Acceptance, and not its interaction with attention monitoring, increases psychological well-being: Testing the Monitor and Acceptance Theory of mindfulness[1]

Simione, Luca; Raffone, Antonino; Mirolli, Marco

Abstract

Objectives:
According to the influential Monitor and Acceptance Theory (MAT), mindfulness includes the two components of attention monitoring and acceptance, which, in conjunction, can explain its benefits on psychological well-being: monitoring alone would increase affective reactivity (MAT tenet 1b), but when combined with acceptance it would lead to increased psycho-physical well-being (MAT tenet 2b). However, the studies cited in support to MAT are not completely consistent with the theory, Thus, we conducted a cross-sectional study to further test it.

Methods:
In a pool of 154 participants, we measured the two mindfulness components with the Five Facets Mindfulness Questionnaire, while also assessing ill-being or psychological distress in terms of depression, anxiety, stress, and sleep disturbances, and psychological well-being in terms of life satisfaction and happiness. We then conducted hierarchical regression analysis on these data for assessing the role of monitoring, acceptance, and their interaction on the other psychological variables.

Results:
Our results show that monitoring alone marginally predicted few ill-being variables, whereas acceptance strongly predicted both reductions in psychological symptoms and increases in well-being. Moreover, no significant interaction between monitoring and acceptance was found for any of the tested variables.

Conclusions:
The present study provides very little support for the two tested MAT tenets. On the contrary, in line with most of the available literature, our results strongly support the alternative view according to which the beneficial effects of mindfulness on psychological outcomes depend mostly on acceptance.

Keywords: mindfulness, well-being, Monitor and Acceptance Theory, acceptance, attention monitoring, emotional reactivity.

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Trait mindfulness and mindfulness meditation training are associated with increases in psychological well-being, as well-documented in the literature (Hofmann, Sawyer, Witt, & Oh, 2010; Tomlinson, Yousaf, Vittersø, & Jones, 2018). However, a comprehensive theoretical account on how mindfulness works to promote well-being is still lacking. In this respect, Lindsay and Creswell (2017) made an important contribution by presenting the Monitor and Acceptance Theory, or MAT, in which they proposed that mindfulness acts essentially throughout two components: attention monitoring and acceptance. Monitoring, or awareness of the present moment, refers to the ability to notice what is actually ongoing in the internal and external environment, including the mental state, the emotional state, and perceived events. Acceptance refers to an open attitude towards one's own experience, an attitude with which each experience is welcomed and accepted as it is, without the need to judge it, push it away, cling to it, or react to it in any way. According to MAT, attention monitoring explains how mindfulness can improve cognitive processes like selective and sustained attention, task switching, and working memory. However, monitoring alone leads to enhanced attention to affective information regardless of its valence, thus it can intensify both positive and negative states. MAT posits that it is the combination of monitoring and acceptance that leads to improvements in outcomes related to affect, stress, and psycho-physical health.

More formally, MAT is based on the following theoretical tenets: tenet (1) affirms that attention monitoring alone increases awareness of present-moment experience, thus leading to (1a) enhanced attentional skills but also (1b) increased affective reactivity (which can both enhance positive experiences and exacerbate negative symptoms); tenet (2) affirms that acceptance interacts with monitoring to reduce affective reactivity, thus monitoring and acceptance together (2a) boost performance on cognitive tasks involving emotion regulation, (2b) reduce both negative reactivity and grasping of positive experiences, and (2c) improve stress-related health outcomes. In particular, two MAT (sub-)tenets specifically refer to the mechanisms through which mindfulness can decrease psychological symptoms and increase well-being: (1b) – monitoring can increase affective reactivity – and (2b) – monitoring and acceptance together can reduce reactivity towards both negative and positive experiences, thus leading to better psychological health. It is important to note that tenet 2b refers specifically to the interaction between monitoring and acceptance, and in particular to the way through which acceptance moderates the effect of monitoring: according to the theory, high levels of monitoring paired with low acceptance lead to affective reactivity, which can lead to stress and other psychological disturbances, while high levels of monitoring paired with high acceptance lead to less reactivity and hence better mental health. Indeed, the authors explicitly discuss the possibility that acceptance alone could be responsible for the positive effects of mindfulness but consider this possibility as an "alternative" to their tenet 2b (Lindsay & Creswell, 2017, p. 56).

Lindsay and Creswell (2017) supported their theory mainly through correlational data obtained in cross-sectional studies with medium to large samples tested with a battery of self-report questionnaires. To assess mindfulness, the vast majority of these studies used the Five

Facets Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), in which monitoring was measured as *observing*, i.e. noticing perceptual and mental events, and acceptance was measured as *nonreactivity* to inner experience and *nonjudging* one's thoughts or feelings (Table 1, p.52, Lindsay & Creswell, 2017). However, a close inspection to the available evidence does not clearly support any of the two tenets.

With respect to MAT's tenet 1b, i.e., attention monitoring alone should increase affective reactivity, Lindsay and Creswell (2017) reported evidence showing that in samples of students and non-meditators monitoring increased psychological symptoms (Barnes & Lynn, 2010; Brown, Bravo, Roos, & Pearson, 2015; Desrosiers, Vine, Curtiss, & Klemanski, 2014; Hamill, Pickett, Amsbaugh, & Aho, 2015) and a latent profile analysis (LPA) study that showed that a "judgmentally observing" profile (individuals with high FFMQ observing and low FFMQ non-judging) was associated with worse psychological outcomes (Pearson, Lawless, Brown, & Bravo, 2015). MAT's authors reported also studies in which higher monitoring was related to better psychological states like higher self-esteem and satisfaction with life (Christopher & Gilbert, 2010), post-traumatic growth (Chopko & Schwartz, 2009), and positive affect (Schroevers & Brandsma, 2010). Also other subsequent studies reported results that seem to support MAT's tenet 1b in that the observing facet of mindfulness was correlated to psychological symptoms (Bravo, Pearson, & Kelley, 2018; Curtiss, Klemanski, Andrews, Ito, & Hofmann, 2017; Kimmes, Durtschi, & Fincham, 2017) and/or with positive psychological outcomes (e.g. i.e. satisfaction with life and life effectiveness: Sahdra et al., 2017).

