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Two-Phase Model of Habit Change: A Longitudinal Qualitative Study

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ABSTRACT

Habits – implicit associations between psychologically satisfying outcomes and the sequence of actions that repetitively produced these outcomes in a relatively stable environment – are crucial for human health, self-regulation, and day-to-day functioning. The present research claims that the primary function of habit mechanism is stress-reduction, associated with decision-making and environmental assessment. Next, addressing the theoretical contradictions of the traditional model of habit development, we propose a new two-phase model, differentiating the old-habit extinction phase and the new-habit formation phase and choosing appropriate cognitive strategies for each. The model was tested via 6-week longitudinal qualitative study, assessing its effectiveness and alignment with participants' experience. Ten participants who expressed the wish to develop a habit of practicing mindfulness meditation, and who had never meditated regularly before, participated. The study protocol was designed to strategically increase their awareness of routine during the first two weeks of the study and decrease it during the remaining four weeks of the study, thus minimizing the stress entailed by the routine restructuring. All participants reported developing a meditation habit, and thematic analysis has shown that the experiences of 8/10 participants fit the two-phase model. Finally, participants' accounts support the synthesis of outcome-insensitivity and cue-dependence issues in habit formation and initiate broader discussion about personal differences in routine following.

KEYWORDS: habit, implicit processing, stress, mindfulness, longitudinal qualitative study

Habits — defined in contemporary psychology as the cue-response associations that require minimal cognitive control to be executed and have been formed in a "stable" environment (Neal et al., 2006; Verplanken & Aarts, 1999) — are extremely prevalent in human lives. Researchers estimate that about 40% of our actions can be classified as habitual, and the complexity of those actions can largely vary. Examples often used in the literature include vitamin C intake, bicycling to college, and maintaining a complex exercising routine (Judah et al., 2018; Kaushal & Rhodes, 2015; Wood et al., 2002; Wood, 2021). Today, efficient long-term behavior change would likely

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consider turning the desired behavior into a habit, which attracts the attention of health, education, and organizational specialists (Badawy et al., 2020; Cleo et al., 2020; Nikolopoulou et al., 2021).

Additionally, having beneficial habits is assumed to play a fundamental role in consistent and effective self-regulation, which, in turn, is crucial for career success, retirement savings, and preventing health problems (see Steel, 2007 for a review of self-regulation failure). It was found that people who have the highest scores in measures of self-control do not actually spend more cognitive effort on avoiding temptations or directly following their intentions than average individuals do (Hofmann et al., 2012). The explanation being those individuals have a certain complex of habits that preserve the cognitive resources typically spent on decision-making (Carden & Wood, 2018). Therefore, a detailed understanding of the mechanisms of habit acquisition and extinction is essential for offering individuals new pathways for life-quality improvement.

What is a Habit

The concept of psychological habit has a rich history of development. "Habit" was a crucial concept used in behaviorism to explain the acquisition of complex behavior responses, happening either because of the repetition of antecedent stimuli (Watson, 1919), or through consequent reinforcement (McDougall, 1908; Thorndike, 1910). However, in both approaches, it was used too generally, either as a complex combination of conditioned reflexes, or as a non-instinctual behavior of an equal complexity, respectively. The most impact made on operationalizing the concept of "habit" was by Clark Hull (1943/1966). Hull aimed to offer a method of inference of the physiological state of an organism which would influence both the current behavior and subsequent learning; therefore, he came up with the concept of "habit" as a "persisting state of the organism (resulting from the reinforcement) which is a necessary, but not a sufficient, condition for the evocation of an action in question" (1943/1966, p. 102 footnote 1, italics removed). Hull's conceptualization of "habit" as an internal state had made possible the reemergence of interest in habits after the Cognitive Revolution and the decayed prominence of behaviorism. Starting with 1980s, cognitive psychology has become specifically fascinated with the "automaticity" of information processing — originating from the mistakes made by the participants in Stroop Test (Logan, 1980), it was developed into a general theory of information-processing, defined as an "implicit" (non-conscious) sensitivity to only particular environmental cues (Bargh, 1994; Moors & Houwer, 2006). Finally, Verplanken and Aarts (1999) approached the "habit" concept from the perspective of social psychology. They offered a perspective of "habits" being a "goal-directed automaticity," attempting to explain an ambiguous association between the past and future behavior and a similar relationship between "attitudes/intentions" and present behavior. Verplanken and Aarts claimed that Hull's understanding of a physiological predisposition to executing a certain response could be saturated with an idea of "automatic goal pursuit" and a "habitual mindset" — i.e., the frequent reinforced cue-response happening creates an inclination to pay attention to these cues and use only them in the decision-making that leads to the 'habitual' behavior. Today, the research into habits as goal-directed automaticity continues as a part of implicit processing and automaticity research done by social psychologists and cognitive neuroscientists (Mendelsohn, 2019; Neal et al., 2006; Verplanken & Orbell, 2022; Watson et al., 2022).

Habits: Uncertainty- and Stress-Reduction

One of the commonly accepted tenets of behavioral sciences is that living organisms are evolutionarily adapted to optimize their performance and conserve energy when possible (Tomkins, 1962). Brain sciences suggest that conscious processing and decision-making are one of the most

energy-consuming activities (e.g. Iso-Ahola, 2022), which social psychologists use as evidence to define the function of automaticity as energy conservation through activation of implicit goals, attitudes, and identities (Bargh, 1994; Devos & Banaji, 2005; Gollwitzer & Bargh, 2005; Trafimow, 2018). Following the 'neurons that fire together wire together' paradigm (Hebb, 1948, as cited in Bargh, 1996; Greenwald et al., 2002; Wood & Neal, 2007) the 'psychology of implicit' perspective argues that the human mind is creating associations between concepts, signals, and/or emotions that frequently appear together, thus reducing the exhaustion of cognitive resources. Appealing to this framework, we would maintain the definition of a 'habit' as a specific case of automaticity – the association between a particular outcome and the action sequence that would yield it with very high probability because it has repeatedly yielded it before.

Using our definition provided above, it would be correct to assign habits the function they are primarily associated with reducing outcome uncertainty, thus eliminating the need for action-outcome probability calculation, which substantially decreases stress. "Stress" may be conceptualized as any kind of affective excitation (particularly, negative affect); such excitation is not supposed to happen when the stimulus-response-consequence chain is executed as a habit, i.e. when a well-learned behavior is executed to a familiar cue to obtain an expected outcome (Tomkins, 1978). The inclination to the familiar and predictable as a way to conserve psychological energy was observed in the studies of people and animals who become more inclined to perform the actions they have previously performed in situations of prolonged and unpredictable adversity (Morgado et al., 2015; Schwabe & Wolf, 2009). This approach is also viable on the level of group dynamics — for example, the change of abusive family functioning may start from the change in the parenting style, encouraging children to adjust their conduct (Barrera, 2025).

