefficients. For the cross-sectional part of the regression model (the associations of the IVs with the DVs at the baseline), non-reactivity, acting with awareness, non-judging, and tranquility remained significantly associated with various indicators of psychological distress, after controlling for other qualities. Describing was not associated with any of the psychological distress indicators. Concentration was only significantly associated with lower perceived stress ($\beta = -0.12$, $p = .03$) while observing was only significantly associated with higher depression ($\beta = 0.14$, $p = .01$). For the well-being indicators, acting with awareness and tranquility remained significantly associated with all the indicators, after controlling for other qualities. Describing was only significantly associated with mental well-being ($\beta = 0.12$, $p = .02$) and eudaimonic well-being ($\beta = 0.25$, $p < .001$); nonreactivity was only significantly associated with mental well-being ($\beta = 0.19$, $p = .001$) and peacefulness ($\beta = 0.26$, $p < .001$); non-judging was only significantly associated with peacefulness ($\beta = 0.18$, $p < .001$), while concentration was only significantly associated with eudaimonic well-being ($\beta = 0.17$, $p = .003$). Observing was not associated with any of the well-being indicators, after controlling for other qualities. Finally, only describing ($\beta = 0.20$, $p < .001$), nonreactivity ($\beta = 0.36$, $p < .001$), non-judging ($\beta = 0.33$, $p < .001$), and tranquility ($\beta = 0.58$, $p < .001$) remained significantly associated with nonattachment.

Table 1 Standardized results of regression analyses

	Observing	Describing	Nonreactivity	Act with Aware	Nonjudging	Tranquillity	Concentration
Depressive symptoms	0.14*/-0.03/0.02/-0.05	−0.04/-0.08/-0.004/-0.007	−0.19*/0.08/0.01/-0.06	−0.31**/-0.03/-0.09/0.11	−0.15*/-0.11*/0.01/-0.08	−0.29***/-0.13*/-0.03/-0.03	−0.02/0.02/0.01/0.02
Anxiety	0.03/0.000/-0.03/0.03	0.03/-0.07/-0.01/-0.04	−0.11/0.03/0.02/-0.11	−0.28**/-0.07/-0.02/0.05	−0.25***/-0.07/-0.10/-0.03	−0.31***/-09/0.01/-0.002	0.01/0.05/-0.02/0.032
Perceived stress	−0.002/0.02/0.03/0.003	−0.02/-0.16*/-0.03/-0.02	−0.15*/-0.06/0.06/-0.09	−0.30***/-0.03/-0.04/0.03	−0.18***/-0.09/-0.01/-0.02	−0.28***/-0.15*/-0.10/-0.01	−0.12*/0.06/0.01/-0.02
Mental well-being	0.02/0.02/-0.02/0.04	0.12*/0.06/0.04/0.08	0.19**/-0.04/-0.07/0.03	0.13*/0.12*/0.10/-0.05	0.08/-0.01/-0.04/-0.02	0.35***/0.14*/0.11/0.12*	0.05/0.02/-0.12/-0.02
Peacefulness	0.02/0.05/0.09/0.06	0.06/0.09/0.04/0.06	0.26***/-0.03/-0.02/0.08	0.17**/0.12*/0.06/0.02	0.18**/0.02/0.07/-0.05	35***/0.13*/0.12/-0.03	0.06/0.02/-0.09/-0.10
Eudaimonic well-being	0.09/0.11*/0.02/0.04	0.25**/0.03/0.07/-0.06	−0.01/0.11*/-0.05/0.07	0.19**/0.04/-0.04/-0.04	0.06/0.04/0.02/-0.02	0.28***/0.02/0.02/0.07	0.17**/-0.009/0.08/0.04
Nonattachment	0.07/-0.05/-0.01/-0.01	0.20*/0.11/0.03/0.07	0.36***/0.03/0.08/-0.04	0.07/-0.03/0.04/0.04	0.33***/0.21/0.05/-0.06	0.58***/0.33***/0.13/0.07	0.04/0.01/-0.11*/-0.03