However, other studies did not confirm such relationships between monitoring/observing and mental health outcomes: for example, observing did not show a direct effect in regression on tobacco and alcohol use (Eisenlohr-Moul, Walsh, Charnigo, Lynam, & Baer, 2012), and on borderline traits (Peters, Eisenlohr-Moul, Upton, & Baer, 2013), nor it significantly correlated with stress and depression symptoms (Tomfohr, Pung, Mills, & Edwards, 2015), couple satisfaction (Krafft, Haeger, & Levin, 2017), and sleep disturbances (Lau, Leung, Wing, & Lee, 2018). More importantly, a recent meta-analysis on the correlational effects of the five mindfulness facets measured through the FFMQ on mental health that included more than 150 studies and 44,000 participants showed that the observing scale does not correlate with affective symptoms (Carpenter, Conroy, Gomez, Curren, & Hofmann, 2019). This result seems to suggest that the correlation reported in single studies between observing and mental health could be considered as spurious, and thus directly contradicts tenet 1b.

Also tenet 2b was supported by Lindsay and Creswell (2017) mostly with cross-sectional studies showing that acceptance modulates the relationship between monitoring and affective reactivity. Lindsay and Creswell (2017) reported mainly three studies using moderation analysis in support of tenet 2b (Barnes & Lynn, 2010; Desrosiers et al., 2014; Eisenlohr-Moul et al., 2012). The moderating effect of acceptance on monitoring was also subsequently found on outcomes such as couple satisfaction (Krafft et al., 2017), psychopathological symptoms (Curtiss et al., 2017), and sleep and distress (Lau et al., 2018). However, all these studies only partially confirmed tenet 2b. In particular, in most of these

studies high acceptance *mitigated the negative effect of high monitoring* (e.g. Barnes & Lynn, 2010; Curtiss et al., 2017; Krafft et al., 2017; Lau et al., 2018), while it was very rare that high acceptance paired with high monitoring *improved* outcomes with respect to conditions in which monitoring was low (such interaction according to which acceptance inverted the direction of the influence of monitoring on some outcomes has been found only in Eisenlohr-Moul et al., 2012 for a behavioral outcome such as alcohol use and in Desrosiers et al., 2014 only for emotional regulation variables like rumination and worry but not for depression or anxiety symptoms).

MAT's proposers research group recently conducted experimental research trying to dismantle the roles of attention monitoring and acceptance by comparing a mindfulness intervention training only monitoring, an intervention training both monitoring and acceptance, and a control condition (Lindsay, Young, Brown, Smyth, & Creswell, 2019). While the authors took this research to support MAT theory, more caution is warranted, for two reasons: first, this study seems to explicitly contradict tenet 1b, as the condition where only monitoring was trained did not change subjective psychological experiences (in this case loneliness and isolation perception); second, since there was no condition in which only acceptance was trained, it was not possible to assess whether the positive effects of the training were due to an increase in both monitoring and acceptance, as stated by tenet 2b, or by the increase in acceptance alone, as predicted by the alternative account. Interestingly, the experiment by Wang et al. (2019) on pain tolerance included also an acceptance-only condition beyond the attention-only and attention+acceptance. The results showed that both the attention-only condition and the control condition did not result in any significant change, while both the conditions that included acceptance training resulted in increases in pain endurance and pain tolerance. Furthermore, only the acceptance-only condition was reported to increase pain endurance and pain tolerance with respect to the attention-only and control conditions. Hence, this recent experimental evidence seems to disconfirm both tenet 1b (according to which attention monitoring to a stressful stimulus should lead to a worse outcome; in this case, less pain endurance and tolerance) and tenet 2b (according to which monitoring and acceptance together should lead to the best outcome).

Lindsay and Creswell (2017) cited in support of their tenet 2b also an influential LPA study using the FFMQ published by (Pearson et al. 2015), in which "students with high monitoring skills (observing) and high levels of acceptance (nonjudging) reported significantly lower levels of depressive and anxiety symptoms" (Lindsay & Creswell, 2017, p. 54). However, here results have been reported only partially: in fact, lower anxiety and depressive symptoms were associated not only to the profile with high monitoring and high acceptance (which the authors call the "high mindfulness" class, as in this profile all mindfulness facets were high), but also to the "non-judgmentally aware" profile, i.e. a profile in which high nonjudging (acceptance) was paired to very low observing (monitoring). Hence, these results do not support MAT, but rather the alternative account, according to which psychological well-being depends on acceptance (the higher, the better), independently on the levels of monitoring. Similar results were also found by other more recent studies using a similar methodology (Bravo et al., 2018; Kimmes et al., 2017). Furthermore, in one

of these studies (Bravo et al., 2018), the "judgmentally observing" profile, which was associated with the worse outcomes, had not only high observing but also high nonreacting scores; since nonreacting can be considered as a measure of acceptance (Lindsay & Creswell, 2017), according to MAT theory this profile should lead to a reduction in psychological symptoms, not to a worsening as it was the case. A further profile study (Sahdra et al., 2017) found, again in contrast to tenet 2b, that the judgmentally observing profile was related to both higher ill-being scores and higher well-being scores, while the non-judgmentally aware (low observing and high non-judging) and the high mindfulness (all mindfulness scores high) profiles were not related to higher well-being scores, nor to lower ill-being scores. In sum, MAT's tenet 2b, according to which high monitoring and high acceptance are associated with the best psychological outcomes, is supported only by a couple of studies (Desrosiers et al., 2014; Eisenlohr-Moul et al., 2012); all other studies only partially confirmed or directly contradicted the expected results (Barnes & Lynn, 2010; Bravo et al., 2018; Curtiss et al., 2017; Kimmes et al., 2017; Lau et al., 2018; Pearson et al., 2015; Sahdra et al., 2017).