Our definition may explain why people tend to characterize habits as actions they feel a compulsion to perform (Gardner et al., 2016). Not performing a habit means inducing uncertainty, which activates the action-outcome probability calculation, which elevates the stress level (Nave et al., 2020), and the most evident and effective way to reduce that stress would be performing the habit (Schwabe & Wolf, 2009). The inclination towards the known and certain may be additionally observed in a particular case of action-outcome automaticity created without consequent repetition. "Implementation intentions" is a cognitive technique that encourages its user to create a situation-action-outcome association in the form: "If situation X happens, I will do Y, [in order to attain Z]" (Gollwitzer, 1993; Gollwitzer, 1999). The explanation of this effect, inside our framework, would be that creating implementation intentions compels the user to perform the chosen action because it allows them to bypass the stress-inducing action-outcome probability computation stage.

Habits and Goals

A crucial distinction between our definition of habit and existing definitions is that of excluding the goal activation component from the definition. Goals – as social-cognitive psychologists define them: the knowledge structures that represent some kind of end state worth pursuing (Kruglanski & Kopetz, 2009) – become the stumbling block for habit theorists. The theoretical debates of intentionality, reward-insensitivity, and goal-directedness pertain only to goals but not to habitual behaviors; thus, this distinction is essential for resolving the conflict.

There are extensive arguments for the existence of automaticity gradation, which means that "automatic" does not always mean "unintentional" (Bargh, 1994; Gollwitzer & Bargh, 2005). The necessary condition to term the goal automatic is that it is supposed to be activated by environmental cues because of repeated pursuit of this goal in this situation (Chartrand & Bargh, 2002). Then, we argue that the goal, i.e. the outcome, becomes associated with a specific pattern of its attainment, i.e. the habit, if it is repetitively attained via this method.

Finally, we suggest that depending on the cognitive complexity of the actions needed to attain this goal – e.g., how prolonged is the action sequence and how many competing goals emerge in the process –, the goal may either be attained without intention or conscious awareness (e.g. locking the house door when leaving) or it may necessarily require it (e.g. visiting the gym). Thus, a complete 'automaticity cue-response arch' would look like this: cue-goal-habit, where goal and habit are distinct cognitive structures, and each of them can involve or not involve conscious awareness.

Resolving Habit-Goal Conflict

Separating goals from habits allows one to resolve the "teleology" problem of habits and habit formation (Watson, 1919). Successfully resolving this conflict involves three components: the problems of rewards and subsequent reward insensitivity, the common research confusion of misattributing the activating cue and the desired outcome, and the discomfort associated with routine disruption.

The remnants of the behaviorist tradition in habit research incline scholars to argue that the behavior must be rewarded to be learned (Kruglanski & Szumovska, 2020). However, most of the behaviors that one could classify as habitual – e.g., choosing a transportation for commute, tooth-brushing, and medication intake (Lally et al., 2011; Wood et al., 2002) – do not include a feasible reward for which they had to be initially performed. What is feasible instead is the purpose behind each action, and the gauge of its success (both implicit and explicit) stem from that purpose. It is important that although the behavior does not need to be explicitly rewarded, it has to be effective to achieve the envisioned goal – otherwise, it simply will not be repeated enough to become habitual (Lally et al., 2010; Verplanken & Orbell, 2003).

This conclusion would then resolve the debate between "outcome insensitivity," i.e. a habit is performing a previously goal-directed action 'in sake of being performed': i.e., even if instead of reinforcement the subject receives a punishment (Neal et al., 2006), vs. "goal substitution," i.e. when the habitual actions emerge to pursue one outcome pattern, but eventually are used to pursue another one (Kruglanski & Szumovska, 2020). The subject of debate was the habit of eating popcorn during the movie. The 'outcome insensitivity' perspective would argue that people with a popcorn-eating habit would eat stale popcorn purposelessly – i.e. not for its flavor or due to hunger (Neal et al., 2011). The 'goal-substitution' side would assume that initially people indeed eat popcorn because of hunger or taste, but then, after numerous repetitions, eating popcorn takes another implicit goal: for example, helping to pay attention to the movie (Kruglanski & Szumovska, 2020).

To negotiate these conflicting perspectives, we need to return to the idea of the desire for certainty and stress-reduction. The repetitive attainment of the same outcome with the same means within the same environment creates a blueprint of certainty, which reduces the cognitive load of attention and decision-making. Thus, even if the original goal loses its motivation force (Wood & Neal, 2007), any change in the established action sequence would induce attention and decision-making stress, and the most evident way to reduce it is to execute the habitual pattern.

Summarizing the discussion of what a habit is, we revise its traditional definition, its formation, and its functions. We propose that habit is, rather, an implicit association between the sequence of actions that would certainly yield a satisfying outcome if performed in a particular environment. Habits form because of repetitive goal-attainment inside a stable environment, and their primary function is reducing the stress of paying attention and making decisions by making satisfying outcomes certain.

Promoting Habit Change: Two Phase Model

Our definition of habits implies that any attempt of behavior changes inside the environment in which one's habits were formed should inevitably induce stress. In addition to decision-making and attention stressors, a subject would experience a compulsion to act habitually to reduce that stress of dealing with uncertainty. Some of the existing models of habit change also notice this dynamic – for example, suggesting that the stress is produced when the outcome of the intended action does not align with the outcome of the habitual one (Wood & Neal, 2007). At the same time, the studies of habit change inside the stable environment suggest that the strongest predictor of habit formation, apart from environment stability per se, would be the frequent repetition of the same behavior sequence (Kaushal & Rhodes, 2015; Lally et al., 2010; Phillips & Gardner, 2016). Therefore, the effective habit change strategies should include factors that would motivate the subject to repetitively perform the target behavior despite the accompanying stress. The frequency of the action repetition would be traditionally facilitated by the external tools of control, such as reminders or incentives, or by various cognitive and behavioral techniques of efficient self-regulation and goal-attainment (Cahil & Perera, 2011; Tobias, 2009; Wang et al., 2017).

Importantly, the forceful, intentional, and/or externally sustained commitment to a particular action sequence would yield only temporal behavior change, and we state that this strategy alone is unlikely to lead to successful habit formation. The reason for this is related to the third parameter required for the successful habit formation — gradual automaticity development, which can be defined as minimizing the cognitive control over the instigation and execution of the target actions (Phillips & Gardner, 2016; Verplanken & Orbell, 2003). Taking the evidence about powerful intentions that are needed to get the existing habit 'overridden' and putting it against the need for automaticity accumulation in forming a new habit, we encounter a contradiction, since those two requirements cannot be simultaneously satisfied. Therefore, in order to solve that conflict, we hypothesize that habit change should be displayed as a two-stage process — breaking an old habit and forming a new, more desired one.

The need for this reconceptualization of habit change strategies could be traced through the research of habit-formation smartphone apps. For example, Stawarz and colleagues (2015), state that taking only one of the approaches — facilitating goal-attainment or automaticity development — leads to either not forming a habit at all or forming it much slower than someone would prefer, respectively. Other research indicates similar problems with goal-directed behavior, promoted by popular apps – e.g. Streaks, Habitica, Habitify (Guinness, 2023) –, stating that users of those apps do not form stable habitual behavior independent from the app (Renfree et al., 2016). In our model, we attempt to combine those two approaches by designing two specific sets of instructions: a behavior changing one, and a habit-formation one, with an eye towards future use in such smartphone apps.

