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**Mindfulness meditation experiences of novice practitioners in an online intervention:
Trajectories, predictors, and challenges**

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Abstract

Background. The benefits of mindfulness interventions are well-known, but their challenges and individual differences in reactions to these challenges are much less clear. **Methods.** The study used a mixed-methods design to investigate the individual trajectories of daily experiences during meditation in a sample of novice volunteers participating in a three-week, distance-based, guided meditation intervention ($N = 175$). **Results.** Multilevel modelling revealed individual differences in the change trajectories of the experiences of effort, meaning, and boredom during meditation, indicating that meditation gradually became less effortful, less boring, more interesting, and more important over the three weeks. The individual differences in the levels of these experiences and their change trends were associated with baseline differences in well-being, reflective processes, self-management, and self-control skills, as well as autonomous motivation to engage in the course. **Conclusions.** Individuals who are initially more autonomous and mindful find it easier to engage with online mindfulness interventions and draw more benefits from the process, whereas those with lower self-regulation skills or higher proneness to rumination are more likely to experience mindfulness as effortful and boring, and, eventually, to give it up.

Practitioner points

- Online mindfulness interventions may be experienced as overly difficult and/or boring by individuals with lower trait autonomy, reflection, self-regulation, and self-control.
- There are vast individual differences in the preferences for the format, structure, duration, and content of daily online meditation sessions.
- 'One-size-fits-all' online mindfulness interventions are less likely to be productive than those tailored to individual differences in relevant skills and preferences.

Keywords: guided meditation, distance-based intervention, activity-related experiences, optimal experience, autonomous functioning, Self-Determination Theory

Introduction

The notion of mindfulness

The concept of mindfulness is relatively new in psychology. Inspired by the new-age interest in Eastern spiritual practices, a whole range of secular mindfulness interventions have been developed in the West since the 1970s. Despite its short history, mindfulness research is a rapidly growing field with nearly 20,000 published papers as of 2021, according to Scopus.

Mindfulness is easily misunderstood. The term “mindfulness” is currently used to denote a mental state, a mental process, a disposition, a skill, or a practice (Keng et al., 2011). Its various definitions share three key characteristics: awareness, focus on the present moment, and a non-critical, accepting attitude (Siegel et al., 2009). Instead of avoiding or escaping unpleasant experience, mindfulness involves openness to all kinds of stimuli, regardless of their valence, and uncritical acceptance of all subjective experiences, however painful they might be.

The existing conceptions of mindfulness vary in their positions concerning the role of motivation and volition: some emphasize the purposeful self-regulation of attention (e.g. Kabat-Zinn, 1990), whereas others focus mainly on the characteristics of the resulting state of mind, such as attention and awareness (e.g. Brown & Ryan, 2003). This diversity may reflect the differences in the importance ascribed to the voluntary concentration of attention in traditional practices, such as Samatha and Vipassana (Chiesa, 2013).

Traditional and online mindfulness interventions

Studies of mindfulness interventions reveal a whole range of benefits (Keng et al., 2011; Cresswell, 2017), including cognitive and affective outcomes such as better attention, memory, and problem-solving performance, and reduction of rumination, anxiety, and depressive symptoms, as well as general mental and physical health outcomes, such as reduction of chronic pain, addictive behaviors, improved immune status, relationship satisfaction, etc.

These effects are generally moderate in magnitude ($\bar{r} = .26$), showing substantial variance across intervention types, treatment durations, and assessed outcomes (Sedlmeier et al., 2012). Unsurprisingly, stronger effects are obtained for traditional manual-based interventions involving class sessions, instructor guidance, and larger doses and duration of practice, such as mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive

therapy (MBCT) (Cresswell, 2017). Nevertheless, the limited meta-analytic evidence existing to date indicates that online versions of these mindfulness interventions may have comparable effects on depression, anxiety, stress, well-being, and mindfulness (Spijkerman et al., 2016). Another meta-analytic study (Blanck et al., 2018) has revealed significant effects of isolated mindfulness exercises on anxiety and depression. Both studies suggest that interventions including instructor guidance, either in a face-to-face or in an online format, are more effective than self-administered online ones.

Despite their weaker efficacy, online self-administered mindfulness interventions have important advantages over the more traditional intervention formats, including lower cost, easier accessibility, and flexibility with respect to time, place, and dosage of practice. These advantages contribute to the vast popularity of smartphone apps offering self-administered mindfulness sessions, such as Calm and Headspace, with 100 million and 65 million downloads in 2020 respectively (Soko Media, n.d.). A recent meta-analysis of 34 RCTs of application-based interventions indicates small to moderate effects on anxiety, stress, and psychological well-being, although the evidence remains limited to date (Gál et al., 2021).

The main challenge faced by unsupervised mindfulness interventions is low retention. The reported attrition rates in app-based online mindfulness meditation intervention groups are up to 77% (with a mean of 42%) (Gál et al., 2021). More strikingly, the number of subscribers to mindfulness apps is less than 5% of the number of downloads (Soko Media, n.d.). These data suggest that online mindfulness interventions may involve specific challenges and may not be equally effective or easy to engage with for everyone.

Individual differences in mindfulness outcomes

Mindfulness interventions may be seen as effortful and challenging due to their high cognitive costs and potentially uncomfortable emotional involved (Cresswell, 2017). However, the issues of individual differences in mindfulness intervention effects and adherence have only attracted limited research attention.

Studies focused on symptom outcomes suggest that mindfulness interventions are more beneficial for individuals with higher symptom severity and lower distress tolerance (Gawrysiak et al., 2016; Spijkerman et al., 2016; Roos et al., 2017; Van der Gucht et al., 2017; Fung et al.,

2019; Kingston et al., 2020). However, some studies focused on self-regulatory and attentional outcomes show that individuals with *lower* baseline depression and attentional problem severity show more improvement (Gould et al., 2012; Fung et al., 2019). Neuroticism was associated with a stronger (DeVibe et al., 2015) or delayed (Nyklíček & Irmischer, 2017) response to mindfulness practice. Research into the moderation effects of baseline trait mindfulness has produced contradictory findings (Shapiro et al., 2011; DeVibe et al., 2015; Greeson et al., 2015; Kappen, Karremans, & Burk, 2019).

Recently, researchers have used intensive longitudinal data to explore individual differences in the trajectories of change in affect, stress, and mindfulness outcomes during mindfulness training (Kiken et al., 2015; Snippe et al., 2015; Snippe et al., 2017; Andreotti et al., 2018). In the two studies linking these trajectories to other variables, the individual slopes reflecting changes in state mindfulness predicted the subsequent changes in trait mindfulness, psychological distress, and affect, but were not associated with baseline mindfulness, affect, and distress levels (Kiken et al., 2015; Snippe et al., 2015).

Studies with a specific focus on adherence indicate that predictors of attrition from mindfulness interventions include younger age, higher cognitive reactivity to negative affect, higher rumination, and worry (Crane & Williams, 2010; Banerjee et al., 2018). Adherence and intention to practice are associated with beliefs about the usefulness of meditation practice, outcome expectations, and one's perceived ability to engage in mindfulness meditation (Russ et al., 2017; Beattie et al., 2020). Studies using personality traits typically find that attrition and perceived barriers to meditation are predicted by higher neuroticism, as well as lower openness and lower cognitive flexibility (Stanley et al., 2011; Williams et al., 2012).