In sum, current evidence for both tenets 1b and 2b of MAT is mixed. Of note, cross-sectional studies testing MAT typically suffer of some important limitations: first, most of these studies did not control for the possible confounding effects of covariates (e.g. Barnes & Lynn, 2010; Eisenlohr-Moul et al., 2012; Peters et al., 2013), nor they reported to check for outliers and for regression assumptions (e.g. Desrosiers et al., 2014; Eisenlohr-Moul et al., 2012; Pearson et al., 2015); second, several of these studies reported results for only one of the two FFMQ facets representing acceptance (nonjudging and nonreacting), without justifying why the other facet has been excluded (e.g. Curtiss et al., 2017; Desrosiers et al., 2014; Lau et al., 2018; Peters et al., 2013); third, they tested only a single outcome (e.g. Krafft et al., 2017) or they found significant results only for a subset of their variables (e.g. Desrosiers et al., 2014), while measuring only ill-being (such as anxiety or depression) or well-being (such as couple satisfaction) variables, never both domains at the same time.

To overcome these limitations, we designed and conducted a cross-sectional study in which we controlled for all the critical aspects mentioned above in order to test the two MAT tenets (1b and 2b) by means of correlation, regression, and moderation analyses. We included multiple outcome variables measuring both ill- and well-being from three domains beyond mindfulness: distress (including stress, anxiety, and depression), another ill-being domain (sleep disturbances), and well-being (including life satisfaction and subjective happiness). In particular, we first tested whether, as predicted by tenet 1b, monitoring could predict variables related to both ill- and well- being. Then, we tested whether, as predicted by tenet 2b, acceptance would moderate the effect of monitoring on all variables (in particular ill-being related ones), so that high acceptance and high monitoring would lead to improvements of psychological symptoms. Moreover, testing tenet 2b also includes testing whether acceptance alone can predict less psychological symptoms and more well-being, since, as discussed above, Lindsay and Creswell explicitly stated that this would be an alternative to their theory (and to tenet 2b in particular). Finally, we tested the effect of covariates (sex, age,

and meditation experience) and of using a single acceptance score merging the two relative FFMQ facets on the results of tenets' testing.

METHOD

Participants

Participants were voluntarily recruited online through email and social media. There was no remuneration for participation. We tested 154 adult participants for this study. All our participants were Italian, with mean age = 32.61 years (SD = 8.45); 96 participants were females and 58 were males. The mean meditation experience during lifetime was 15.75 hours, with most participants reporting no or very little experience with mindfulness meditation (median = 0 hours). Three subjects reported to take pharmacological treatments for sleeping and five to take pharmacological treatments for psychological or psychiatric issues. We decided to include these participants in the final sample as we considered them to be representative of the population and we had no reason to think that pharmacological treatments should change the relationships between mindfulness facets and other psychological variables (in any case, re-running the models while removing these subjects did not alter the results significantly).

We checked for multivariate outliers by means of Cook's distance (Fox, 2016) and excluded in this way two participants. Thus, we obtained a final sample of 152 participants (mean age = 32.57 years, SD = 8.46 years; females = 94, males = 58) for the analysis. On average, participants in the final sample dedicated 9.37 hours to meditation during lifetime.

Procedure

After providing informed consent for participating to the study, participants compiled a battery of questionnaires described in the next section. Each questionnaire was presented in a separated online form, and participants had to complete each questionnaire before continuing to the next one. The first module included personal information, that is sex, age, nationality, meditation experience, and currently taken drugs for psychiatric or psychological problems. The current work was part of a larger study investigating the relationships between mindfulness, stress, sleep and well-being (see Simione, Raffone, & Mirolli, 2020): since this larger study involved also assessing the effects of mindfulness on dreaming, the online form included other questions regarding participants' dreams, not reported and analyzed here. All data were collected in a completely anonymous format.

Measures

The online battery included seven questionnaires, assessing participant's mindfulness, distress (including stress, depression, and anxiety), sleep disturbances, and psychological well-being. In our sample, all scales showed good internal reliability, with Chronbach's α values ranging from 0.70 to 0.95 (reported below).

In line with previous literature on MAT, mindfulness was assessed through the Five Facets Mindfulness Questionnaire (FFMQ; Baer et al., 2006; Giovannini et al., 2014), a 39-item questionnaire measuring five aspects of mindfulness: observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience (Chronbach's α = .79, .90, .89, .89, and .70, respectively).

Distress was assessed through two scales: the first was the Depression Anxiety Stress Scale-21 (DASS-21; Henry & Crawford, 2005), including 21 items, which provides a global distress (Chronbach's α = .95) score and three subscale scores for depression, anxiety, and stress (Chronbach's α = .91, .85, and .91, respectively); the second was the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 2006), a questionnaire including 10 items measuring how much participants perceive their lives as stressful, i.e. as unpredictable or out of control (Chronbach's α = .88).

