Be Mindful of User Preferences: An Explorative Study on Game Design Elements in Mindfulness Applications

Shanshan Hu
Karlsruhe Institute of Technology
shanshan.hu@kit.edu

Aylin Usta
Karlsruhe Institute of Technology
ughgc@student.kit.edu

Manuel Schmidt-Kraepelin
Karlsruhe Institute of Technology
manuel.schmidt-kraepelin@kit.edu

Simon Warsinsky
Karlsruhe Institute of Technology
simon.warsinsky@kit.edu

Scott Thiebes
Karlsruhe Institute of Technology
scott.thiebes@kit.edu

Ali Sunyaev
Karlsruhe Institute of Technology
sunyaev@kit.edu

Abstract

Mindfulness practices are valuable exercises for physical and mental health. Various digital applications exist that support individuals in practicing mindfulness. Following the trend of gamifying utilitarian systems, many mindfulness applications (MAs) incorporate game design elements (GDEs). However, little is known about users' GDE preferences in this unique context. In line with extant research that investigated users' GDE preferences in other contexts, we conducted an online survey among 168 potential users of MAs. The results indicate that users generally prefer progress, levels, and goals in MAs, while leaderboards and avatars are not highly rated. Furthermore, we identified four context-independent and three context-dependent rationales that help explain users' GDE preferences. By providing first insights into MAs as a peculiar application context for gamification, our work contributes to advancing knowledge of contextual differences in users' GDE preferences while challenging the extant research assumptions regarding the dominance of contextual factors in forming user preferences.

Keywords: Gamification, Game Design Elements, Mindfulness, User Preferences, Online Survey

1. Introduction

Over the past two decades, mindfulness has gained wide-ranging popularity in science and practice (Creswell, 2017). Broadly speaking, mindfulness refers to a mental state in which awareness is raised through nonjudgmentally paying attention to the present moment (Kabat-Zinn, 2003). Existing research indicates the potential benefits of practicing mindfulness for both physical health (e.g., blood pressure regulation) and mental health (e.g., emotional regulation) (Creswell, 2017). Recently, digital mindfulness applications (MAs) have become increasingly popular as they allow users to flexibly attend mindfulness practice sessions on their own schedule at low costs (Mrazek et al., 2019). Following the general trend toward using elements borrowed from video game designs in utilitarian systems (i.e., gamification) (Deterding et al., 2011; Koivisto & Hamari, 2019), many MAs have begun to incorporate more and more game design elements (GDEs) (Sliwinski et al., 2017).

In general, gamified systems intend to evoke meaningful engagement by enhancing both instrumental (e.g., completing training courses) and experiential (e.g., satisfaction and enjoyment) outcomes (Liu et al., 2017). However, different GDEs yield different effects. For instance, *goals* may lead to self-regulation processes within users, while *leaderboards* may trigger social comparison between users (Fallon et al., 2020). Extant research has argued that gamification can fail to achieve these desired motivational effects or even lead to unintended negative consequences, when the selection of GDEs is unsuitable for the respective application context or neglects users' preferences (e.g., by developing one-size-fits-all solutions) (Koivisto & Hamari, 2019). Thus, to advance effective gamification concepts tailored to contexts and user-related specificities, a sound understanding of users' needs and preferences regarding GDEs in specific contexts is required (Klock et al., 2020; Rodrigues et al., 2020).

Several studies have provided valuable information on users' GDE preferences in different contexts, such as healthy nutrition (Berger & Jung, 2021), physical activity (PA) (Schmidt-Kraepelin et al., 2019a), and learning management systems (Schöbel et al., 2016). Nevertheless, the insights on user preferences in these contexts are not easily transferable for the effective design of gamified MAs as the context has some special requirements regarding user-system interactions. For instance, previous research has argued that slow interactions with systems and a reduced focus on efficiency can promote engagement with mindfulness practices because mindfulness necessitates a nonjudgmental atmosphere and calm surroundings without distractions from the present exercise (Kabat-Zinn, 2003; Terzimehić et al., 2019). Such requirements

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are antithetical to the desired effects of gamification in other contexts (e.g., achievement or competition), distinguishing mindfulness from other widely examined contexts of gamification like PA or education and making it a particularly interesting application context for gamification research. Thus far, research has also produced little insight into the underlying factors that influence why users form preferences for certain GDEs in specific contexts. A better understanding of rationales behind users' GDE preferences within the context of MAs will aid in explaining and predicting users' engagement with gamified MAs in the future. Therefore, we ask the following research questions (RQs):

RQ1: Which GDEs do users of MAs prefer?

RQ2: How do users of MAs rationalize their GDE choices?