Qualitative interview studies indicate that the most frequently reported barriers to meditation include negative emotional experiences and thoughts, difficulties associated with the length of mindfulness practice, and difficulties maintaining regular practice and fitting it into one's daily routines (Laurie & Blandford, 2016; Banerjee et al., 2017). In turn, engagement with meditation is fostered by the positive experiences of one's ongoing progress (Lomas et al., 2014; Banerjee et al., 2017).

The existing evidence discussed above indicates a large diversity in the individual experiences and outcomes of mindfulness practices. But why do these practices appear to be easy for some individuals, but overly difficult for others? Adopting a developmental perspective on mindfulness may help to approach this issue.

Mindfulness and the development of self-regulation

According to Kabat-Zinn (1990), mindfulness is something that is cultivated over time in a lengthy process of growth and learning. What exactly is being cultivated? From a functional point of view, mindfulness can be seen as a reflective mode of self-regulation. In this mode, one is open to both the ongoing experience and to a holistic self-representation, which allows one to process the options with regard to their compatibility with the self (Brown & Ryan, 2003). Within Self-Determination Theory (Ryan & Deci, 2017) and Kuhl's Personality Systems Interaction Theory (Kazen & Quirin, 2018), conscious reflection is seen as a more flexible form of self-management, involving deliberation and autonomous self-regulation, as opposed to controlling or pressuring oneself.

However, autonomous processing is also a more complex, resource-demanding, and developmentally advanced mode of functioning that emerges relatively late in ontogenesis (Loevinger, 1976). There is evidence indicating a higher prevalence of deliberate attentional practices, reflective states, and dispositions at more advanced stages of adult development (Joiner, 2011; Kostenko & Leontiev, 2016; Ishanov, Osin, Kostenko, 2018). This developmental perspective allows us to predict the individual differences in the experiences of mindfulness and in the effects of mindfulness practices using Vygotsky's concept of the "zone of proximal development" (Gredler, 2009): individuals with lower self-management skills at baseline may experience mindfulness as more challenging, exhibit more shallow learning curves, and may require more structure and support in order to remain engaged. In short, "mindfulness facilitates successful self-regulation and vice versa" (Masicampo & Baumeister, 2007, p. 256).

Mindfulness and optimal experience

The individual differences in mastering mindfulness skills can be most readily evident in immediate subjective experiences that arise during mindfulness practice and reflect the quality of the process. The concept of optimal experience was proposed by Csikszentmihalyi (1990),

who described flow as an experience of acute and continuous enjoyment coupled with an intense, but subjectively effortless concentration on the task at hand, merging of action and awareness, loss of self-consciousness, and altered sense of time. The original model of flow is difficult to apply in the context of mindfulness, where attention may not be completely effortless at all times (but, rather, may become “post-voluntary”: see Dormashev, 2010), self-awareness is not completely lost (Sheldon, Prentice, Halusic, 2015), and the process is dependent on the perceived meaning of practice (Kabat-Zinn, 1990).

Based on their awareness of these limitations of the flow model, Leontiev (2016) in collaboration with Csikszentmihalyi and Nakamura has proposed a more parsimonious model postulating three criteria of an optimal activity: 1) active use of resources leading to success at achieving an outcome, 2) positive emotional state of pleasure or enjoyment, and 3) integration of the activity into personal meaning contexts. An activity meeting these three criteria is reflected in three subjective experiences—effort, pleasure, and meaning—whose combination is described as engagement or an optimal experience. The opposite of engagement is described as void, boredom or psychological entropy (Kubey & Csikszentmihalyi, 1990), when one’s mental resources are disengaged and one remains a passive object of processes one does not control.

This model of activity-related experiences (ARE) has been validated in the contexts of work, education, and leisure (Leontiev et al., 2018; Osin & Leontiev, 2017) with the findings showing that pleasure, meaning, and effort covary and are positively associated with activity performance and well-being outcomes, whereas void demonstrates an inverse pattern. In regression analyses, however, effort often failed to show any unique variance in predicting these positive outcomes, suggesting that optimal experience may only take place when effort is combined with pleasure and meaning and/or that optimal experience might be effortless for some individuals or at some time points. In the present study, we used the ARE model to investigate the change trajectories of mindfulness experiences in novice meditators.

The present study

The study was carried out as part of a two-study project that aimed to investigate the effects of mindfulness practice. The first study used a randomized wait-list control design with a

pre-test and a post-test and is published elsewhere (Osin & Turilina, 2020). The second study aimed to explore the intensive longitudinal data describing the daily meditation experiences of all the participants who completed the intervention either as part of the intervention group or after the wait-list period.

Aims and Hypotheses

The present study aimed to investigate: 1) the experiential trajectories reflecting the day-to-day dynamics of mindfulness meditation experiences in novice practitioners; 2) the individual variability in these trajectories; 3) the associations of individual trajectory parameters with baseline personality characteristics. We tested several hypotheses:

- 1) The day-to-day experiences of pleasure and meaning increase, whereas the experiences of effort and void decrease over the intervention period.
- 2) The subjective evaluation of success at meditating increases with time and is positively predicted by pleasure and meaning and negatively predicted by void.
- 3) There is significant individual variability in the parameters of regression of pleasure, meaning, effort, void, and self-evaluated success at meditation on time.
- 4) Individuals with higher baseline well-being, self-management skills, and autonomous motivation to practice are more likely to experience higher pleasure and meaning, as well as lower effort and void, during meditation.

Methods

Sample

We used data from a sample of anonymous Russian-speaking volunteers recruited in social networks to participate in an online study of the effects of mindfulness meditation ($N = 206$). For the present study, we combined daily meditation reports provided by participants from both groups ($N = 175$) during the intervention period with their pre-test scores. The data of 16 participants (9.14%) who either failed to complete the pre-test or used a different identifier could not be linked to their pre-test scores. The participants were mostly female (79.87%), aged between 18 and 67 ($M = 30.08$, $SD = 8.78$), and most had a university degree (76.52%) or were current university students (19.13%). They provided 1,834 daily meditation reports, ranging from

1 to 23 per participant ($M = 10.45$, $SD = 7.23$). Of those, 115 reports (6.27%) described days when a person failed to meditate.

Procedure

The participants were anonymous volunteers recruited in social networks. The research was carried out in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants. We invited adults interested in learning mindfulness meditation skills to join a free, three-week online course. Those who registered and provided their informed consent were randomly assigned to the intervention group or the wait-list group (due to start the course next month) and received a link to the pre-test questionnaire.

The structure of daily guided meditations followed the model of popular smartphone applications. Each meditation session began with a brief introduction discussing the place of mindfulness in everyday life and the goal of today's session. The course was modelled following the logic of Vipassana, proceeding from developing concentration skills by focusing on breath (Week 1) and body scanning (Week 2) to practicing mindful awareness of thoughts and emotions (Weeks 2 and 3). The course schedule is provided in the Online Supplement. The guided meditation sessions were recorded as audio files (mean duration, 12.8 minutes) by the second author, a practicing psychologist with several years of individual meditation experience. Every morning, the participants received an e-mail containing a link to the recording of the day's meditation session and a link to the daily report questionnaire. The e-mail was followed by a text message reminder. No individual coaching or feedback was provided, but the participants could contact the course leader by e-mail with their questions, problems, or suggestions.