Our model proposes that the formation of the new habit would inevitably require breaking the older one. Additionally, if the habit is finally broken, but no new habit is formed over it, the older habit will slowly re-emerge. The evidence for those claims could be found in the results of studies of habit change via changing the environment (e.g., Walker et al., 2015). This study showed that during the first week after travel, both people who intended to change their habits and those who did not had a significant drop in automaticity. Consequently, people with no intention for change had their old habits slowly re-emerge during the following three weeks, and people with intention for change developed new habits. Thus, the problem of excessive intentionality preventing habit formation and the process of habit re-emergence in cases of unintentional

functioning encourage a two-phase model of habit change: Phase 1 – breaking the existing habit, and Phase 2 – promoting a new habit formation.

Study Expectations

To test whether our theorizing is correct, we have designed two sets of strategies based on scientific recommendations regarding the efficient behavior change and habit formation. The main purpose of the former is to help the subject consistently perform their desired behavior, bypassing the temptation to return to the older habitual pattern. The main purpose of the latter recommendation is to enhance the new habit formation by reducing the need for paying attention to the environment and making decisions about the actions needed to be performed. Since our theory challenges the existing models of habit operationalization and habit formation, the two expectations that drove the study's methodology were observing whether participants' experience of habit change would be in line with our definition of a habit as a stress-reducing mechanism, and whether they would find the two-phase model effective and relatable.

Method

Author Reflexivity Statement

The primary research area of the Author 1 is motivation, emotion, and their relation to productivity. Author 1 has been particularly interested in the experience of distress which frequently entails the change of routine behavior, which has become the cornerstone for the research of habits and habit change. Author 2 research meditation, relationships, and culture, and is also a Zen practitioner with 10 years of experience. Additionally, Author 2 teaches a college-level course on psychology of mindfulness, wherein strategies for helping students make meditation a habit was explored. This experience became one of the factors for selecting mindfulness-based meditation as the activity for habit development.

Study Design

The primary goal of this project was to empirically examine the proposed two-phase habit development model, and since we had made a theoretical claim of its advantage over existing models, the main criterion of its accuracy had to be the effectiveness of habit change which, as discussed, involves numerous experiential factors (e.g. stress levels, automatization, goal-directedness, etc.). For this reason, our study adopted a Longitudinal Qualitative Interview (LQI) methodology (Hermanowicz, 2013). First, LQI is particularly designed as a response to stage-development psychological models, ascribing the cause of change to subjective experience, instead of mere time passing. Second, its methodological purpose is to recreate the everyday experience during the influences they undergo between two distant points of life (Hermanowicz, 2016). Third, LQI has a specific prominence in health and wellness studies (see Calman et al., 2013 for review) – like the situation in habit development scholarship (Kaushal & Rhodes, 2015; Lally et al., 2008; Raghupathi & Raghupathi, 2017) – which integrates the proposed model into the existing discourse. Finally, we had to make an adjustment to classic LQI methodology to address the specific conditions of our study. Our study-imposed changes on participants' daily routines, so the study is not purely observational. These elements motivated us to rely on semi-structured interview design to account for possible uncertainties and novel findings in data gathered.

Participants

Participant recruitment happened in Reddit forums and Facebook groups dedicated to mindfulness, Buddhism, and yoga. Our sample contained 10 adult (18 year or older; mean age = 33.1) participants from the US (n=6), Canada (n=1), Sweden (n=1), Spain (n=1), and India (n=1). The sample size replicates one of Lally and colleagues' qualitative study on weight-loss behavior change through habit formation (2011). All the participants had been practicing mindfulness meditation for 2 weeks or less at the beginning of the study, and all the participants indicated a personal reason to meditate regularly. Participants set their own goals: six participants planned to meditate 7 days a week; two participants – 5 days a week; one participant – 4 days a week; and one participant – 3 days a week.

Study Design

The study was designed as longitudinal, requiring 6 weeks of enrollment. The 6-week period was chosen in response to Kaushal & Rhodes (2015) findings that the complex habit of gym attendance was formed as fast as within the six weeks of study enrollment when the correct combination of strategies is implemented in the traditional one-phase model. Therefore, it could be inferred that if the proposed two-phase model is more accurate, then the habit change should happen at least within the same time frame.

Second, our reconceptualization of habit and habit formation involves description and integration of numerous complex experiences, such as the experience of stress, goal, success, intentionality, etc. Therefore, to maximize the robustness of participants' experience reports, we relied on qualitative design (Steils, 2021), collecting interviews, journal entries, and open-ended questionnaires. Another reason for designing our study as qualitative is the near complete absence of non-scale reports of habit development experience in social psychology literature. Since our definition of habit permits both intentionality and conscious control in habitual actions, we are not obliged to treat qualitative data as auxiliary to behavioral data (as, e.g., Lally et al., 2011 do) and may rely solely on self-reports to make conclusions about the accuracy of our theory.

Target Activity: Mindfulness Meditation

Mindfulness is the practice of sensational, emotional, and cognitive awareness that typically happens in the form of silent meditation in which the practitioner makes non-judgmental observation of their present-moment experience (Kabat-Zinn, 2015; Kristeller, 2007). The practice of mindfulness receives significant attention from stress-management scholars and clinicians (Khoury et al., 2015; Parsons et al., 2017), thus interplaying with the stress-reduction function of habits. Another reason is positive effect of mindfulness on awareness of intentions and actions and its negative effect on automatic judgment and decision-making (Rosenberg, 2004). Thus, exploring the formation of a meditation habit provides a fertile ground for researching possible facilitation by stress-reduction and possible attenuation by awareness-increasing. Summarizing the argument, the rationale of selecting mindfulness-based meditation over other complex but benign activities (e.g. reading or ice-bathing) is twofold — first, mindfulness-based meditation contributes directly to stress-reduction, which is supposed to mitigate the distress caused by the habit extinction and make it easier; second, practicing mindfulness is supposed to increase the overall level of awareness, which is supposed to complexify the discussion of "automaticity" as more than 'implicit'/'non-awareness' process.

Finally, the third reason to study mindfulness meditation in the context of habit development is its complexity. The most popular complex activity researched for habit-formation is exercising (Kaushal & Rhodes, 2015; Lally et al., 2011; Phillips & Derryberry, 2017; Phillips & Gardner, 2016; Stults-Kolehmainen & Sinha, 2014). Therefore, the study of an activity comparable in its complexity yet different in its purpose of engagement and outcome, would become either an argument for generalizability of existing habit-formation principles or a claim for rethinking them.

Behavior Change & Habit Formation Model

Phase 1 – Breaking the Existing Habit

Following the idea that normal/everyday human functioning is directly associated with a set of habits (Mulan & Novoradovskaya, 2018; Wood et al., 2002), every new behavior entails routine distortion. Following our definition of a habit as a stress-reducing mechanism, the routine distortion would inevitably create stress which people would intuitively want to decrease by acting habitually (Schwabe & Wolf, 2009). Therefore, the two related goals of the strategy at this stage would be to 1) help the participants repeat the behavior as regularly as possible and 2) reduce the participants' stress.