Sleep and dream disturbances were assessed through two scales: the Pittsburgh Sleep Quality Index-A (PSQI-A; Germain, Hall, Krakow, Katherine Shear, & Buysse, 2005), a 9-item questionnaire assessing the quality of sleep and its disturbance in clinical and non-clinical populations, with higher scores corresponding to poorer sleep quality (Chronbach's α = .75), and the Van Dream Anxiety Scale (VDAS; Agargun, Kara, & Bilici, 1999), a 17-item scale that evaluates dream anxiety, nightmares' frequency and content, and the effect of nightmares and bad dreams on daytime activity, again with higher scores indicating worse outcomes (Chronbach's α = .93).

Lastly, well-being was assessed through two widely used questionnaires: the Satisfaction With Life Scale (SWL; Di Fabio & Gori, 2016), measuring perceived satisfaction in life on 5 items (Chronbach's α = .90), and the Subjective Happiness Scale (SHS; Iani, Lauriola, Layous, & Sirigatti, 2014), evaluating the perceived level of happiness on 4 items (Chronbach's α = .85). For both these scales we computed an overall score, with higher scores indicating higher psychological well-being.

Data Analysis

The observing, nonreacting, and nonjudging facets of the FFMQ represented our predictors, while our dependent variables were the total scores of the other questionnaires plus the three DASS subscales (depression, anxiety and stress). We considered sex, age, and meditation experience as possible covariates as they are related to mindfulness (e.g. Baer et al., 2006; Mahlo & Windsor, 2020) and psychological well-being (e.g. Mizoguchi et al., 2000; Norton, 2007; Stone, Schwartz, Broderick, & Deaton, 2010). However, following the recommendations of VanderWeele (2019), we included in the final model only the variables that correlated with the predictors, the dependent variables, or both.

Since we collected all our data at the same time point, we preliminarily checked for the presence of a common method bias (CMB) in the data through the Harman's one-factor test (Podsakoff et al., 2003) and the correlation matrix procedure (Bagozzi, Yi, & Phillips, 1991). Subsequently, we conducted bivariate Pearson correlations to assess the general relationship pattern between our variables and then tested the two MAT tenets by means of hierarchical regression analysis. In the first step we assessed the effects of the covariates. In

the second step we added the three mindfulness-related predictors, i.e. the monitoring score (observing) and the two acceptance scores (nonjudging and nonreacting). In the third and last step we added the interaction terms observing x nonjudging and observing x nonreacting. Before running the moderation analysis, we mean-centered the antecedent and mediator variables, as this is credited to reduce estimation and multicollinearity problems (Cohen, Cohen, West, & Aiken, 2003), which makes the regression coefficients more meaningful (Hayes, 2018). For each predictor, we report the unstandardized coefficient (indicated as *b*), as suggested by Hayes (2018). We also report the semi-partial correlations as interpretable measures of effect size. When a significant interaction was found, we probed it by means of simple slope analysis with the 16th, 50th and 84th percentiles, i.e. a standard deviation below the mean, the mean, and a standard deviation above the mean (Hayes, 2018). We also applied the Johnson–Neyman technique (Johnson & Neyman, 1936) indicating the region of significance of the probed conditional effect.

Following the recommendations of Heinze, Wallisch, and Dunkler (2018), we included all the considered predictors and covariates in the same model, as this is preferred over exclusion or selection of variables, or fitting a different model for every predictor (e.g. a model with nonreacting as predictor and another with nonjudging). In our model, we had a total of seven independent variables (IVs). This resulted in a number of events per variable (EPV) higher than 20, considered as sufficient to make the interpretation of our model meaningful (Harrell, 2015).

Before completing the regression analysis, we checked for regression assumptions to be met. To this aim, we used the global test for validation of linear model assumptions proposed by Peña and Slate (2006) through the R's package *gvlma version 1.0.0.3*. In particular, we checked for violation of linearity, as this is the most fundamental assumption for linear regressions (Hayes, 2018). Along with this general assumption of linearity (global test of gvlma), we also checked the skewness, kurtosis, and heteroscedasticity of error distribution. When we found a violation of such linear assumption, we proceeded by applying the principle of robustification of the analysis. We found non-acceptable assumptions at the global test for the regression models on depression, anxiety, PSQI, and VDAS. Thus, for these variables we computed the confidence intervals (CIs) of the estimates over 1000 bootstrap samples for these scores. We used bootstrap for estimation of regression parameters, given that this is considered as the best non-parametric approach for linear multiple regression estimation (Mooney & Duval, 1993; Yaffee, 2002). For the other variables, which showed acceptable assumptions, in the following section we only report the plain regression coefficients.

Finally, we conducted two control analyses. First, we analyzed the contributions of the covariates to the models. In particular, we compared our main results with control models in which we removed the covariates, leading to only two steps of hierarchical computation: the first step including the three investigated mindfulness scores and the second step adding the interaction terms. Second, we compared the results obtained with the models including the two FFMQ acceptance scores (main analysis) to models including a single acceptance score as the sum of nonjudgment and nonreacting.

All data are available at the Open Science Framework (https://osf.io/bknda/?view_only=ec11b45df8c446749d2291b89782cfa2).

RESULTS

To check for a common method bias, we conducted a single-factor exploratory factor analysis (EFA) overall the items from all scales and computed the variance explained by such factor. As the proportion of variance explained was about 23%, that is less than the critical threshold of 50%, we can exclude that our results were affected by CMB. The correlation matrix procedure also confirmed the absence of CMB, as all the correlation coefficients (Table 1) between our variables were less than the threshold value of .90.