Instruments

Daily Meditation Report, a brief, seven-item, self-report measure created for this study. It began with a screening item, "Have you managed to meditate today?", with three answer options, "Yes", "No", and "Somewhat" (those who answered "No" did not see the remaining items). This was followed by a brief ARE measure created by choosing one item with the highest factor loading ($\lambda > .70$) from the validated scale (Osin & Leontiev, 2017) and adapting it to the meditation context. The instructions ("Please evaluate whether each statement reflects your experience of today's meditation") were followed by one-item indicators of effort ("While

meditating, I felt that I was applying my efforts”), meaning (“The meditation was valuable and meaningful for me”), pleasure (“I was enjoying the process of meditation”), and void (“I felt that nothing was happening and was experiencing boredom”). These were rated using a Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). Next, a single-item indicator of success at meditation (“How would you evaluate the extent of your engagement in today’s meditation?”) with a semantic, differential-type response scale anchored by 1 (*Superficial: I have listened to the record formally but could not engage in meditation*) and 7 (*Very deep: I have really managed to concentrate and to complete the meditation task*). Finally, an open-ended item: “If you would like to share your experiences during the meditation or tell us about the difficulties you have faced, please describe them below”.

The pre-test questionnaire included several measures of baseline well-being, self-regulation skills, and motivation to practice meditation. All of these measures were previously validated in Russian. The internal consistency coefficients are given in Table 1.

Positive and Negative Affect Schedule (PANAS: Watson et al., 1988; Osin, 2012). Participants are asked to rate 20 adjectives reflecting their emotional states over the past two weeks and these are grouped into Positive Affect and Negative Affect scales.

Mental Health Continuum – Short Form (MHC-SF: Keyes, 2009; Osin & Leontiev, 2020) includes 14 items reflecting the experiences of emotional, social, and psychological well-being during the past month.

Comprehensive Relative Autonomy Index (C-RAI: Sheldon et al., 2017). For the present study, we formulated 18 items reflecting different reasons to take part in the meditation study, with three items for each of the six motivational regulation types described in Self-Determination Theory: intrinsic motivation, identified regulation, positive introjection, negative introjection, external regulation, and amotivation. The participants were asked to evaluate these reasons on a five-point scale. The continuum structure of the item set was validated using multidimensional scaling and used to derive the unweighted Relative Autonomy Index score reflecting the quality of motivation (i.e., a predominance of the autonomous motivational regulation types over the controlled ones) following the same procedure as used by Sheldon and colleagues.

Mindful Attention Awareness Scale (MAAS: Brown & Ryan, 2003; Mitina et al., 2021) includes 15 items reflecting the experiences and the consequences of mindful attention and awareness of the present.

Differential Test of Reflection (DTR: Leontiev & Osin, 2014) has 30 items measuring three dispositional types of reflective processes: Systemic Reflection (ability to self-distance and analyze oneself within situational contexts: sample item, “I learn something new about myself by analyzing my own actions”), Introspection (rumination, being unable to disengage from one’s negative feelings and experiences: “I am constantly thinking about my misfortunes”), and Quasi-Reflection (tendency to get absorbed by task-irrelevant thoughts: “I can sometimes daydream and forget about everything”).

Volitional Components Inventory – Short Version (VCI: Kuhl & Fuhrmann, 1998, 2004; Mitina & Rasskazova, 2019) includes 52 items operationalizing different components of self-regulation described by the PSI theory. For brevity, we only present results for the four secondary scales: Self-Regulation (the processes of self-determination, self-motivation, and self-soothing allowing one to maintain actions in line with one’s integrated self), Self-Control (cognitive and affective processes allowing one to maintain a commitment to one’s goals without anxiety), Volitional Development (action orientation, the processes supporting active and persistent goal pursuit), and Access to Self (access to and awareness of one’s feelings without being overwhelmed by them).

Brief Self-Control Scale (BSCS: Tangney, Baumeister, & Boone, 2004; Gordeeva et al., 2016), a 13-item scale measuring the ability to control one’s impulses and to delay gratification.

Data analysis

To separate the within-participant (Level 1, L1) and the between-participant (Level 2, L2) variance, we tested a series of multilevel models in Mplus 8.4. As a measure of time, we used the difference in days (integer) between the date of each report and the beginning of the course.

First, to investigate the dynamics of daily meditation experiences in the sample as a whole, we tested two random-intercept multilevel regression models (random effects ANCOVA). In the first model, the time variable was entered as an L1 predictor of within-individual daily

meditation outcomes. The L1 residual variances and the L2 variances of the dependent variables (DVs) were allowed to covary. In the second model, we added time squared as an L1 predictor to find out whether the trajectories of experiences could be better described by a quadratic function. We also used multilevel regression to investigate which of the indicators of optimal experience explain the subjective evaluation of engagement in meditation at the within and between-individual levels, controlling for time (L1).

Next, to investigate the individual differences in the dynamics of experiences associated with meditation, we tested a random coefficient regression model with random slopes of the five DVs on time. The estimates of slopes and intercepts were allowed to covary at the between-participant level. To reduce the error of individual slope estimates, we repeated the analysis using a subsample of individuals with data from at least three time points ($N = 141$). Next, we explored the correlations of the individual slope and intercept estimates derived from the model with the pre-test scores to find out whether the baseline individual differences can predict the change trajectories of experiences during meditation.

Finally, to gain more insight into the participants' experiences and challenges, we applied conventional content analysis (Hsieh & Shannon, 2005) to the open-ended item answers. The initial categories were derived independently by the two authors with expert agreement ranging across categories from 82.7% to 98.8% ($M = 91.3\%$). One answer could contain several codes; discrepancies in the coding were reconciled by the authors jointly.

Results

Dynamics of experiences

The within-level and the between-level correlations of the DVs are given in Table 1. The intraclass correlation coefficients for the DVs ranged from .38 to .55, indicating that a substantial proportion of variance could be attributed to individual differences. At the within-participant level, pleasure and meaning were positively associated with each other and negatively associated with effort and void. In line with Hypothesis 1, more successful meditation sessions were perceived as more pleasurable, more meaningful, less effortful, and less boring. With time, experiences of meaning and pleasure increased, whereas those of effort and void decreased.

At the between-participant level, meaning, pleasure, and boredom revealed strong and predictable associations with each other and with the engagement in meditation. Effort was not related to any of the other variables: the individuals who enjoyed the process of meditation and were fully immersed in it may or may not have experienced it as effortful. The participants who provided a larger number of daily reports experienced, on average, higher levels of meaning and lower levels of void and effort during the meditation sessions.