Addressing these goals, we included several cognitive techniques aimed at increasing the participants' commitment to meditation and the positive emotions they get from it. First, we asked participants to identify the cue in their environment after which they plan to meditate. Proper cue establishment is attributed to the cornerstone of a deliberate habit formation for its role in automatic processes (Lally et al., 2010). For our purposes, it was additionally expected to create certainty in, and commitment to, the new routine incorporating meditation practice. The second strategy was the "mental contrasting + implementation intentions" (MCII) combination: Thinking about the desired outcome, then thinking about the obstacles that may prevent attaining it, and then creating a detailed plan for addressing each of the obstacles in the form "If X happens, I will do Y" (Duckworth et al., 2011; Gollwitzer, 1999; Oettingen, 2012). This combination has previously shown to give the most increase in goal-attainment, compared to each of the strategies separately (Duckworth et al., 2011). The third strategy we included was day journaling, for which participants had to indicate whether they meditated that day and find one positive aspect of their practice. Referring to the Broadening Theory (Fitzpatrick & Stalikas, 2008), we expected that thinking of the positive emotions that practice gives should reduce the stress of routine disruption, due to their incompatibility. Finally, participants received reminders to complete the journal each day they had indicated they wanted to meditate. To avoid the unnecessary association between the reminder and the practice (Stawarz et al., 2015), participants were reminded of the journaling rather than the practice itself. At the same time, the reminder to complete the journal was synonymous with the reminder to complete the practice, which was intended to prevent participants from forgetting about the practice.

In addition to supporting participants in their commitment to meditation practice, we offered them an option to ease into their sessions via a guided meditation mobile phone app named "Meditopia." Guided meditations are assumed to reduce background distractions and improve the desired effect of the practice – e.g. muscle relaxation, anxiety reduction, mind tranquility– thus reducing the stress the novice may experience directly from the practice. The Meditopia app was selected due to its intuitive design and variety of 'effect-specific' guided meditations it offers, including custom practice duration: from 5 to 25 minutes. Nevertheless, participants were not restricted from using other guided meditation apps, as well as not relying on any of the apps.

We calculated that the duration of the first stage should be two weeks. Walker and colleagues (2015) suggest that it takes about 3 weeks to either break or return to the old habit. Since participants have been already practicing meditation for 1-2 weeks before the study, this phase was reduced by a week. This adjustment was done in respect to Kaushal & Rhodes' (2015) recruitment: their study enrolled gym members with 2 or less weeks of membership.

Thus, over the course of the first two weeks, we expected participants to break their existing routine automaticities, reduce the levels of stress induced by routine disruption, increase their commitment to practice, and thus reduce the degree of self-control needed to perform the practice.

Phase 2 – Developing a habit

One of the crucial factors of habit development is automaticity, which entails a certain degree of incompatibility with awareness and intentionality (Bargh, 1994; Verplanken & Aarts, 1999). Therefore, if we continue to facilitate commitment through cognitive techniques, we risk impeding the development of automaticity. For this reason, the second phase of habit formation should minimize the cognitive activity necessary for the behavior instigation and execution. The most evident way to establish this would be removing the cognitive techniques implemented during the first stage. Thus, over the course of the remaining four weeks of the study, participants were no longer required to rely on their cognitive strategies (adhering to the established cue and journaling about their positive emotions) and we no longer reminded participants to journal (which is equivalent to a reminder of meditation).

Procedures

Participants were involved in the study for 6 weeks total – 2 weeks for the first phase and 4 weeks for the second one. The first stage involved completing the interview conversation, completing the "Behavior Change Plan" cognitive strategies, meditating regularly, and journaling about meditation experiences (see below). The second phase involved completing two interviews – after 2 weeks of the study and after 6 weeks, respectively – and filling out the open-ended survey of habit development progress (see below) after 4 weeks of study. At the end of the sixth week, upon completion of the third interview, each participant received $100 compensation.

Interviews

Participants engaged in 3 semi-structured interviews – at the beginning of the study, two weeks later, and six weeks after the beginning of the study. Interviews were conducted and recorded using audio only.

In the first interview, we were looking for background information about participants' existing routines and habits, experience with meditation, and meditation-related goals participants envisioned for themselves. We asked participants about their familiarity with mindfulness practice, their current routine, the reasons why they want to practice meditation regularly, how they define a habit for themselves, and what are their personal habit-development strategies. After the interview, participants completed the "Behavior Change" integrative procedure (see below).

During the second interview, we asked participants about the state of their habit development and the effects of the study interventions on it. The topics discussed included emotional satisfaction from the practice, cognitive effort required to instigate and execute meditation, and general changes in their daily routine.

Between the second and the third interview, participants filled out the "Habit Development" open-ended survey. The survey asked participants about their progress in habit development and changes in their approach to meditation practice. It included questions about cue following, session attendance, desire to return to the previous routine, and amount of self-control needed to instigate and complete a session.

For the third interview, we utilized the same questions as in the second interview, and additionally asked whether participants believed they had developed a habit, what was the goal of meditation practice they established for themselves at the beginning of the study, and (if they remembered the goal) whether they were able to achieve it.

Phase 1: Routine Disruption

Behavior Change Integrative Intervention. Immediately after the first interview, participants were sent a document with two writing activities to complete. First, participants were asked to establish an easily noticeable and relatively stable cue in their environment after which they were to start the meditation session. Additionally, participants had to outline the weekdays and location they planned to meditate. Second, participants completed the "Mental Contrasting + Implementation Intentions" activity (Gollwitzer, 1999; Oettingen, 2012). Participants listed 4 features of their "ideal meditation day," and then, using an "If X happens, then I do Y" form, outlined 3-5 obstacles they may encounter and how they planned to handle those.

After that, participants were asked whether they would be interested in using the guided meditation app Meditopia. If the response was positive, participants were introduced to the app by the researcher via the screen share utility. Participants were instructed to choose the free version of the app, with the limited amount of guided meditation recordings, and were promised a full-access subscription after the first two weeks of the study, if desired.

Meditation Journaling. After the "Behavior Change" integrative intervention was done, participants received an Excel spreadsheet with questions about their meditation practice that functioned as their journal. Participants were asked to fill out the spreadsheet every day, regardless of whether they meditated or not. For the days when they meditated, participants had to indicate whether they followed the established cue, whether the "Implementation Intentions" technique was helpful to instigate the practice and whether it was easier to complete the practice than before. Finally, participants had to write down one pleasant experience they had from completing the practice. Also, participants received email-reminders to fill out the journal at the end of each practice day.

Phase 2: Habit Formation

At the end of the second interview, participants received an explicit announcement that they were transitioning to the next phase of the study. They were instructed that they were no longer expected to journal, and they were not expected to follow the meditation routine as precisely as the first stage. Nevertheless, they were informed that they would not be restricted from both journaling and routine-following. Participants who used Meditopia and expressed the wish to continue using it were sponsored with the Premium subscription for the next 4 weeks of the study.

Data Analysis

The audio recordings of interviews were transcribed using the Notta.AI software; then, the first author listened to the audio recordings and manually edited the transcripts, correcting the grammar and incorrect word transcription.

To most flexibly analyze the variety of qualitative data collected, we applied Thematic Analysis (Braun & Clarke, 2006) tailored for our study design. First, since our study emerged from the reconceptualization of the habit construct and the proposal of a two-phase model of habit development, our primary themes logically emerged from our theoretical outlines. Second, we expected straightforward answers for most questions we asked — for example, we asked people how they define a habit for themselves, and whether the implementation intentions technique had helped them to adhere to regular meditation practice. Thus, our analysis was concentrated primarily on semantic themes (Maguire & Delahunt, 2017); however, we did not abstain from investigation into the emergence of latent themes (Braun & Clarke, 2006).