Table 1 reports the correlation coefficients between each pair of variables, plus the mean and SD values of each score. Regarding covariates, sex and meditation experience were both positively correlated with the observing score of the FFMQ. Sex was also correlated with some ill-being scales, that is stress, anxiety, PSQI, and VDAS. Age was not correlated with any other variable. Regarding mindfulness-related scores, observing was positively correlated only with three ill-being variables (anxiety, PSQI, and VDAS). On the contrary, nonjudging and nonreacting were both negatively correlated with all distress and sleep disturbances scores and positively correlated with both well-being scores. Lastly, nonreacting and nonjudging were positively correlated with each other. All the scales about distress were strongly and positively correlated among each other. The same was true for the scales of sleep disturbance, and those of well-being. Moreover, distress measures were strongly positively correlated with those of sleep disturbance, and both of these were negatively correlated with well-being scales.

INSERT TABLE 1 ABOUT HERE

Regarding hierarchical regression, Table 2 reports the regression coefficients for the regressors added at each step as *b* along with their 95% confidence intervals for the regression models with non-acceptable linear assumptions, for all hierarchical regression steps. Table 2 also reports the effect size of each coefficient in terms of semi-partial correlation. In supplementary material (table S1), we provide a table reporting statistics and coefficients for all the variables included in each model, along with the results of the assumption tests.

INSERT TABLE 2 ABOUT HERE

In step 1 of hierarchical regression, we included in the model only the covariates that showed a significant correlation with at least a predictor or a dependent variable, i.e. sex and meditation expertise. Meditation expertise did not show any significant effect, whereas sex had a significant effect on anxiety, stress, DASS total, PSQI, and VDAS. For all these scales, female sex predicted increased psychological distress and sleep disturbances.

In the second step of hierarchical regression, we added to the model the mindfulness variables considered in MAT: monitoring (measured as the observing facet of FFMQ) and acceptance (measured as the nonjudging and nonreacting facets of FFMQ). Observing showed a significant effect on DASS total, PSQI, and VDAS. Nonjudging and nonreacting showed significant effects on almost all the measured dependent variables. In particular, both nonjudging and nonreacting were significant regressors of all the DASS scores, PSS, PSQI and VDAS, and SWL. Nonjudging showed also a significant positive effect on SHS. Step 2 was better than step 1 in terms of R^2 for all the dependent variables considered here, as showed by significant ΔR^2 ranging from .13 to .36. Hence, adding the mindfulness scores in the models significantly increased their fit to the data.

In the third and last step, we also added the interaction between observing and each of the two acceptance variables. Adding such interactions did not significantly increment R^2 scores for any of the considered dependent variables (all $\Delta R^2 < .03$), and none of the interactions was significant at $p < .05$. However, the interaction observing x nonjudging was close to significance in the models including PSQI ($p = .09$) and VDAS ($p = .08$). So, we decided to probe these relationships through slope analysis. The analysis showed that the effect of observing on PSQI was significant for low and average scores of nonjudging ($\theta_{X\rightarrow Y}$(nonjudging = -7.01) = 0.19: $p < .01$; $\theta_{X\rightarrow Y}$(nonjudging = 1.00) = 0.11: $p < .05$), but not for high scores ($\theta_{X\rightarrow Y}$(nonjudging = 6.99) = 0.05: $p = .35$). The Johnson-Neyman analysis confirmed that the relationship between observing and PSQI was positive and significant only when nonjudging was less than 2.95. As we dealt with cross-sectional data, we could not infer the direction of the interaction, and so we also assessed the moderation in the opposite direction, i.e. observing as a moderator of acceptance. In this case, we found that the effect of nonjudging on PSQI was significant only for high and average scores of observing ($\theta_{X\rightarrow Y}$(observing = 5.77) = -0.14: $p < .05$; $\theta_{X\rightarrow Y}$(observing = -0.22) = -0.08: $p < .05$), but not for low scores ($\theta_{X\rightarrow Y}$(observing = -5.22) = -0.03: $p = 0.51$). The Johnson-Neyman analysis confirmed that the relationship between nonjudging and PSQI was negative and significant only when observing was higher than -1.19. Probing the interaction on VDAS, we found that the relationship between observing and VDAS was significant and positive only when nonjudging was low or average ($\theta_{X\rightarrow Y}$(nonjudging = -7.01) = 0.46: $p < .01$; $\theta_{X\rightarrow Y}$(nonjudging = 1.00) = 0.27: $p < .05$), but not when nonjudging was high ($\theta_{X\rightarrow Y}$(nonjudging = 6.99) = 0.12: $p = .39$). In particular, the relationship between observing and VDAS was significant only when nonjudging was lower than 2.80, as revealed by the Johnson-Neyman analysis. Probing the opposite moderation effect (observing as the moderator of nonjudging) showed that the relationship between nonjudging and VDAS was significant and negative only when observing was high or average ($\theta_{X\rightarrow Y}$(observing = 5.77) = -0.37: $p < .01$; $\theta_{X\rightarrow Y}$(observing = -0.22) = -0.22: $p < .05$), but not when observing was low ($\theta_{X\rightarrow Y}$(observing = -5.22) = -0.10: $p = .33$). The Johnson-Neyman analysis indicated that the relationship between nonjudging and VDAS was significant when observing was higher than -2.47. Of note, even in the case of PSQI and VDAS variables, introducing the interaction terms did not significantly change any of the model fit indexes, with comparable R^2 to step 2.

First control analysis: covariates influence the monitoring's effect

As a control, we compared our main regression models to the models in which we removed the covariates from the pool of predictor variables. Thus, we obtained hierarchical models with two steps: the first with the mindfulness scores as predictors (step 1), and the second including the interaction terms (step 2). The only significant difference between these models and the ones with the covariates is that in this case observing resulted also as a significant predictor of anxiety and SHS, with main effects of $b = 0.12$ and $b = 0.03$, respectively, and nonreacting was also a significant predictor of SHS, $b = 0.03$. Also in this control condition, no moderation term was significant at $p < .05$.