(Table 1 about here)

We proceeded by testing three random intercept models describing the average dynamics of daily individual experiences as a function of time. The detailed parameters of these models are presented in the Online Supplement (Table SI.2). In the first model (1), all the linear effects of time on the DVs were statistically significant ($p < .001$), indicating that pleasure ($\beta = .12$), meaning ($\beta = .27$), and engagement in meditation ($\beta = .20$) increased with time, whereas boredom ($\beta = -.13$) and effort ($\beta = -.21$) decreased. The addition of quadratic terms allowing for non-linear dynamics improved the fit of the model (Wald test: $\chi^2(5) = 25.28, p < .001$). The resulting model (2a) performed better according to the AIC and the Sample-Adjusted BIC, but not to the BIC, which favors model parsimony. However, the regression coefficient of the quadratic term was only significant for meaning, indicating a faster increase during the first week of the intervention. When we excluded the non-significant quadratic terms, the model (2b) fitted the data quite well ($\chi^2(4) = 2.99, p = .56$). The average change trajectories derived from this model are in line with Hypothesis 1 and are presented in Figure 1.

(Figure 1 about here)

To investigate the relative contribution of different experiential parameters to the overall subjective evaluation of engagement in meditation, we tested a two-level regression model. At the within-participant level, all four components of optimal experience emerged as significant predictors, explaining 50% of the variance in engagement. In line with Hypothesis 2, the meditation sessions perceived as more engaging involved more pleasure ($\beta = .29, 95\% \text{ CI } [.22, .37], p < .001$), more meaning ($\beta = .24, 95\% \text{ CI } [.18, .30], p < .001$), less boredom ($\beta = -.23, 95\% \text{ CI } [-.28, -.17], p < .001$), and less perceived effort ($\beta = -.14, 95\% \text{ CI } [-.21, -.07], p < .001$). The effect of time was not significant ($\beta = .04, 95\% \text{ CI } [-.01, .10], p = .11$).

At the between-participant level, the four experiences explained 43% of the variance in engagement in meditation. Meaning was by far the strongest predictor ($\beta = .85$, 95% *CI* [.47, 1.00], $p < .001$), followed by void ($\beta = .39$, 95% *CI* [.11, .66], $p < .001$) and effort ($\beta = -.20$, 95% *CI* [-.37, -.03], $p < .05$). The effect of pleasure was not significant ($\beta = .03$, 95% *CI* [-.32, .38], $p = .87$). This pattern differed from our theoretical expectations (Hypothesis 2).

Individual differences

The model with random slopes (4) allowing for individual differences in the change trajectories of meditation experiences explained the full sample data better than the random intercept model (1), based on the information criteria (again, except for the BIC). The parameters of the model were quite similar for the full sample and for the subsample of participants with three or more time points (see the Online Supplement SI.3).

The intercept estimates ($p < .001$) indicated relatively high levels of pleasure ($\gamma_{00} = 4.89$), meaning ($\gamma_{00} = 4.69$), effort ($\gamma_{00} = 4.66$), and engagement ($\gamma_{00} = 4.25$) combined with a low level of void ($\gamma_{00} = 2.75$). The intercept variance estimates were statistically significant for all the DVs ($\sigma^2_{u0j} = .64$ to 1.06 , $p < .001$), indicating reliable individual differences in the average levels of these experiences throughout the intervention.

The mean slope estimates were also statistically significant for the five DVs ($p < .001$, for void, $p = .010$), indicating that the scores on all these variables were, on average, likely to change during the intervention. The coefficients were stronger for meaning ($\gamma_{10} = .038$), effort ($\gamma_{10} = -.036$), and engagement ($\gamma_{10} = .027$) than for pleasure ($\gamma_{10} = .017$) and void ($\gamma_{10} = -.017$). The slope variance estimates were significant and most pronounced for effort ($\sigma^2_{u1j} = .003$, $p < .001$), followed by void ($\sigma^2_{u1j} = .002$, $p = .002$), meaning ($\sigma^2_{u1j} = .001$, $p = .003$), and engagement ($\sigma^2_{u1j} = .001$, $p = .008$), indicating individual differences in the trajectories of these experiences, in line with Hypothesis 3. The slope variance was not significant for pleasure ($\sigma^2_{u1j} = .001$, $p = .097$), suggesting that the latter increased with time at a similar pace for all participants.

Psychological correlates of meditation experiences

The correlations between the pre-test scores and the parameter estimates derived from the multilevel model for each individual are presented in Table 2.

(Table 2 about here)

The relative autonomy of motivation for engaging with the meditation course emerged as the strongest correlate of several intercepts, indicating that autonomously motivated participants experienced more meaning and pleasure, less void, and deeper engagement in meditation throughout the intervention. The additional negative association of autonomous motivation with the slope of effort indicates that experienced effort decreased faster for individuals motivated by the interest in meditation or by the perceived importance of learning meditation, rather than by extrinsic reasons, such as boosting self-esteem or gaining others' approval.

The baseline mental health scores were negatively associated with the slope and the intercept of effort and positively associated with the slope of meaning and the intercept of pleasure. Thus, individuals who had had more positive experiences during the month preceding the study experienced more pleasure and less effort during meditation and were also more likely to report a decrease of effort and an increase in the perceived value of meditation throughout the intervention. Similarly, positive affect showed a weak association with the slope of effort. Negative affect, however, was positively associated with the intercept of effort and negatively associated with the slope of meaning, indicating that individuals with more negative affective experiences at baseline found the meditation task generally more demanding and were less likely to experience an increase in its perceived value and meaning over the three weeks.

The effects for the baseline DTR scores show that the individuals capable of systemic reflection were more likely to enjoy the process of meditation and to experience its value, were less likely to feel bored, and more likely to experience a decrease of effort during the course. This contrasts with the individuals prone to rumination, who experienced meditation as more effortful, and with those prone to quasi-reflection who tended to experience it as boring. Both of these maladaptive reflection dispositions were positively associated with the slope of effort, indicating a slower decrease. The MAAS scores were only associated with effort, revealing an inverse pattern: a lower overall effort and a quicker (or more pronounced) decrease of experienced effort in individuals with higher baseline mindfulness.

The self-regulation skills measured by the VCI and the BSCS were generally associated with the slope and the intercept of effort and demonstrated marginal associations with void. This indicates that individuals with stronger self-management capacities tended to experience

meditation generally as less effortful and less boring, and were more likely to demonstrate a decrease of effort during meditation throughout the intervention. These effects are generally in line with Hypothesis 4.

Experiences and challenges of meditation

The participants provided 393 brief descriptions of their daily meditation experiences. Content analysis revealed that the most common challenges involved controlling one's attention (32.8%) (e.g., "hard to concentrate on breathing"; "distractions"; "I was impatient and couldn't wait to open my eyes"), followed by bodily discomfort (24.2%) (e.g., "hard to stay upright"; "my back hurt"; "cramps in my legs"), and sleepiness (11.5%) ("I almost fell asleep", "I wanted to sleep"; "on the verge of falling asleep, not sure how mindful I was").

The participants mostly found themselves distracted by their thoughts and mental images (21.4%) (e.g., "my consciousness was drifting to past and future events, which was distracting"; "my thoughts were wandering", "meditating in the morning was hard—my head was busy with my daily plans"), observing the guided meditation (15.0%) (e.g., "the voice was very sad"; "I was irritated by background noises and even by the teacher's voice"; "today I found that the narrator's voice was interfering with my experience, but then in the middle it wasn't") or pondering on its content (14.5%) ("you said one shouldn't blame oneself, which was surprising for me"; "today I noticed that the instructions use visual language, e.g., 'observe', but what if I am kinesthetic?"; "when I was asked to observe my thoughts, I had more thoughts, which were comments to this suggestion"). The meditation setting (22.1%) was also mentioned as a major source of difficulties and distractions (e.g., "it is very hard to choose a time for meditation when I have project deadlines in parallel--very angry at myself!"; "my dog was distracting 😊 I should find a way to organize it next time"; "some of my neighbors were having sex loudly which made it hard to concentrate").