Since the study relied primarily on the self-reported measures, the methodology had to address common qualitative studies caveats, such as the "normative response" bias (Budd, 1987). Data analysis happens under the guidance of "hermeneutics of faith" rather than "suspicion" — i.e. that participants have no intention of deceiving the researchers (Josselson, 2004). Therefore, we only had to ensure that the data is rich enough to construct credible interpretations. First, the data comes from several sources: interviews, diaries, and questionnaires. Second, the interview analysis concentrated on both semantic and affective accounts — e.g. every participant had stated that they developed a habit, but in order to make an interpretation that they actually had achieved that, we paid attention to the affective cues and analogies made (e.g., "I feel a bit weird the days that I don't do it [meditate…] It's like the way I feel when I don't floss", Participant 6).

Transparency and Openness

The raw interview transcripts that include both interviewer's questions and participants' responses, journal entries, and demographic surveys have been made publicly available at the Zenodo repository and can be accessed at 10.5281/zenodo.12675705. The study hypotheses were not preregistered; neither was an analysis plan. This project meets all ethical criteria from Clark University IRB (IRB review #320). Before any kind of data collection began, all participants read and discussed the specifics of the informed consent procedures before signing the form to indicate their agreement.

Findings

Theme 1: Habit Change & Stress Management

In line with our expectations, the first stage of habit development, i.e. deliberate instigation and execution of meditation practice at the specific place and/or time, was associated with discomfort for more than a half of the sample – Participants 1, 2, 3, 4, 5, 6, 7, 8. However, for only a half of this cohort – Participants 1, 6, 7, 8 – stress was associated with changes in their routine. Participant 7 expressed this discomfort in the closest to our model form – he mentioned that he meditated to reduce his anxiety and get energy, and on the days when he felt good, he "[had] the urge to not meditate". Participant 7 regarded it as an irrational wish to "cheat one day", which can be interpreted as an implicit reaction to routine change, and he overcame this temptation by thinking about the pleasantness of the practice and benefits that it had already given him. A similar

dynamic is seen in reports of Participant 8. He was the least stressed of the group; nevertheless, he similarly mentioned that he had "a little bit of a struggle to overcome that initial resistance to key change," and he similarly found motivation in gaining pleasure from practicing.

The case of Participant 1 was different. His intrusive thoughts of skipping the practice happened during his exam week, when stress levels had significantly increased. Participant 1 expressed the urge to avoid practicing, despite the benefits it gave to his well-being, attributing it directly to his stress:

It would just be a lot harder for me to find the time and energy and meditate [...] I think just when I'm stressed, my mind is better able to come up with excuses. Like, 'oh, you're tired. Oh, you should start being productive', whatever. And so, it just takes a lot more concerted willpower to just be like, 'no, no, no, let's sit down, do this, it's just 10 minutes really quick.' (Interview 2)

Important to note is the case of Participant 10 whose routine was also disrupted by unforeseen circumstances, but it happened at week 4 – after a half of Phase 2 was completed. In comparison to Participant 1, who "always had time [for practice]" but had to motivate himself, Participant 10 was eagerly anticipating his every session, but lacked free time for practicing and experienced frustration from not meditating. This 'mirror-like' situation may additionally illustrate the effects that disruption of an established routine can have on well-being.

A fascinating case of routine-change stress is Participant 6, who was so committed to making meditation her habit that she experienced anxiety about missing the cue and therefore missing the session. Her stress seems a result of the high importance she put on regular practice – "I feel like a failure if I don't do it" –, and her unestablished routine created a sense of uncertainty.

For the other half – Participants 2, 3, 4, 5 – stress was associated not with the routine change but with meditation practice itself. Participants 2, 3 & 5 reported occasional problems with focusing and imperfect outcomes of several sessions, and Participant 4 experienced anxiety produced by self-awareness during some of her first sessions. Each participant, however, was able to overcome their discomfort by the end of the second week, either by simply meditating frequently or by adjusting their practice (see "Subtheme 1.1").

It can be argued that the remaining participants who did not report experiencing either instigation or execution stress – Participants 9 & 10 – are somewhat outlying cases in the sample. Participant 9 did not feel any resistance either from the practice, nor from his routine. He ended up meditating whenever "it came naturally" to him, for longer durations and more frequently than expected, and he most explicitly articulated the connection of the practice to his "inner self" Participant 10 was unique because of the strength and his cue-response association. After only two weeks, Participant 10 explained that he feels himself "primed" by the cue of his choice, getting him into "the mindset for meditation." Also, Participant 10 was the only person from the sample who expressed that he felt discomfort from not completing the meditation practice when he had already encountered the cue

Thus, our general assumption about the routine change producing stress was partially correct. The type of 'instigation' stress was unique for each of the participant who experienced it, and over half the participants reported either only 'execution' stress, or no stress at all.

Subtheme 1.1: Effects of "Behavior Change" Strategies

All the participants benefited from at least one of the "Behavior Change" strategies offered. Participants regarded them as useful tools of 'routine scaffolding' (Participants 2, 8), which were helpful and sometimes necessary to overcome initial resistance (Participants 3, 5).

One of the popular strategies was "Implementation Intentions" (Gollwitzer, 1999): 5/10 participants (1, 3, 6, 7, 10) listed it as helpful. Participants created implementation intentions

predominantly for addressing the discomfort they may experience during their meditation practice, rather than for helping themselves to better instigate the practice and avoid postponment or skipping. Typically, implementation intentions played an occasional role in improving the practice. Participant 3 stated, “When I wasn't feeling focused, there were just certain words that I had remembered that I put down that I had actually implemented and followed.” (Interview 2). Conversely, “Mental Contrasting” (Oettingen, 2012) was associated with instigation, allowing participants to search for new meaning in their practice, giving them more reasons to engage in it, and 3/10 participants (Participants 2, 4, 9) found it helpful. Participant 9 reported, “I was writing about the importance that I should have, the importance of me meditating, and how it will benefit me. [...] It helped me to have in mind what I should be doing.” (Interview 2).
Importantly, neither implementation intentions, nor mental contrasting had negative effects, and those who did not find them beneficial ignored this option.

Journaling was appreciated by 5/10 participants (2, 3, 5, 6, 9) – it had similar effects to mental contrasting and had an additional routine-structuring effect. For example, for Participant 6, it was “nice to look back at the past days [...] and just remind [herself] of some positive things,” and Participant 3 “found helpful [the] enforced accountability by recording”. For others, however, journaling was associated with “a chore” (Participant 8) and a struggle “to come up with something positive” (Participant 10) and they were relieved to stop journaling. For a few of participants – Participants 5 and 10 –, the similar structure-adding effect was observed in reminders about journaling. However, Participant 10 expressed his appreciation toward reminders only after they stopped – e.g., “Now that I’m looking back, it was nice to have them” (Participant 10).