Note. All results are standardized regression coefficients. *$p<.05$, **$p<.01$, ***$p<.001$. The first index in each column represents the regression coefficient between the baseline measure of the independent variable (IV) and the dependent variable (DV). The second, third, and fourth indices in each column represent the regression coefficients between the baseline IV and the DV measured at the 3-month, 6-month, and 9-month follow-up assessments, respectively. For example, the first index, 0.14, in the column for observing and depressive symptoms indicates that the regression coefficient between baseline observing and baseline depressive symptoms is $\beta=0.14$. In contrast, baseline observing had non-significant associations with depressive symptoms measured at the 3-month, 6-month, and 9-month follow-up assessments, with $\beta=-0.03$, 0.02, and −0.05, respectively

For the longitudinal part of the model, tranquility could significantly predict lower depressive symptoms ($\beta = -0.13$, $p = .041$), lower perceived stress ($\beta = -0.15$, $p = .014$), higher mental well-being ($\beta = 0.14$, $p = .038$), higher peacefulness ($\beta = 0.13$, $p = .03$), and higher nonattachment at T2 ($\beta = 0.33$, $p < .001$), after controlling for the other qualities. Tranquility also had consistently weak effects on mental well-being at T3 ($\beta = 0.11$, $p = .12$) and T4 ($\beta = 0.12$, $p = .05$), although the association was not significant at T3. Acting with awareness could significantly predict higher mental well-being ($\beta = 0.12$, $p = .05$) and peacefulness at T2 ($\beta = 0.12$, $p = .02$). Interestingly, observing, describing, and nonreactivity could predict higher eudaimonic well-being ($\beta = 0.11$, $p = .01$), lower perceived stress ($\beta = -0.16$, $p = .003$), and higher eudaimonic well-being ($\beta = 0.11$, $p = .02$) at T2, respectively, although they were not significantly associated with the respective variables at T1. No other significant longitudinal effects were observed in other qualities.

Discussion

Expanding upon the past research that investigated the relative effects of the five facets of FFMQ (e.g., Carpenter et al., 2019; Mattes, 2019), the present study also accounts for tranquility and concentration which are the important qualities that are closely related to mindfulness. A longitudinal design was used to examine the relative associations of these qualities with a comprehensive range of mental health related variables, including well-being, psychological distress, and nonattachment so that the predictability of the qualities on the outcome variables over time could be investigated. The results showed that while some of the qualities remained significantly associated with the outcome variables in cross-sectional manner consistent with the past research (e.g., Cash & Whittingham, 2010; Roemer et al., 2021), they may not be predictable to the outcome variables over time.

In general, tranquility was found to have good predictability in most variables, except for anxiety and eudaimonic well-being. This could suggest that tranquility may be the most effective inherent ability among the mindfulness practice-related qualities at dispositional levels in predicting changes in levels of mental health and nonattachment across times. The results are reasonable, as tranquility has the characteristic of quieting and crushing mental disturbance (Buddhaghosa, 2003), thus the ability to remain tranquil could directly counteract distress more effectively than the other six facets. For example, when negative thoughts arise, individuals with higher levels of tranquility can quickly calm their negative emotions, leading to lower psychological distress over time. The results support previous research that tranquility is significantly associated with psychological distress cross-sectionally and could significantly predict psychological distress longitudinally at a two-week follow-up assessment (Chan et al., 2023). Additionally, tranquility leads to delight, happiness and joy (Buddhaghosa, 2003), thereby contributing to long-term happiness and overall well-being. While tranquility did not significantly predict anxiety and eudaimonic well-being at later time points, it is important to note that the results accounted for the effects of the other six predictors, as well as the corresponding outcomes measured at previous time points. Therefore, the results suggest that tranquility may have

relatively greater predictive power than some of the other predictors, which might have lower relative predictability for certain outcomes. Nonetheless, these predictors could still have significant associations with the outcome variables on their own. The results provided insights into future research, indicating that contemplative practice may explore ways to cultivate tranquility to optimize its effects on mental health and nonattachment among non-meditators or novices. Given that tranquility and mindfulness are different constructs (e.g., Bodhi, 2006; Chan et al., 2023), this finding also highlights the need to account for tranquility in research on mindfulness-based intervention so that the effect could be more attributable to the impact of mindfulness.

Moreover, it was also observed that acting with awareness was significantly associated with higher peacefulness and mental well-being across time after controlling for other qualities and its baseline score. These results supported that lower automatic pilot could be an essential factor, among all the qualities, in nurturing peacefulness and mental well-being. It is worthy to note that lower automatic pilots could have potential incremental value over the ability to stay tranquil, on peacefulness. Although concentration was not predictive of any of the outcomes after accounting for other qualities, it has been said it could be an important antecedent to tranquility in mindfulness practice from the Buddhist psychological perspective (Chan et al., 2023). Future research could investigate the relationship between concentration, tranquility, and acting with awareness experimentally.