Second control analysis: single acceptance score as a predictor of ill- and well-being

For this second control analysis, we computed a single acceptance score as the sum of nonreacting and nonjudging and used it in the hierarchical regression models instead of the two separate FFMQ facets. The single acceptance score was a significant predictor for all our ill- and well-being score, with coefficients in the expected direction (predicting higher well-being scores and lower ill-being scores). Using a single score instead of two separated facets did not change the results at step 3, in which we added the moderation term observing x acceptance. In fact, the interaction term did not reach significance for any outcome variables (as in the main analysis, the interactions were close to significance for both PSQI, $p = .06$, and VDAS, $p = .08$).

DISCUSSION

In this study, we used cross-sectional data from a sample of the general population to test the main predictions of the Monitor and Acceptance Theory (or MAT: Lindsay & Creswell, 2017) about the relationship between monitoring and affective reactivity (tenet 1b), and the modulatory effect of acceptance on such a relationship (tenet 2b). In particular, we tested the effects of monitoring, acceptance, and their interactions on a set of psychological and affective scales through hierarchical regression analysis. Our results showed that, out of the 9 tested variables, only 3 were significantly affected by monitoring, all in a pejorative way (higher monitoring corresponded to higher ill-being values). On the other hand, acceptance affected *all* the tested variables in an ameliorative way (higher acceptance always corresponded to lower ill-being values and to higher well-being values). Furthermore, adding the interactions between acceptance and monitoring did not improve any of the fits of the models and no significant interaction was found. These results are mostly in contrast with the two tested MAT tenets. Rather, they do strongly support the alternative account according to which the beneficial effects of mindfulness depend, for the most part, by acceptance alone. In the rest of this section we discuss the results with respect to the two tested MAT tenets and the general theory about the benefits of mindfulness.

Tenet 1b test

MAT's tenet 1b stated that monitoring would increase affective reactivity to both negative and positive experiences, thus increasing both psychological symptoms and well-being. Tenet 1b was only very partially confirmed in our sample: monitoring predicted only a 3 out of 7 measures of ill-being (DASS total score and the two variables related to sleep disturbances, i.e. PSQI and VDAS score) while it did not predict the other 4 (anxiety, depression, and the two stress scores of PSS and DASS), nor it predicted any of the two well-being variables (SWL and SHS).

Our results are in line with some previous MAT-related studies, where monitoring related with some negative psychological outcome measures (e.g. Barnes & Lynn, 2010; Bravo et al., 2018; Curtiss et al., 2017; Desrosiers et al., 2014; Hamill et al., 2015; Kimmes et al., 2017; Lau et al., 2018; Peters et al., 2013). However, in other studies monitoring related to both positive and negative outcomes (e.g. Sahdra et al., 2017), only with positive outcomes (e.g. Cristopher & Gilbert, 2010), or neither with positive nor with negative psychological outcomes (e.g. Eisenlohr-Moul et al., 2012; Tomfohr et al., 2015). A possible explanation of these inconsistencies is that the relationship between monitoring and psychological outcomes may depend on symptom and/or population. In line with this view, the recent meta-analysis by Carpenter and colleagues (Carpenter et al., 2019) showed that the observing facet did not correlate with psychological symptoms in general but that there were some correlations for some symptoms (e.g. anxiety) and for some populations (e.g. students).

Another important aspect to consider is that only a few of the studies investigating MAT controlled for covariates in regression analysis (Hamill et al., 2015; Lau et al., 2018; Tomfohr et al., 2015) while most of them did not. Our control models showed that covariates, and sex in particular, can indeed affect regression results, as removing sex from the models made observing a significant predictor of other two variables, namely anxiety and SHS. This evidence is in accordance with previous findings showing that sex correlates to many psychological variables like stress (Crawford & Henry, 2003; Norton, 2007), sleep disturbances (Buysse et al., 2008; Madrid-Valero, Martínez-Selva, Ribeiro do Couto, Sánchez-Romera, & Ordoñana, 2017) dream anxiety (Simor, Köteles, Sándor, Petke, & Bódizs, 2011), life satisfaction (Hong & Giannakopoulos, 2011; Tomás, Gutiérrez, Sancho, & Romero, 2015) and psychological well-being (Mizoguchi et al., 2000). Hence, it is possible that the lack of controlling for sex in many previous MAT studies led to an overestimation of the role of observing on psychological outcomes.

Based on our results, the reviewed literature, and methodological considerations, we contend that *future research testing of tenet 1b should use regression analysis that includes all the relevant mindfulness facets (when using the FFMQ, the observing, nonjudging, and nonreacting scales) while controlling for the covariates that could alter the effects of observing on psychological outcome measures (in particular, sex).* Only if more studies will be conducted with a higher methodological rigor it will be possible to run a meta-analysis on regression results for assessing whether observing is indeed a predictor of ill- or well-being variables, or both.

Tenet 2b test

According to MAT's tenet 2b, acceptance should moderate the effects of attention monitoring so that high monitoring paired with high acceptance should lead to better outcomes. In our sample, none of the 18 interactions between monitoring and acceptance (9 variables times 2 acceptance measures, i.e. nonjudging and nonreacting) reached statistical significance at $p < .05$, nor adding any of the interactions improved any of the models' fits. The same happened in the control models that used a general acceptance score computed as the sum of the two scales. Nonetheless, we decided to probe through simple slope and Johnson-Neyman analysis the two interactions (between nonjudging and observing) that were close to significance, i.e. on the two sleep disturbance variables PSQI and VDAS. We found that the detrimental effect of monitoring on these variables was significant only at low and medium levels of acceptance (nonjudgment), but not at high levels. Anyway, even in these cases, high acceptance only (partially) protected from the detrimental effects of monitoring on these variables. In none condition it was found that monitoring and acceptance together led to less disturbances. Hence, our data clearly disconfirm tenet 2b.