Positive emotional experiences were mentioned more often (23.9%) (e.g., "I'm starting to get immersed deeply and with pleasure"; "the meditation emerged as a great way to get recovered emotionally after a hard day"; "during the meditation I had a pleasant sensation of safety and of being at home") than negative or unspecified emotions (17.8%) (e.g., "I felt

something like an existential horror of facing being without a flow of thoughts; this horror is familiar to me and I usually try to stifle it by whatever means”; “I experienced a strong anxiety in the process”; “meditation and depressive feelings are two elements that can’t be combined”). Relaxation was also mentioned often (8.9%), both as a pleasant and unpleasant phenomenon (e.g., “today I drifted to some kind of unconscious state”; “surprisingly, after the meditation I had a feeling of having rested”; “I think I’ve managed to achieve the desired effect in my body, but now I am feeling too relaxed”). More examples can be found in the Online Supplement (SI.4).

Discussion

Experiential trajectories

In line with Hypothesis 1, the findings from the random intercept models indicated that the experiences of meaning and pleasure increased, whereas effort and void decreased over the intervention period. In line with Hypothesis 2, the overall evaluation of meditation success improved as well: the participants who kept engaging with the intervention felt that they were gradually mastering meditation. Based on the existing findings and theory (Andreotti et al., 2018; Rosenkranz et al., 2019), we explored whether the change trajectories were linear. Meaning emerged as the only DV with a curvilinear trajectory showing a faster increase during the initial week, which may reflect emergent motivation to practice.

The overall evaluation of successful engagement in meditation was predicted by all four indicators of optimal experience at the within-participant level: “deeper” meditation sessions were evaluated as more pleasant, meaningful, effortless, and less boring, in line with Hypothesis 2. At the between-individual level, however, the meaning of meditation emerged as by far the most important predictor of engagement with the meditation task. Meaning was also positively associated with adherence (i.e., the number of daily reports submitted by participants). This is in line with the findings showing that (lack of) perceived benefits of meditation is a strong predictor of intention to persist in the practice (Russ et al., 2017).

Unexpectedly, void has emerged as a positive predictor of engagement in meditation at the between-participant level. The evidence that boredom may play an adaptive role in self-regulation processes (Elpidorou, 2014) suggests that individuals who are more successful at controlling their attention and avoiding distractions might experience more boredom during the

meditation task, but might ultimately become more immersed in it. However, boredom was also negatively associated with adherence: participants who experienced more boredom at the beginning of the course were more likely to drop out.

The negative effect of effort on engagement at the between-participant level is similar to the results of Osin and Leontiev (2017), where effort at work was positively related to well-being at work, but emerged as a weak *negative* predictor in regression, after controlling for the other three activity-related experiences. This finding suggests that effort *not* accompanied by a sense of meaning and value of meditation might be characteristic of individuals who experience their attempts at mastering meditation as less successful and who might be more likely to abandon the practice. Thus, the experiences of boredom and effort may reflect difficulties at coping with some early challenges of meditation practice.

Baseline predictors of experiential trajectories

The findings from the random slope model confirm Hypothesis 3 and reveal pronounced individual differences in the dynamics of meaning, effort, void, and engagement in meditation; pleasure was the only DV whose slope did not show any statistically significant variance. In line with our expectations based on developmental theories, effort showed the largest slope variance, reflecting individual differences in the speed of overcoming the challenges constituted by meditation practice.

In line with Hypothesis 4, we found significant associations of baseline personality scores with the experiential trajectory parameters. Most notably, the relative autonomy of motivation for participating in the meditation course was the strongest predictor of intercepts for meaning, void, pleasure, and successful engagement in meditation. More autonomously motivated participants also demonstrated a more pronounced (quicker) decrease of effort over the intervention period. This is in line with the theory emphasizing the importance of the quality of motivation or of beginning the meditation practice with a “right” intention (Kabat-Zinn, 1990; Rosenkranz et al., 2019).

The associations of baseline affect and mental health with the intercept of effort and the slopes of meaning and effort corroborate the existing findings showing that meditation interventions are more challenging for individuals prone to negative affect and mental health

difficulties (Crane & Williams, 2010; Banerjee et al., 2018). Given that individuals with higher baseline negative emotionality and symptom severity draw more benefits from mindfulness practice (Roos et al., 2017), it is somewhat unsettling to learn that the same individuals are more likely to give it up (at least, in an online self-administered intervention context). Future research could explore the possibility of reducing the challenge of mindfulness for these individuals by tailoring the dosage, type, or format of mindfulness practices.

We also found weak, but significant associations of baseline trait mindfulness with the intercept and the slope of effort. It is hardly surprising that mindfulness practice is less challenging for those who are more mindful, which explains why they might gain more benefits from mindfulness interventions (Shapiro et al., 2011). Systemic reflection, which was theoretically proposed and empirically shown to be a more developmentally advanced form of awareness (Kostenko & Leontiev, 2016), emerged as the second strongest correlate of the intercepts of pleasure, meaning, and void. It was also associated with a stronger (quicker) decrease of effort over the intervention period. We call for future research to investigate the longitudinal associations of mindfulness with ego development and personal growth proposed by multiple theorists (Xiao et al., 2017).

Baseline mental health, autonomous motivation, mindfulness, and systemic reflection, as well as self-management and self-control indicators, were associated with the decrease of effort. This suggests that individuals more capable of autonomous self-regulation based on reflective consciousness may find it easier to engage with mindfulness interventions and to draw some benefits from this process. In contrast, individuals with lower self-regulation and self-control skills and higher proneness to maladaptive reflection patterns (rumination and quasi-reflection) may or may not perceive meditation as valuable and pleasant, but instead tend to experience it as more effortful and/or boring and have higher chances of giving up meditation practice. These findings support the idea that mindful states are more accessible to individuals with more developed self-management and self-control skills (Masicampo & Baumeister, 2007).

Qualitative findings

Qualitative descriptions of participants' experiences corroborate and extend the quantitative findings. Unsurprisingly, the most common difficulties were related to attentional

control and to maintaining an optimal level of arousal. This was most evident in the descriptions of pauses: some novice meditators experienced anxiety or frustration, while others felt drowsy or even fell asleep. Some individuals attributed unpleasant tension and headaches to their excessive efforts at concentrating. In line with quantitative findings, qualitative descriptions revealed that unprocessed negative emotions and unresolved life problems may seriously interfere with meditation practice. Although respondents tended to report positive experiences more often than negative ones, some mentioned that mindfulness practice intensified or revealed the anxiety and frustration they would normally be distracted from by their daily activities. These results are in line with prior findings showing that anxiety, dysphoria, tension, headaches, and sleep changes are among the most common problems reported by meditation practitioners (Lindahl et al., 2017).