Consistent with the cross-sectional findings, the observing facet was found to have the weakest association with all the mental health-related variables (Mattes, 2019; Roemer et al., 2021; Prieto-Fidalgo et al., 2022), although observing is theoretically considered an important quality in mindfulness (Lilja et al., 2013). A point worth noting is that we observed a positive association between T1 observing and depressive symptoms; however, the magnitude is weak after controlling for other predictors. Given that the result of zero-order correlation showed a non-significant association between the two variables concurrently, we suggest interpreting these results with caution. Specifically, it is not conclusive to suggest that observing is associated with higher depressive symptoms based on the results of the present study.

Nonetheless, we found that the observing facet could predict higher eudaimonic well-being at T2, sharing a similar effect size with the non-reactivity facet. The results may imply that people who consistently observe their inner sensations and the environment are more likely to be capable of deriving meaning from these stimuli and their own lives, which is conducive to their eudaimonic well-being in the long term. Consistent observation of inner sensations might allow one to gain a deeper understanding of them and facilitate the search for meaning from these sensations. More primary studies are warranted to examine the longitudinal effect of observing on various mental health outcomes.

This study has several limitations that warrant attention when interpreting the findings. First, although a longitudinal approach was used in the present study, the causality of the findings could not be established. Second, the data were primarily collected from college students and women, so the generalizability of the findings could be limited. Moreover, the participants included in the present study reported that they do not have any mindfulness practice experience. Given that meditation practices could affect how people interpret the items or these qualities, future studies could consider

replicating the model on meditator samples. Despite these limitations, the present study has provided a more comprehensive investigation of the associations between mindfulness-practice-related qualities and mental health-related variables and nonattachment by accounting for the effects of tranquility and concentration. This provided insights into the literature on which quality could be focused on for cultivation, contingent on which outcome is of the main focus among non-meditators or novices.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11482-025-10443-z.

Author Contributions Ben C.L. Yu: Conceptualization, Methodology, Formal analysis, Data Curation, Investigation, Writing – Original Draft, Project Administration. Winnie W.S. Mak: Conceptualization, Methodology, Supervision, Funding acquisition, Writing - Review & Editing. Floria H.N. Chio: Conceptualization, Methodology, Writing - Review & Editing. Hin-Tak Sik: Conceptualization, Writing - Review & Editing. Ryan M. K. Chan: Conceptualization, Writing - Review & Editing.

Funding Open access funding provided by The Hong Kong Polytechnic University
The study was partially supported by the direct grant from the Faculty of Social Science of The Chinese University of Hong Kong (Ref. No. 4052176).

Data Availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors declare no conflict of interest.

References

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*(1), 27–45.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., & Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment*, *15*(3), 329–342.

Bernstein, A., Hadash, Y., Lichtash, Y., Tanay, G., Shepherd, K., & Fresco, D. M. (2015). Decentering and related constructs: A critical review and metacognitive processes model. *Perspectives on Psychological Science*, *10*(5), 599–617.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11*(3), 230.

Bodhi. (2006). *Comprehensive manual of abhidhamma: The philosophical psychology of Buddhism* (3rd ed.).). Buddhist Publication Society.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822.

Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight meditation (Vipassana) and meditation-based psychotherapy: The development of the Freiburg mindfulness inventory (FMI). *Journal for Meditation and Meditation Research*, *1*(1), 11–34.

Buddhaghosa, A. (2003). The path of purification: Visuddhimagga. BPS Pariyatti. ISBN 978-955-24-0023-0.

Carpenter, J. K., Conroy, K., Gomez, A. F., Curren, L. C., & Hofmann, S. G. (2019). The relationship between trait mindfulness and affective symptoms: A meta-analysis of the five facet mindfulness questionnaire (FFMQ). *Clinical Psychology Review*, *74*, 101785.

Cash, M., & Whittingham, K. (2010). What facets of mindfulness contribute to psychological well-being and depressive, anxious, and stress-related symptomatology? *Mindfulness*, *1*, 177–182.