Finally, for 6/10 participants (2, 3, 4, 6, 8, 10), meditation apps played an important role in their routine formation. The effect and the use of guided meditations can be compared to implementation intentions and mental contrasting. For most app users, 4/6, the effect of guided meditations was like implementation intentions, helping to make meditation practice more convenient and less stressful to follow. Participant 3 referred to guided meditations when she could not concentrate well on the practice. For Participant 4, during a period of intense travel, doing short 3-minute meditations was the only way to keep the practicing. Participants 6, 8, and 10 wanted to make their practice intuitive and convenient to follow, and their apps allowed them to do it. Similarly to mental contrasting, guided meditations showed an impact on people’s motivation to meditate – for Participant 2, the “scientific explanation [of meditation benefits]” that her app provided was the primary reason to take up the practice and eventually continue it.

Subtheme 1.2: Autonomy Facilitation & Habit Development

Phase 2, the removal of tools that increase forceful commitment to regular practice used at Phase 1, was intended to facilitate the transition to a more intuitive and effortless behavior. For 10/10 participants, the beginning of the Phase 2 was associated with increased self-regulation abilities and more mastery in executing the meditation practice, which they developed through committed repetition at the Phase 1. During Phase 2, 8/10 participants experienced a more intuitive instigation of the practice and lesser need for forceful commitment to it, reporting in their Interview 3s:

- The idea naturally pops in my head (Participant 1)
- I feel a lot more confident in knowing that I can stick with the meditation (Participant 3)
- I don't need self-control anymore because it's something that I want to do (Participant 7)

One of the exceptions was Participant 9 whose meditation practice was autonomous from the beginning of the study – in the first two weeks of the study, he completed more meditation

sessions than he planned, stating that, "It just came naturally." Another notable exception was Participant 10 who expressed regret that there were no more journaling and reminders that helped him to complete his practices.

Also, 9/10 participants had a more pleasant experience from their meditation sessions during Phase 2, and for 8/9 (except Participant 9), this pleasure was closely related to the sense of increased personal autonomy, reported in the Interview 3s:

- You have become kind of independent of any external force that is pushing you to do it [...] you take that on as your own thing (Participant 2)
- Because there was less pressure, I felt that I could be more creative with it. [...] I have my own autonomy (Participant 4)
- It felt good to have someone reminding you day in and day out [...] but I'm a lot freer without all that stuff (Participant 5)

Thus, the experience of 8/10 participants fit the two-phase model – i.e. the apparent need for forceful commitment and self-regulation during the first 2 weeks of habit change, and the benefit of autonomy support during the next 4 weeks of habit development – better that the traditional 'spurt' model which would presume a rapid increase in cue-response automaticity during the first two weeks and gradual progress in the next four (Lally et al., 2010). Participant 10 was the only person who fit the 'spurt' model better, which could be explained by his cue-responsiveness. Finally, Participant 9 fit neither model, which could be explained by his intrinsic enjoyment of the practice.

Theme 2: Goals & Outcomes

As part of sampling strategy, all the participants had in mind a desired outcome. The most frequently mentioned aspirations were reducing stress and anxiety (Participants 4, 6, 7), improving attention and emotional awareness (Participants 1, 2, 3, 4, 6, 10), and gaining self-understanding (Participants 2, 3, 4, 5, 9). Additionally, during the first conversation, participants were asked about their goals specifically for the study. They mentioned similar aspirations, occasionally adding a wish to make their practice consistent. At the end of the study, participants were asked about whether they remember the goals they set for themselves. In line with the proposition of action-goal independence in implicit processes, we expected participants to be unable to name their initial goals. As expected, most of the sample, 6/10, confessed that they did not remember their goals. Additionally, there were 2/10 participants (3 & 5) who claimed that their study goal was to "develop a habit." Although this is partially correct, their initial goals were more complex. Nevertheless, there were 2/10 participants (9 & 10) who correctly and confidently identified their goals.

Importantly, regardless of restating the goal, all the participants demonstrated that both of their 'personal' and 'study' goals were met. They usually shared this information in response to general questions, e.g. "How has your practice been going thus far?". For example, Participants 3 & 6 had initial goals of wanting to be less stressed, and they explicitly stated in their interviews that they had become less stressed. Participants 9 & 10 similarly reported improvements associated with making the practice "the part of the self" and "becoming more mindful", respectively.

Another fascinating dynamic was the gradual shift of participants' attention toward the most apparent and effective results of the practice. For example, Participant 1 started with the goal to be less anxious and less reactive in social situations, but then, he mentioned that the pleasant effect of the practice was to "ready [him]self mentally, psychologically for the day".

Thus, we observed that participants did not associate intentional commitment with their habitual actions; nevertheless, they remained conscious of the effects and readily attributed the desire to repeat the action to the most apparent ones.

T*heme 3: Intentionality & Individual Differences in Automaticity Development*

All the ten participants reported that they had developed a habit. However, the course of the habit development and the details of this habit was unique to each participant.The differences between participants come from the degree of automaticity in their pre-study routines and the desire to automatize their meditation practice. Using these qualities as a marker, the sample can be divided into three groups – 1) people who thrive on routines (Participants 5, 7, 10), 2) people who benefit from routines but stay mindful about their intentionality (Participants 1, 3, 8, 9), and 3) people without a stable routine (Participants 2, 4, 6).

Group 1 – Benefits of Routine

Participants in both Group 1 and Group 2 had started the study with relatively stable routines and daily schedules. However, Group 1 is marked by the combination of benefits they received from establishing and following the specific cue-response chain for their meditation practice and by the wish to maintain their newly emerged routine. Participant 7 came into the study with a well-established morning and afternoon routine, due to his stable-hours workdays. However, he expressed dissatisfaction with his unstructured after-job evenings and aimed to fill that uncertainty gap with meditation. For this reason, he decided to meditate after work and made his home return his cue. As he expected, it gave the necessary structure to his evenings and successfully combined with the benefits of the practice and his progressing mastery:

> [Meditating] is something that I really look forward to [...] I arrive home and it's just the first thing that I do. […] And now when I start my meditation, I don't even have to think that much about what I should be doing, but it's already in my meditation routine. (Interview 3*)*

Participant 5, in comparison, was initially more cautious about habit development, claiming that he does not want “an army-like routine” and would be satisfied with “two or three things [as habitual].” Instead, he found that cue establishment was the most efficient study intervention to help him form a habit, and, remarkably, the automaticity component was the most satisfying for him:

> [Establishing a cue] was useful because when you have a day, that's kind of going as per as a plan, it is usual and easy to go in the momentum and to just go with the flow. (Interview 2)

The cue establishment procedure had the most significant impact on Participant 10. For the first few days, he had experimented with the time, location, and execution of his practice, and came up with the most comfortable cue-response sequence for himself. The cue “primed [him] to be ready to meditate,” and he seemed to enjoy the ease of this instigation. Remarkably, even when his larger routine was disrupted by unforeseen circumstances, he was reluctant to change his meditation routine and preferred to reduce the number of sessions per week:

> [The established cue is] what really helped to get everything going. I just felt that after the cue I was ready. I was just ready to go and, in the days, when I didn't have time, I knew that I was like, “I wish I could, but I don't have the time this morning to make it happen. (Interview 3)

Thus, 3/10 participants expressed the desire for a stable and effective routine, associated with the anticipation of the beneficial meditation practice.