Our results are consistent with most previous studies, in which it was found that the moderatory effect of acceptance (when present) only protects against the negative effects of monitoring rather than leading to better psychological conditions (e.g. Krafft et al., 2017). However, it must be noted that the other studies that reported such a moderatory effect involved the scale nonreacting, while they found no effect for nonjudging (Barnes & Lynn, 2010; Eisenlohr-Moul et al., 2012) or did not test nonjudging at all (Curtiss et al., 2017; Desrosiers et al., 2014; Lau et al., 2018). Thus, in this respect our results seem more in line with LPA-based studies, in which the critical mindfulness factor for determining a better psychological condition was nonjudging (e.g. Pearson et al., 2015).

Even in this case, we contend that, if both nonjudging and nonreacting are to be considered as measures of acceptance, *future research using the FFMQ should test tenet 2b by means of moderation analysis including the interaction terms for both nonreacting x observing and nonjudging x observing, while controlling for all the relevant mindfulness facets (i.e. observing, nonjudging, and nonreacting scales of the FFMQ), and for the covariates that could alter their effects (in particular, sex)*. Even in this case, running a meta-analysis to assess which, if any, of the two acceptance facets actually moderates the relationship between monitoring and psychological variables would be very interesting but it would require more methodological accuracy and consistency between studies.

An alternative theory: acceptance as the most important mindfulness mechanism

While our data do not support MAT, they strongly support the hypothesis that most benefits of mindfulness depend on acceptance alone, a hypothesis that MAT authors considered as an "alternative" and a "challenge" to MAT (in particular, to tenet 2). Indeed, both acceptance measures (nonjudging and nonreacting) predicted all our dependent variables, with the only exception being that nonjudging did not predict the PSQI. Moreover, all the effects were in the expected directions, that is, the two acceptance variables predicted lower values of distress and sleep disturbance measures and higher values of the two well-being measures (see also Baer et al., 2006). Furthermore, the effects of these two variables were generally

higher with respect to the effects of the monitoring variable (observing). Also the control condition with a single acceptance score led to the same results, i.e., higher acceptance always predicted lower ill-being and higher well-being. These results strongly support the view that the beneficial effects of mindfulness on affective outcomes depend on acceptance alone.

This view is further supported by the fact that, as discussed above, acceptance in general did not moderate the effects of monitoring and that, when acceptance did influence the effects of monitoring, it just had a protective role (i.e. with high acceptance, having high monitoring was not too deleterious).

Given that an interaction might in principle depend on one variable moderating the other or viceversa, we also probed the interactions observing x nonjudging on the two sleep disturbance measures in the other direction, i.e. as monitoring moderating the effect of nonjudging. In this case we found that nonjudgement predicted decreases in sleep disturbances when observing was medium or high but not when it was low. A possible explanation of this result might depend on the fact that judging or nonjudging something seems to presuppose one's awareness of the thing that is to be judged (or nonjudged). Hence, if too little attention is given to one's experiences (corresponding to low observing), one's nonjudging tendency does not exert its positive benefits. Interestingly, this explanation is in accordance with the fact that, of the two acceptance measures, the (weak) interactions on sleep disturbances was found for nonjudging but not for nonreacting: while judging (or nonjudging) seems to require some awareness of experiences, reacting (or nonreacting) seems a process that can be completely unconscious.

The view that the beneficial effects of mindfulness depend on the most part on acceptance alone is in line with the substantial literature, acknowledged also by Lindsay and Cresswell (2017), that demonstrated the association of acceptance alone with many beneficial outcomes, including lower stress, depression, and anxiety (Cash & Whittingham, 2010; Hamill et al., 2015), lower post-traumatic stress symptoms (Vujanovic, Youngwirth, Johnson, & Zvolensky, 2009; Wahbeh, Lu, & Oken, 2011), and lower worry, rumination, and negative bias (Fisak & von Lehe, 2012; Paul, Stanton, Greeson, Smoski, & Wang, 2013).

Other correlational data using another mindfulness questionnaire, i.e. the Philadelphia Mindfulness Scale (PHLMS), which divides mindfulness in only the two components of awareness (monitoring) and acceptance, support the view that it is mainly acceptance that matters for psychological well-being. Indeed, Cardaciotto et al. (2008) reported that, while the awareness subscale was not related to any measure of psychopathology or well-being, the acceptance subscale correlated negatively with depression and anxiety in a non-clinical student sample; it was also found that acceptance correlated negatively with depression, anxiety, and hopelessness, and positively with happiness and quality of life, in a sample of outpatients of a student counseling center. Similarly, in a study with a sample of Chinese Buddhists that used a revised version of the PHLMS with improved psychometric properties, Zeng, Li, Zhang, and Liu (2014) reported that the acceptance subscale was correlated (in the appropriate directions) with both negative affect and life satisfaction, while the awareness subscale was not.