Chan, R. M. K., Mak, W. W. S., & Yu, B. C. L. (2023). Going beyond mindfulness: How concentration and tranquility commonly Co-Arising with mindfulness account for mental health. *International Journal of Environmental Research and Public Health*, *20*(8), 5470.

Chio, F. H., Lai, M. H., & Mak, W. W. (2018). Development of the nonattachment Scale-Short form (NAS-SF) using item response theory. *Mindfulness*, *9*, 1299–1308.

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the united States. In S. Spacepan, & S. Oskamp (Eds.), *The social psychology of health* (pp. 31–67). Sage.

Dawson, A. F., Brown, W. W., Anderson, J., Datta, B., Donald, J. N., Hong, K., & Galante, J. (2020). Mindfulness-based interventions for university students: A systematic review and meta-analysis of randomised controlled trials. *Applied Psychology: Health and Well-Being*, *12*(2), 384–410.

Dreyfus, G. (2013). Is mindfulness present-centred and non-judgmental? A discussion of the cognitive dimensions of mindfulness. *Mindfulness* (pp. 41–54). Routledge.

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J. P. (2007). Mindfulness and emotion regulation: The development and initial validation of the cognitive and affective mindfulness Scale-Revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment*, *29*, 177–190.

Fernández-Campos, S., Roca, P., & Yaden, M. B. (2021). The impermanence awareness and acceptance scale. *Mindfulness*, *12*, 1542–1554.

Glei, D. A., Goldman, N., Shkolnikov, V. M., Jdanov, D., Shkolnikova, M., Vaupel, J. W., & Weinstein, M. (2013). Perceived stress and biological risk: Is the link stronger in Russians than in Taiwanese and Americans? *Stress (Amsterdam, Netherlands)*, *16*(4), 411–420.

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.

Gómez-Odriozola, J., & Calvete, E. (2020). Longitudinal bidirectional associations between dispositional mindfulness, maladaptive schemas, and depressive symptoms in adolescents. *Mindfulness*, *11*, 1943–1955.

Grabovac, A. D., Lau, M. A., & Willett, B. R. (2011). Mechanisms of mindfulness: A Buddhist psychological model. *Mindfulness*, *2*, 154–166.

Gu, J., Baer, R., Cavanagh, K., Kuyken, W., & Strauss, C. (2020). Development and psychometric properties of the Sussex-Oxford compassion scales (SOCS). *Assessment*, *27*(1), 3–20.

Guillaume, N., Jean, M., Marcaurelle, R., & Dupuis, G. (2020). Mindfulness meditation versus training in tranquil abiding: Theoretical comparison and relevance for developing concentration. *Psychology of Consciousness: Theory Research and Practice*, *7*(2), 151–172.

He, X., Li, C., Qian, J., Cui, H. S., & Wu, W. (2010). Reliability and validity of a generalized anxiety disorder scale in general hospital outpatients. *Shanghai Archives Psychiatry*, *22*(4), 200–203.

Ho, C. Y. Y., Yu, B. C. L., & Mak, W. W. S. (2022). Nonattachment mediates the associations between mindfulness, well-being, and psychological distress: A meta-analytic structural equation modeling approach. *Clinical Psychology Review*, *95*, 102175.

Hou, J., Wong, S. Y. S., Lo, H. H. M., Mak, W. W. S., & Ma, H. S. W. (2014). Validation of a Chinese version of the five facet mindfulness questionnaire in Hong Kong and development of a short form. *Assessment*, *21*(3), 363–371.

Juneau, C., Pellerin, N., Trives, E., Ricard, M., Shankland, R., & Dambrun, M. (2020). Reliability and validity of an equanimity questionnaire: The two-factor equanimity scale (EQUA-S). *PeerJ*, *8*, e9405.

Kabat-Zinn, J. (2013). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness* (2nd ed.). Bantam.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613.

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., & Devins, G. (2006). The Toronto mindfulness scale: Development and validation. *Journal of Clinical Psychology*, *62*(12), 1445–1467.

Lee, Y. C., Lin, Y. C., Huang, C. L., & Fredrickson, B. L. (2013). The construct and measurement of peace of Mind. *Journal of Happiness Studies*, *14*(2), 571–590.

Lilja, J. L., Lundh, L. G., Josefsson, T., & Falkenström, F. (2013). Observing as an essential facet of mindfulness: A comparison of FFMQ patterns in meditating and non-meditating individuals. *Mindfulness*, *4*, 203–212.