Group 2 — Routine and Intentionality

Group 2, in comparison, was either less responsive to cue establishment, or continuously expressed the demand for flexibility in their routines. For Participant 9, having a cue was a "quite helpful" addition to his practice – "something that you get used to doing every day, so it makes everything easier." Nevertheless, he repeatedly indicated that he would meditate whenever it was intuitive for him to do it, so he did not express any cue dependence.

For Participant 8, cue following took a form of routine scaffolding, and during week 4 of the study, after he felt that his habit had the necessary stability, he became less strict with his cue following:

> I would say, [I followed the cue] for the most part, but there were occasions where I did not follow the same cues. I guess probably later, in the four weeks process, I felt a little more comfortable with the development of the habit. So, it kind of got looser, and instead of meditating in the morning, sometimes I'd meditate at night. (Interview 3)

Participants 1 & 3 were similarly interested in having flexibility in their routines. Both had chosen tooth brushing as their cue, which turned out to be strategic since it allowed them to postpone their practice to evenings if their mornings were too busy. A more remarkable finding, however, was their concern about their personal agency in routine following. For Participant 1, the agency question emerged from his use of incense that created an ambient environment for his meditation practice. During the week 2, when he was unusually stressed because of the exams, he would light incense to compel himself to meditate:

> Sometimes if I'm feeling a little stressed and there's this voice in my head being like 'oh we can skip it today, whatever' Then I'll light the incense and then do the next thing that I need to do to get ready for the day. Then I come back into the room, and the incense already smells good and then I'll be like, "okay, cool, I'm ready to meditate." (Interview 2)

However, at the end of week 6, he claimed that he became less dependent on the use of incense and a stable environment in general. He showed appreciation toward his context-independence and attributed it to his developed skill in the practice:

> *I feel like at the beginning I clung to the procedure with the lighting of the incense. It seemed like a bigger thing in my head, were now, even if I'm not at home, it's no big deal. (Interview 3)*

For Participant 3, the question of agency was associated with guided meditations. Participant 3 used Meditopia every session to make the practice more comfortable. However, she claimed that her meditation goal was not only to relax, but also to "have the benefit for me that [she] won't get so caught off guard by unexpected things in [her] environment". This goal motivated her to change the type of her meditation practice to a more self-dependent one and to limit the use of the app only for the days of struggle. Remarkably, she expressed that her need for scaffolding in focusing, and thus in the use of the guided meditation app, was mostly apparent at nights when she could not complete her morning meditation.

Thus, 4/10 participants expressed appreciation toward having a routine, yet they were not aiming to maximize the automaticity in their meditation practice and were intentional about their routine flexibility and personal agency.

Group 3 – No Need for Routine

The distinct feature of Group 3 is the general fluctuation and instability of their routines. For Participants 4 & 6, this was associated with a specific period in their lives, associated with intensive traveling and moving to a new location, respectively. Both participants initially intended to form a stable cue-response habit chain but failed due to the constantly changing context. Instead, they both decided to choose the time for meditation intuitively, "depend[ing] on my schedule" (Participant 4) or "whenever I have a few minutes to spare" (Participant 6). This also entailed choosing the duration of their meditation practice – for Participant 4, those practices could take as little as 3 minutes; for Participant 6, duration ranged from 5 to 15 minutes.

While Participants 4 & 6 had to adapt to unstable routines, Participant 2 was more intentional in having uncertainty in her daily schedule. She was interested neither in intentionally developing automaticity for starting her meditation practice, nor in following a stable routine in general. The primary theme of Participant 2 was her wish to consciously experience the positive effect that her actions produce. This aspiration expressed itself in the benefit of mental contrasting she reported and her definition of a habit and means to develop it (see "Subtheme 3.1"). Similarly to Participants 4 & 6, the most stable feature in the environment of Participant 2 was her day planner, and the stability came from the tasks she would "keep in [her] mental checklist," like walking the dog, and, eventually, meditating. Participant 2 described the reason for meditation joining the list due to the certainty of the effect: "As you gain more familiarity and understanding with something, then you don't have to worry about if this is worth my time." It can be concluded, therefore, that Participant 2 demanded certainty, but not an environmental one, as the habit theory might expect. Interestingly, the initial motivation for Participant 2 to start meditating was the scientific evidence of the benefits the practice gives, and the determining factor in her decision to join the study was the "scientific research" component in our interventions.

As it could be expected, no one from Group 3 expressed any effects associated with cue following, such as easier instigation or pleasant anticipation of practicing. Rather, each of them described meditation as providing stable positive effect that must be maintained:

> With exercise [and similarly with meditation], you feel good. You have, you know, some good chemicals flowing around in your brain. [...] I just don't feel good if I know that I skipped [the session]. (Participant 2, Interview 1)
>
> You must do it, but you're so used to doing it that you still have to make yourself do it. But you know that it has, like, a positive result in the end. (Participant 4, Interview 3)
>
> Sometimes it feels like I only do it to check it off the list, but otherwise I think it's still good. And it's good for me to keep the habit because even if some days are not great, then other days after it just means that I will keep trying, and then I will have good days as well. (Participant 6, Interview 3)

Thus, 3/10 participants were able to develop positive associations with meditation and practice it regularly, despite not having a stable routine and not intentionally forming cue-response associations.

Subtheme 3.1: What is a Habit?

All the participants claimed that they had developed a habit. However, since they were asked whether they "believe that [they] have developed a habit [for themselves]," rather than

whether their relation to meditation practice resembles the academic definition of a habit, the explanations were heterogeneous.

Participants' lay definitions of habit were more aligned with the 'attitude-toward-routine' perspective. Participants with no consistent routine used the discomfort from not performing an action as a marker of a developed habit. Participant 4 concluded that she has a habit because she felt the same discomfort from not meditating as from not brushing her teeth, and Participant 6 compared her meditation practice to her flossing habit. Participant 2 stated that her mark of a habit is that she feels the need to meditate every day. She compared this impulse to walking her dog– an activity that she cannot simply skip.

People who thrive on routines referred to consistency of their practice and anticipation of it as a marker of habit. The leading theme of Participant 5, despite his initial belief that "If [the habitual action] is missed, you feel like something is lacking in your life," was that he practices meditation at the same time and after the same cue, which significantly improves his performance and makes him look forward to meditating. Similarly, Participant 7 stated that he always looks forward to meditating after the same sequence of events – i.e., when he comes home from work. Finally Participant 10 defined the habit as "something that I am not struggling to find time for [because it is the part of the day at the intuitive level]." He stated that he had the habit "started," and he would need to "increase the frequency" of meditation practicing per week, yet he had already had the necessary "cue priming" to perform meditations consistently.

Group 2, those who appreciated routine and intentionality, used the idea of effortless initiation to define the habit. They used terms like "second nature" or "like a nature" (Participants 1 & 8), "body knows before the mind" (Participant 3), and "something that you are used to do, even if you are not aware, even if your mind may not be prepared to do it" (Participant 9).

Finally, all the participants claimed that consistency, commitment, and discipline would be the key component of successful habit development. The suggestions of additional accountability to the researcher (Participant 2), prompt reminders (Participant 10), and overall discipline (Participant 5) converge on the lay understanding that regular repetition is the key to habit formation. Importantly, the results from Phase 1 confirm participant's intuitions.