Difficulties with organizing the setting (finding a suitable time and place for meditation, ensuring its regularity, eliminating distractions, etc.) also emerged as a very common challenge. This suggests another explanation for the link with self-regulation: meditation practice may be only one of the many life situations in which a general difficulty with staying committed to one's goals can manifest itself. It is hardly surprising that regular meditation requires self-regulation and self-control just like any other self-administered practice (Masicampo & Baumeister, 2007); the good news, however, is that these skills also develop in the process (Muraven, 2010).

Finally, qualitative data revealed vast individual differences in the preferences for meditation. Voice instructions appeared helpful to some and disturbing to others; the same meditation sessions were experienced as being too short or too long; some participants enjoyed the soft background sounds of nature while others said they would have preferred some background music; some individuals were frustrated by the silent pauses that others appreciated and enjoyed; some were uncomfortable with the same themes and practices found to be particularly helpful by other participants. All of this, as well as recent evidence showing that individuals prefer mindfulness techniques compatible with their personality (Tang & Braver, 2020), suggests that 'one-size-fits-all' online interventions might be less engaging and less effective than those tailored to individual preferences.

Limitations of the present study

First of all, the online format of the intervention and absence of incentives may have reduced participant adherence. It also precludes us from generalizing our findings to offline formats of mindfulness interventions. However, the findings might more readily apply to typical online self-administered intervention settings, in which individuals engage with meditation courses or mobile applications on their own, without any support or incentives. Second, we had to keep our daily questionnaire extremely brief to reduce the participant workload. As a result, we opted to use single-item measures for the daily outcomes (activity-related experiences and engagement in meditation), which may have limited the representation of the target constructs. A third limitation concerns the use of the MAAS as a baseline mindfulness measure: despite a large body of evidence of its convergent validity, this scale only taps into one facet of mindfulness--acting with awareness (Baer et al., 2006). The use of more comprehensive mindfulness measures could reveal different associations with experiential trajectories. Fourth, a three-week period may not be sufficient to capture the development of mindfulness skills, which may have non-linear trajectories of growth over weeks, months, and decades of practice (Sedlmeier et al., 2012). Fifth, we did not monitor informal meditation practice, which could happen in parallel with the formal meditation course and could account for some of its positive effects (Fredrickson et al., 2019). Sixth, our study used a self-selecting sample of educated individuals, mostly female, coming from a single cultural context, which calls for caution when generalizing the findings to other populations. Finally, our sample size ($N = 133$) has only allowed us to achieve sufficient power (.80) for medium-sized associations ($r = .24$).

Research perspectives

The study contributes to the growing body of knowledge about the individual differences that may affect the outcomes of mindfulness practice. Future research could explore the possibilities of tailoring distance-based mindfulness interventions to prevent them from being overly challenging for individuals with lower reflection and/or self-management skills. The introduction of a pre-test to assess how a person feels while meditating, followed by an individually tailored dosage, format, or even type of daily mindfulness practice, could enable a larger number of people to benefit from online self-administered mindfulness interventions.

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Table 1*Intercorrelations of daily experience variables*

| | Pleasure | Meaning | Effort | Void | Engagement | N sessions |
|------------|----------|---------|---------|---------|------------|---------------|
| Pleasure | .38 | .84*** | -.13 | -.63*** | .53*** | .16 |
| Meaning | .60*** | .55 | -.02 | -.74*** | .59*** | .26** |
| Effort | -.36*** | -.26*** | .42 | .15 | -.16 | -.17* |
| Void | -.53*** | -.49*** | .26*** | .42 | -.29** | -.28** |
| Engagement | .61*** | .58*** | -.38*** | -.54*** | .47 | .09 |
| Time | .12*** | .27*** | -.21*** | -.13* | .20*** | |

Note. Within-participant correlations are shown below the diagonal. Between-participant correlations are shown above the diagonal. Intraclass correlations are shown on the diagonal.

*** $p < .001$, ** $p < .01$, * $p < .05$.

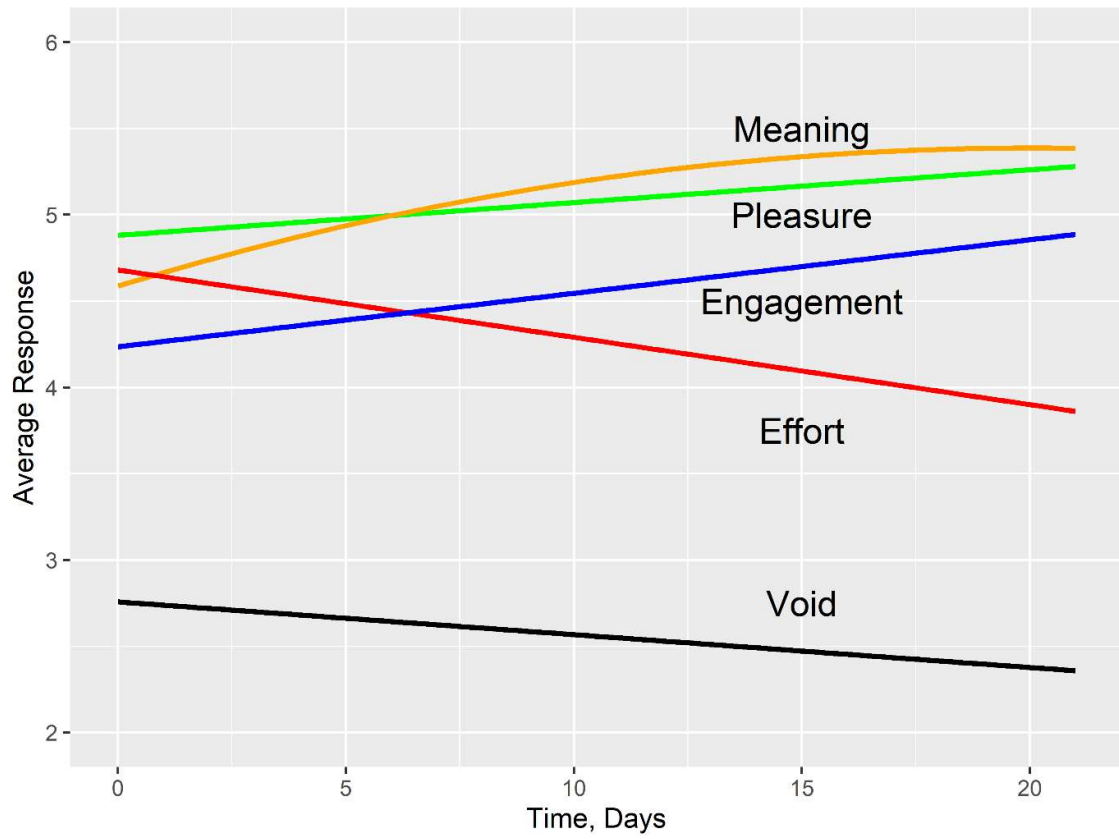
Table 2*Correlations of pre-test scores with parameter estimates derived from the multilevel model (N = 133)*