Even the recent dismantling experimental investigations are more consistent with the alternative acceptance account highlighted here then with MAT itself. In a series of randomized controlled trials involving mindfulness interventions, MAT's proponents and colleagues compared training in only monitoring and training in both monitoring and acceptance with various control conditions on a number of psychological and physical outcomes including mind wondering (Rahl, Lindsay, Pacilio, Brown, & David Creswell, 2017), cortisol and blood pressure reactivity to a stressor (Lindsay, Young, Smyth, Brown, & Creswell, 2018), positive and negative affect (Lindsay, Chin, et al., 2018), and loneliness and social contact (Lindsay, Young, Brown, Smyth, & Creswell, 2019). Compatibly with both MAT and the alternative acceptance hypothesis, in all these studies the monitoring+acceptance condition resulted in the most favorable outcomes. However, in all these studies the monitoring only condition produced results that did not differ from the control condition. This is in contrast with MAT tenet 1b, according to which monitoring training should increase affective reactivity. This seems to further support the view that the psychological benefits of mindfulness depend on acceptance, while monitoring does not play any major role. Of course, since none of these experiments included an acceptance-only condition, the possibility that monitoring is also important cannot be completely ruled out. However, the dismantling experiment on pain tolerance by Wang et al. (2019) did include also an acceptance only condition. Even in this case, the results do not support any of the two discussed MAT tenets. While tenet 1b would predict that attention monitoring alone would enhance affective reactivity and hence lead to less pain endurance and tolerance, the attention-only condition led to no significant change, just as the control condition. And while tenet 2b would predict that attention monitoring plus acceptance would lead to the best outcome (i.e. higher pain tolerance), both the conditions including acceptance (attention+acceptance and acceptance-only) led to increases in pain endurance and tolerance; moreover, only the acceptance-only condition is reported to lead to more pain endurance and tolerance than the attention-only and the control condition while the attention+acceptance condition is not. Hence, rather than leading to the best outcome, the combination of attention and acceptance seems to be not as beneficial as acceptance alone. Hence, these results clearly support the alternative hypothesis according to which the benefits of mindfulness depend on acceptance.

It is important to emphasize that we are not completely dismissing the importance of attention monitoring, which is a fundamental part of most mindfulness trainings. What our data and the current literature seem to show is rather that the psycho-physical beneficial effects of mindfulness depend for the most part on acceptance. However, attention monitoring may plausibly still play a role as an ancillary capacity that may be useful for the development of acceptance itself. A hint in this direction comes from our analysis of the interaction between monitoring (observing) and acceptance (nonjudging) with respect to the two sleep disturbance measures. Our data showed that in both cases acceptance predicted less disturbance only when monitoring was medium or high but not when it was low. This may be interpreted as the need for a minimum amount of monitoring for acceptance to express its benefits.

The view that acceptance is the key to well-being seems also to be in line with the Buddhist tradition that is at the root of the modern mindfulness movement. According to Buddha's second noble truth, "*dukkha"*, which usually translated with "suffering", depends on "*tanha"*, which is usually translated with "craving" and stands for the urge to grasp or hold something rewarding and to push away something that is not liked (Teasdale & Chaskalson (Kulananda), 2011). And according to the third noble truth, suffering can cease as soon as *tanha* is extinguished, that is as soon as we stop craving reality to be the way we want it to be. This is just what acceptance is: letting things be just as they are. Hence, our findings, together with the current literature, seem to support the original Buddhist theory: trough acceptance it is possible to decrease psychological ill-being and increase well-being.

Limitations and Future Research

Our study had a cross-sectional design and thus causal relationships can only be considered with caution. We chose this design because it is simple to implement, allows rapidly collecting a considerable amount of data, and, most importantly, was the design used by most of the articles through which MAT theory was developed and tested. Since the aim was to compare our results with the previous ones, we decided to employ the same study design. However, experimental research might provide stronger evidence about the causal relationships between mindfulness aspects and psychological or physical outcomes. In this respect, the approach of Wang et al. (2019), which compares four conditions (attention-only, acceptance-only, attention+acceptance, and control) seems the most promising, but it involved only a short one-session training. An interesting challenge for future research will be to try and design a mindfulness based multi-session intervention which trains only acceptance just as the one designed by Lindsay and colleagues (e.g. Lindsay, Chin, et al., 2018) which trained only attention.

Another interesting possibility would be to investigate these issues through ecological momentary assessment studies (Shiffman, Stone, & Hufford, 2008) where psychological states, including attention, acceptance and other psychological variables are repeatedly sampled in subjects's natural environments (e.g. through smartphones). This may lead to a more ecologically valid assessment of the relationships between the two discussed mindfulness aspects and psychological outcomes.

Another limitation of the present study is related to the measurement tool used for assessing mindfulness. We used the FFMQ because it is by far the most widely adopted, in particular in research dealing with the MAT theory. However, this questionnaire includes two distinct measure of acceptance (nonjudging and nonreacting), which can be a source of confusion. On note, our control analysis showed that using a single score for acceptance (as the sum of nonjudging and nonreacting) did not lead to different results. Anyway, future research testing the roles of attention and acceptance in psychological ill- and well-being may benefit from using another tool like the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008), which includes only two scales: one for acceptance and the other for awareness, which can be assimilated to attention monitoring.

A final limitation of our study, which is shared by the vast majority of the relevant literature, is the exclusive use of self-report questionnaires, in particular regarding mindfulness components. In this respect, a major challenge for future research is to develop alternative methods for assessing the investigated factors, including behavioral ones. In particular, developing behavioral assessment of mindfulness facets (see Hadash & Bernstein, 2019) instead of using only self-report measures would greatly increase our capacity of rigorously testing mindfulness theories.

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Author Contributions

LS: designed and executed the study, analyzed the data, and wrote the paper. AR collaborated in the design of the study and in finalizing the manuscript. MM analyzed the data and wrote the paper. All authors approved the final manuscript.

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Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical approval for this study was granted by the Research Ethics Board of Sapienza, University of Rome.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

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