Discussion

The present longitudinal qualitative study had several goals. First, it aimed to advance the theoretical discussion of habit operationalization and its presumed functions. The study followed participants over the course of implementation of a new habit – practicing mindfulness meditation – into their existing routines. The tested function of a 'habit' was the reduction of attentional and decision-making stress through forming an association between a particular action and its repeated outcome. These assumptions were partially correct – for all the participants, progress in habit development was associated with increased confidence in meditation practice's impact on their emotional state. However, although several participants did experience stress from their routines being disrupted, for most participants, the most significant stressor was the process of mastering the practice of meditation itself, e.g. maintaining non-judgmental awareness of the present moment.

Another goal that the study pursued was to explore the novel two-phase model of habit development, which resolves the conceptual contradictions of routine change and habit development. The main assumption of the two-phase model is the incompatibility between the intentionality, commitment, and deliberation of routine change and the effortlessness of a habit developed. Our study showed the effectiveness of this model: all participants reported developing a habit in two phases. In the first phase, when participants experienced resistance to practice, they benefited from traditional awareness-increasing and commitment-facilitating strategies

(Duckworth et al., 2011). Subsequently, when the meditation execution was already mastered, participants report more appreciation of having autonomy and flexibility in their practice.

The third goal the study explored the traditionally conflicting components of habit development – i.e. action-outcome independence, implicit goal pursuit, and environmental cue following – via the unique methodological contribution of qualitative methods. Our study shows that individuals are conscious of the benefits they desire and receive from their practice, but they do not always attribute these as their original intentions. We also observed that people can implicitly restructure their goals and continue to perform the habitual action because of its most beneficial and/or apparent aspect – although people remain aware of this effect, they forget about the initial reasons for taking up the behavior. Thus, returning to the theoretical question of 'goal-lessness' and implicitness of habitual actions, these findings support the idea of Kruglanski and Szumowska (2020) that habitual actions must be goal-directed regardless of the degree of implicitness of these goals. Our study further suggests that goal-directedness would be also maintained independently of how accurately we are able to identify the outcome that makes a habitual action attractive, if it does not conflict with our intentionality (Wood & Neal, 2007).

Fourth, our findings question the definition of automaticity and challenge the importance of environmental cues for goal activation and habit sustainability, as well as the general assumption of human preference to maximally optimize cognitive loads and cling to the familiar and certain (Bargh, 1996). Our results suggest a more complex system, in which the discomfort from not completing a habitual action could (or could not) happen both after encountering the cue and without a stable cue at all, depending on the individual's attitude toward personal agency and their desire for automaticity in their actions. Importantly, these observations do not challenge the point of the classic habit theorizing that having a cue-response chain indeed reduces the cognitive load necessary for behavior instigation (e.g. Phillips & Gardner, 2016; Wood et al., 2002). Instead, our study implies that people range in their desires for routine, predictability, and automaticity, which emerges from the question of personal agency and control over their own decisions and actions. Similarly, our study does not dismiss the desire for action-outcome certainty among people without stable routines. Nevertheless, these findings pose several practical questions to habit-development methodologies, encouraging the rethinking of cue-establishment as the necessary and sufficient procedure for effective habit formation. Future studies should more precisely examine the relationship between the need for personal agency and responsiveness to cue establishment.

The present study has several limitations. First, since the sample was constituted of mindfulness meditation enthusiasts, we may expect that the issues of awareness, personal agency, and self-control would be mentioned less frequently in a sample taken from the general population. Second, the widespread effect of increasing autonomy during Phase 2 may be attributed to both the study intervention and to meditation practice as the practice of non-judgmental awareness and self-sustainability. Third, future studies could benefit from implementing the "qualitative experiment" mixed-method design (Robinson & Mendelson, 2012; Steils, 2021). This research design has shown its effectiveness for behavior change studies in testing the effectiveness of self-regulation strategies (Leonov & Laplante, 2024). A potential qualitative experiment will involve two conditions: one for the 'spurt' model of habit development (Lally et al., 2010), and a control one with no interventions to make a more precise comparison of models.

Future Directions for Behavior Change Implications

The research of habit development has been predominantly concerned with the gap between people's knowledge of wellness-improving activities – such as vegetable consumption – and the

reluctance to change their lifestyles accordingly, despite the initial motivation for change (Wood, 2021). The present study applies this concept of habit formation specifically to mindfulness meditation; the same principles may be applied to other activities associated with building wellness and preventing workplace burnout. Studies evaluating other evidence-based self-care methods – such as yoga practice for burnout prevention in nurses (Alexander et al., 2015) and regular physical exercising for burnout prevention in general population (Bretland & Thorsteinsson, 2015) – used longitudinal timeframes like our duration (8, 4, and 6 weeks, respectively). Therefore, it may be assumed that these activities would be specifically responsive to habit development interventions, thus becoming even more effective and applicable for well-being maintenance and burnout prevention.

Our study also contributes to a larger problem of behavior regulation, suggesting that the mere deviation from the habitual action pattern would act like a decision-making and/or environment assessment stressor. One of the pertinent psychological conditions that illustrates this dynamic in its extreme is autism-spectrum disorders (Russell & Brosnan, 2018). Several studies indicate that individuals with ASD experience higher amounts of behavioral and physical stress when exposed to unfamiliar environments and stimuli (Corbett et al., 2019; Stein et al., 2014) and are prone to recalling nostalgic memories to navigate through emotional stress (Bennett et al., 2025). Therefore, implementing the concept of habit as an uncertainty-stress management mechanism may yield explanation for the [in]effectiveness of existing methods and serve as a fertile ground for new intervention design.

Conclusion

The present longitudinal qualitative study explores the conceptually restructured definition of a habit and the effect of the novel two-phase model of habit development entailed by this reconceptualization. The results corroborated the function of habits as promoters of action-outcome certainty, facilitated the discussion of the implicitness and non-intentionality in goal-attainment via habitual actions, and challenged the presence of a vivid environmental cue as a cornerstone of habit development. Additionally, the six-week course of mindfulness meditation habit development in accordance with the two-phase model – first two weeks facilitate awareness and commitment to the regular behavior repetition and next four weeks facilitate autonomy in behavior instigation – suggested that this model would be more accurate for habit development promotion. Finally, the article discussed the areas of further testing and implementation of the two-phase model, including the organizational context (burnout prevention) and clinical context (therapy for ASD).

Authors Contributions

Both authors designed the study hypothesis and methodology. Both authors obtained IRB approval. Artemiy Leonov recruited participants and conducted data collection procedures. Artemiy Leonov transcribed and analyzed data. Both authors drafted and prepared the manuscript for submission.

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Institutional Review Board Statement

This project meets all ethical criteria from Clark University IRB (IRB review #320).

Informed Consent Form

Before any kind of data collection began, all participants read and discussed the specifics of the informed consent procedures before signing the form to indicate their agreement to engage in the stated behavior change procedures, complete self-report questionnaires, and participate in 3 ~1hr interviews over the course of 6 weeks. They also consented for de-identified data to be published.

Data Availability Statement

The raw interview transcripts that include both interviewer's questions and participants' responses, journal entries, and demographic surveys have been made publicly available at the Zenodo repository and can be accessed at 10.5281/zenodo.12675705.

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Conflicts of Interest

The authors report no conflict of interest.

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Notes on Contributors

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