| | α | Intercept PL | Intercept ME | Intercept EF | Intercept VO | Intercept EN | Slope PL | Slope ME | Slope EF | Slope VO | Slope EN |
|---------------------------------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------|-------------|-------------|-------------|-------------|
| PANAS: Positive Affect | .88 | .08 | .09 | -.03 | -.13 | -.02 | .01 | .02 | -.17* | .01 | .04 |
| PANAS: Negative Affect | .89 | -.06 | .03 | .32*** | .02 | .05 | -.16 | -.24** | .16 | .13 | -.16 |
| MHC: Mental Health | .89 | .17* | .14 | -.18* | -.16 | .07 | .12 | .17* | -.29** | -.07 | .15 |
| C-RAI: Relative Autonomy | .64 | .38*** | .43*** | .12 | -.42*** | .22** | -.03 | -.11 | -.22** | .07 | .02 |
| MAAS: Mindfulness | .88 | .05 | .02 | -.19* | -.11 | .04 | .10 | .16 | -.24** | -.03 | .05 |
| DTR: Systemic Reflection | .80 | .31*** | .32*** | .06 | -.35*** | .10 | -.04 | -.06 | -.21* | .01 | .07 |
| DTR: Introspection (Rumination) | .85 | -.07 | .02 | .26** | .14 | .06 | -.04 | -.15 | .24** | .03 | -.08 |
| DTR: Quasi-Reflection | .81 | -.08 | -.09 | .13 | .25** | -.12 | -.09 | -.09 | .25** | -.09 | .11 |
| VCI: Self-Regulation | .83 | .13 | .11 | -.26** | -.19* | .04 | .08 | .13 | -.28** | -.04 | .15 |
| VCI: Self-Control | .63 | .04 | -.02 | -.07 | -.16 | -.19* | -.12 | -.02 | -.15 | .09 | -.05 |
| VCI: Volitional Development | .86 | .06 | .04 | -.27** | -.18* | -.04 | .07 | .11 | -.18* | -.08 | .15 |
| VCI: Access to Self | .85 | .01 | -.07 | -.23** | -.07 | -.02 | .06 | .14 | -.11 | -.02 | .01 |
| BSCS: Self-Control | .76 | .06 | .03 | -.14 | -.17 | -.02 | .04 | .09 | -.23** | -.02 | .04 |

Note. PL = pleasure, ME = meaning, EF = effort, VO = void, EN = engagement. PANAS = Positive and Negative Affect Schedule; MHC-SF = Mental Health Continuum – Short Form; C-RAI = Comprehensive Relative Autonomy Index; MAAS = Mindful Attention Awareness Scale; DTR = Differential Text of Reflection; VCI = Volitional Components Inventory; BSCS = Brief Self-Control Scale.

*** $p < .001$, ** $p < .01$, * $p < .05$.

Figure 1. Average trends of daily experiences during meditation.



Online Supplement

Table SI.1

Daily guided meditation schedule

| Week | Day | Theme | Duration, min |
|------|-----|--|---------------|
| 1 | 1 | Concentration: Focusing on breathing | 8 |
| | 2 | Concentration: Focusing on breathing | 9 |
| | 3 | Concentration: Focusing on breathing | 10 |
| | 4 | Concentration: Focusing on the breath within the body | 12 |
| | 5 | Concentration: Focusing on the breath within the body | 14 |
| | 6 | Concentration: Focusing on breathing with counting | 10 |
| | 7 | Concentration: Focusing on breathing with counting | 11 |
| 2 | 1 | Body scan; awareness of change | 13 |
| | 2 | Body scan; awareness of anxiety | 13 |
| | 3 | Body scan; awareness of stress | 14 |
| | 4 | Body scan; developing mindfulness | 15 |
| | 5 | Body scan; emotional awareness | 15 |
| | 6 | Body scan; developing productivity | 15 |
| | 7 | Loving-kindness practice; self-compassion and self-kindness | 19 |
| 3 | 1 | Body scan; accepting without reacting | 12 |
| | 2 | Mindful awareness of thoughts | 13 |
| | 3 | Mindful awareness of emotions | 14 |
| | 4 | Mindful awareness of emotions | 14 |
| | 5 | Mindful awareness of thoughts | 14 |
| | 6 | Mindful awareness of thoughts | 11 |
| | 7 | Mindful awareness of thoughts; accepting unpleasant thoughts | 13 |

Table SI.2*Parameters of random intercept models*

| | Model 0 | Model 1 | Model 2a | Model 2b |
|--|------------|-----------------------|-----------------------|-----------------------|
| N parameters | 42 | 40 | 45 | 41 |
| Loglikelihood | -17092.160 | -11143.995 | -11129.912 | -11129.912 |
| Scaling correction factor | 1.9323 | 1.9628 | 1.8867 | 1.8866 |
| AIC | 34268.320 | 22367.990 | 22349.824 | 22345.425 |
| BIC | 34499.918 | 22585.970 | 22595.051 | 22568.854 |
| SABIC | 34366.486 | 22458.894 | 22452091 | 22438.602 |
| Slope estimates (STDYX), γ_{01} | | | | |
| Pleasure on Time | | .122* [.062, .183] | -.015 [-.200, .169] | .123* [.063, .183] |
| Pleasure on Time ^ 2 | | | .145 [-.034, .324] | |
| Meaning on Time | | .269* [.200, .338] | .481* [.278, .684] | .573* [.412, .735] |
| Meaning on Time ^ 2 | | | -.221* [-.423, -.020] | -.318* [-.469, -.167] |
| Effort on Time | | -.213* [-.283, -.142] | -.204 [-.419, .012] | -.213* [-.283, -.142] |
| Effort on Time ^ 2 | | | -.009 [-.212, .193] | |
| Void on Time | | -.126* [-.199, -.053] | -.064 [-.251, .124] | -.127* [-.200, -.054] |
| Void on Time ^ 2 | | | -.066 [-.242, .111] | |
| Engagement on Time | | .202* [.142, .262] | .077 [-.094, .248] | .203* [.143, .263] |
| Engagement on Time ^ 2 | | | .131 [-.020, .292] | |

Note. 95% confidence intervals are given in square brackets.