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*, *12*(4), 163–169.

Mattes, J. (2019). Systematic review and meta-analysis of correlates of FFMQ mindfulness facets. *Frontiers in Psychology*, *10*, 2684.

Nilsson, H., & Kazemi, A. (2016). Reconciling and thematizing definitions of mindfulness: The big five of mindfulness. *Review of General Psychology*, *20*(2), 183–193.

Prieto-Fidalgo, Á., Gómez-Odriozola, J., Royuela-Colomer, E., Orue, I., Fernández-González, L., Oñate, L., & Calvete, E. (2022). Predictive associations of dispositional mindfulness facets with anxiety and depression: A meta-analytic structural equation modeling approach. *Mindfulness*, 1–17.

Roemer, A., Sutton, A., Grimm, C., & Medvedev, O. N. (2021). Differential contribution of the five facets of mindfulness to well-being and psychological distress. *Mindfulness*, *12*, 693–700.

Rogers, H. T., Shires, A. G., & Cayoun, B. A. (2021). Development and validation of the equanimity scale-16. *Mindfulness*, *12*, 107–120.

Sahdra, B., Ciarrochi, J., & Parker, P. (2016). Nonattachment and mindfulness: Related but distinct constructs. *Psychological Assessment*, *28*(7), 819.

Sahdra, B. K., Shaver, P. R., & Brown, K. W. (2010). A scale to measure nonattachment: A Buddhist complement to Western research on attachment and adaptive functioning. *Journal of personality assessment*, *92*(2), 116–127.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, *62*(3), 373–386.

Spijkerman, M. P. J., Pots, W. T. M., & Bohlmeijer, E. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical Psychology Review*, *45*, 102–114.

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097.

Vago, D. R., & Zeidan, F. (2016). The brain on silent: Mind wandering, mindful awareness, and States of mental tranquility. *Annals of the New York Academy of Sciences*, *1373*(1), 96–113.

Van Gordon, W., Shonin, E., Griffiths, M. D., & Singh, N. N. (2015). There is only one mindfulness: Why science and Buddhism need to work together. *Mindfulness*, *6*, 49–56.

Waterman, A. S., Schwartz, S. J., Zamboanga, B. L., Ravert, R. D., Williams, M. K., Agocha, V. B., Kim, S. Y., & Donnellan, M. B. (2010). The questionnaire for Eudaimonic Well-Being: Psychometric properties, demographic comparisons, and evidence of validity. *The Journal of Positive Psychology*, *5*(1), 41–61.

World Health Organization. (1998). *Wellbeing measures in primary health care/the depcare project*. WHO Regional Office for Europe: Copenhagen.

World Health Organization. (2004). *Promoting mental health: Concepts, emerging evidence, practice: Summary report*. World Health Organization.

Yeung, A., Fung, F., Yu, S. C., Vorono, S., Ly, M., Wu, S., & Fava, M. (2008). Validation of the patient health Questionnaire-9 for depression screening among Chinese Americans. *Comprehensive Psychiatry*, *49*(2), 211–217.

Yu, B. C. L., Mak, W. W. S., & Chio, F. H. N. (2020). Promotion of well-being by Raising the awareness on the interdependent nature of all matters: Development and validation of the interconnectedness scale. *Mindfulness*, *11*, 1238–1252.

Yu, B. C. L., Ng, J. C. K., Chio, F. H. N., & Mak, W. W. S. (2025). Does mindfulness facilitate letting be? A longitudinal investigation of nonattachment as a mediator in the association between mindfulness, well-being, and affect at trait and state levels. *Applied Psychology: Health and Well-Being*, *17*(1), e12634.

Authors and Affiliations

Ben C. L. Yu[1] · Winnie W. S. Mak[2] · Floria H. N. Chio[2] · Hin-Tak Sik[3] · Ryan M. K. Chan[2]

✉ Ben C. L. Yu
clyuben@gmail.com

[1] Department of Applied Social Sciences, The Hong Kong Polytechnic University, Hung Hom, Hong Kong

[2] Department of Psychology, The Chinese University of Hong Kong, Sha Tin, Hong Kong

[3] Centre of Buddhist Studies, The University of Hong Kong, Pokfulam, Hong Kong