* $p < .05$

Table SI.3*Parameters of random slope models*

| | Model 4, Full sample (N=175) | | Model 4, Three or more time points (N=141) | |
|---------------------------|--|--|--|--|
| N parameters | 80 | | 80 | |
| Loglikelihood | -11029.272 | | -10661.818 | |
| Scaling correction factor | 1.4598 | | 1.4666 | |
| AIC | 22218.544 | | 21483.636 | |
| BIC | 22654.504 | | 21917.474 | |
| SABIC | 22400.353 | | 21663.325 | |
| Parameter estimates | Mean (γ_{00} / γ_{10}) | Variance (σ^2_{u0j} / σ^2_{u1j}) | Mean (γ_{00} / γ_{10}) | Variance (σ^2_{u0j} / σ^2_{u1j}) |
| Pleasure, intercept | 4.886* [4.743, 5.030] | 0.636* [0.434, 0.839] | 4.901* [4.746, 5.057] | 0.646* [0.430, 0.862] |
| Pleasure, slope | 0.017* [0.008, 0.027] | 0.001 [0.000, 0.002] | 0.019* [0.010, 0.029] | 0.001 [0.000, 0.002] |
| Meaning, intercept | 4.693* [4.523, 4.862] | 1.060* [0.791, 1.328] | 4.803* [4.631, 4.976] | 0.933* [0.686, 1.180] |
| Meaning, slope | 0.038* [0.027, 0.048] | 0.001* [0.000, 0.002] | 0.035* [0.025, 0.045] | 0.001* [0.000, 0.002] |
| Effort, intercept | 4.655* [4.492, 4.818] | 0.794* [0.573, 1.014] | 4.616* [4.439, 4.794] | 0.820* [0.588, 1.051] |
| Effort, slope | -0.036* [-0.050, -0.021] | 0.003* [0.001, 0.005] | -0.033* [-0.047, -0.019] | 0.003* [0.001, 0.005] |
| Void, intercept | 2.752* [2.595, 2.910] | 0.801* [0.551, 1.051] | 2.679* [2.515, 2.843] | 0.750* [0.503, 0.996] |
| Void, slope | -0.017* [-0.030, -0.004] | 0.002* [0.001, 0.003] | -0.016* [-0.028, -0.004] | 0.002* [0.001, 0.003] |
| Engagement, intercept | 4.248* [4.089, 4.407] | 0.856* [0.599, 1.112] | 4.278* [4.110, 4.445] | 0.813* [0.552, 1.074] |
| Engagement, slope | 0.027* [0.017, 0.037] | 0.001* [0.000, 0.002] | 0.028* [0.018, 0.038] | 0.001* [0.000, 0.002] |

Note. 95% confidence intervals are given in square brackets.

* $p < .05$

Table SI.4

Themes describing the experiences of novice meditators emerging from content analysis

| Theme | Frequency |
|--|-----------|
| Content : Reflections concerning the general structure and content of daily meditations, as well as difficulties at understanding the instructions (<i>"instructor's comments and explanations were distracting at times", "my inner critic kept muttering and correcting, for instance, that breath doesn't enter one's body being a process, but air does", "when I listen, I have a feeling that I do not quite understand what should happen during the meditation", "it feels like the narrator is talking too much", "as soon as anxiety was mentioned I started experiencing it", "I was very distracted by the text saying that getting distracted is all right", "the text helped me to meditate"</i>) | 14.5% |
| Form : Attention paid to voice and sound, as well as pauses and time of meditation (<i>"I was somewhat distracted by the voice in the record", "today the narrator's voice was interfering [with my experience], but then by the middle it wasn't anymore", "the voice sounded very sad", "I was extremely irritated by the record quality... I think it has to do not only with the file quality, but with my experiences accumulated before the meditation", "there were pauses without the voice, and then it would start unexpectedly, startling me", "the sounds of nature help to stop thinking", "the meditation was too short, I hadn't the time to concentrate"</i>) | 15.0% |
| Setting : Challenges associated with finding the time and place for practice, or challenging life situations (<i>"my dog was distracting me") have to do organize something about it next time", "some of my neighbors were having sex loudly, making it hard to concentrate", "a child was crawling, playing toy cars—it wasn't distracting until the car started driving on my face))", "it is easier for me to meditate in the mornings", "with project deadlines in parallel it is hard to choose a time for meditation, very angry at myself", "I had a fever and took a medication. I think it may have strongly influenced the ease of the task", "I had to meditate while travelling, because I lack the time to do it at another time"</i>). | 22.1% |
| Attention : Difficulties with attention control, coping with the challenge of maintaining concentration (<i>"my attention was drifting away", "impatience", "I kept wanting to open my eyes", "I could not fully get involved in the process", "at the end I was intolerably bored", "all the time I wanted to run, to do something, to move or to fidget", "hard to sit until the end"</i>) | 32.8% |
| Bodily sensations : Discomfort in the body, unusual somatic experiences, or reflections concerning one's posture (<i>"I had to attend frequently to somatic sensations: stinging, itching, pain", "my feet became so numb I couldn't finish the meditation", "I can't manage to find a posture where I would not be distracted by bodily discomfort", "it is hard to keep my back upright and relax it at the same time", "intense concentration starts giving me headache", "I had a sore throat. Couldn't ignore it", "I was bitten by a mosquito and it was impossible to focus on sensations and avoid reacting to it"</i>) | 24.2% |
| Thoughts : Thoughts, mental images or memories appearing as distracting (<i>"hard to turn off thoughts", "I was distracted a lot by my thoughts", "it's hard to me not to control my breathing, I keep thinking about it all the time", "I kept thinking whether the meditation was ending... I was afraid the session would end too soon for me to concentrate well", "scenes from the movie I watched before the practice were appearing in my head", "my consciousness kept reminding me about some past or future events", "how can I stop remembering other stuff during the meditation?"</i>) | 21.4% |
| Sleepiness : Falling asleep or yawning interfering with the meditation (<i>"again fell asleep in the process", "I tried it twice and fell asleep both times", "I think I may have fallen asleep", "either I fell asleep or the recorded session had no conclusion", "I was practicing on the verge of falling asleep; I did fall into some"</i> | 11.5% |

| | |
|---|-------|
| <i>kind of oblivion, but not sure it was mindfulness”, “I fall asleep. At some point I was captivated by thoughts that were part of my dream”, “I keep yawning during the meditation”)</i> | |
| Positive experiences : Positive emotions or experiences of progress (“ <i>now I am feeling refreshed, full of energy, serene, satisfied, and ready to work – thank you!</i> ”, “ <i>I started to get immersed deeply and with pleasure</i> ”, “ <i>I feel a small progress in my concentration, an enveloping sense of softness and calm</i> ”, “ <i>I slowed down and this is very pleasant</i> ”, “ <i>afterwards I felt so good and so serene as I haven’t in a long time</i> ”, “ <i>the self-love meditation was very valuable and important to me</i> ”, “ <i>during the meditation I get a good feeling of safety and home</i> ”) | 23.9% |
| Negative or unspecified emotions : Emotions arising related to the process of meditation or unprocessed daily experiences (“ <i>couldn’t get rid of my emotions</i> ”, “ <i>I had a feeling that my consciousness has dissolved, it’s not here—interesting and frightening</i> ”, “ <i>I have an interview tomorrow and I’m nervous – can’t calm my anxiety, meditation was not much help</i> ”, “ <i>In theory, meditation is supposed to relieve unpleasant emotions and worry. But in practice it’s exactly the opposite. As long as you’re busy they are muffled. But once you attend to breath and try not to think of anything, they start emerging much stronger than before</i> ”, “ <i>I kept crying throughout the practice</i> ”, “ <i>working with stress gets me irritated</i> ”, “ <i>it is hard to stop evaluating thoughts and to put emotions aside</i> ”) | 17.8% |
| Relaxation : Experience of relaxation or relieving tension (“ <i>full relaxation, happy calm</i> ”, “ <i>after the meditation I feel relaxed, sleepy, but my head is light and free from tension</i> ”, “ <i>relaxation</i> ”, “ <i>I felt more serene after the meditation</i> ”, “ <i>calms down</i> ”, “ <i>I sense an intense relaxation of the body</i> ”, “ <i>surprisingly, after the meditation I feel like having rested</i> ”). | 8.9% |

Note. Frequency denotes the percentage of daily reports where this theme was found.