To answer our two RQs, we conducted an online survey with 168 potential users of MAs based on a best-worst-scaling (BWS) approach that resulted in a ranking of the ten most prevalent GDEs. Moreover, we analyzed users' justifications for their GDE preferences, which led to the identification of seven different rationales. The contribution of our work is three-fold. First, we provide an overview of users' GDE preferences in MAs, thereby contributing to a better understanding of meaningful gamification design in this unique context. Second, by comparing our results with similar studies in other application contexts, we enhance the knowledge base about contextual differences in users' GDE preferences. Lastly, by uncovering context-dependent and -independent rationales for users' GDE choices, we advance the scientific knowledge on the determinants that drive the formation of users' GDE preferences and set the base for more explanatory theory-driven research on that matter. The knowledge provided in this work is one of many building blocks needed in the future to develop highly efficient personalized and tailored gamification concepts for unique application contexts.

This paper proceeds as follows: Section two briefly presents the related work about gamified MAs and users' GDE preferences. We then outline our survey procedure. Section four presents our results in the form of users' preferred GDEs and rationales behind them. We discuss our findings, elaborate on the potential limitations of our study in section five and conclude our paper at the end.

2. Background

2.1 Gamification in Mindfulness Apps

In this study, we refer to mindfulness as a mental state in which awareness is raised through nonjudgmentally paying attention to the present moment (Kabat-Zinn, 2003). Mindfulness can be reached and sustained through mindfulness practice (Terzimehić et al., 2019). Recently, a shift toward digital MAs attracted much interest as the traditional face-to-face practice is more limited in terms of time and geographical location (Mrazek et al., 2019). Moreover, developments such as the COVID-19 pandemic and the low availability of mental health practitioners have further increased the need for MAs. To that end, extant studies show that MAs can positively impact emotional outcomes (e.g., depression, anxiety, and stress). For example, Howells et al. (2016) found a reduction in depressive symptoms during a controlled trial in which 121 participants used the MA *Headspace* for ten days. Despite the potential positive effects, MAs also face challenges with respect to adherence. To foster user engagement and ultimately long-term use, several prominent MAs like *Headspace* and *The Mindfulness App* implement gamification (Floryan et al., 2020).

In research, MAs are often classified as a type of mental health intervention (MHI) (e.g., Cheng et al., 2019; Floryan et al., 2020). Reviews regarding gamification for MHIs have shown that initial research endeavors focused on whether gamification works or not (Brown et al., 2016; Johnson et al., 2016). However, extant research still repeatedly calls for investigations of individual GDEs in different mental health contexts (Cheng et al., 2019; Koivisto & Hamari, 2019). It is not too surprising that studies explicitly dealing with gamified MAs are mainly limited to assessing MAs' overall effects on desired outcomes, such as lower depression severity (Fish & Saul, 2019) or increased focus (Bennike et al., 2017), without investigating the effects of GDEs separately, or considering users' perspectives or providing thorough guidance on how to design gamification in this unique context (Sliwinski et al., 2017). One of the few studies that touches on users' attitudes toward gamified MAs has been conducted by Ahtinen et al. (2013). This field study with 15 users of the mental health app *Oiva* indicated users' skepticism toward rewards (e.g., points). Users stated that rewards do not fit the philosophy of mindfulness, concentration, and stillness. This highlights that users have specific preferences considering gamification in MAs and suggests taking user preferences into account and integrating gamification carefully in the context of such sensitive topics, which is in line with extant research (Cheng et al., 2019; Schmidt-Kraepelin et al., 2019b).

2.2 Users' Game Design Element Preferences

Gamification, in broad terms, refers to the use of elements typically found in video games (e.g., points, badges, leaderboards, narratives) to evoke gameful experiences in non-game contexts (Koivisto & Hamari, 2019). Extant research highlights that when selecting GDEs, it is necessary to consider the underlying

application context and users' preferences. Especially, linking user preferences to the applied context plays a fundamental role in the acceptance, feasibility, and sustainability of gamification (Deterding, 2015; Morschheuser et al., 2018). To elicit context-specific user preferences, extant research uses a variety of different approaches, including focus groups (e.g., Nour et al., 2018), questionnaires (e.g., Fitz-Walter et al., 2013), collecting log data (e.g., Van Houdt et al., 2020), or user profile data (e.g., Li et al., 2019). These studies provide valuable insights, especially in developing personalized and tailored gamification concepts (Schöbel et al., 2021). However, plenty of them focus on the effective development of a specific system considering their users' preferences, thereby narrowing their results to a very specific system and target group.

Another related literature stream has dealt with developing user types with distinct gamification preferences based on personality traits (e.g., Tondello et al., 2016) or the influence of demographic factors like age (e.g., Yuan & Guo, 2021) or gender (e.g., Koivisto & Hamari, 2014). A recent study by Hassan et al. (2020) examined the relationship between player types and user preferences regarding general gamification features (i.e., achievement, immersion, and social interaction). While this study substantially contributes to research on users' GDE preferences, it is limited to abstract categories of GDEs rather than individual GDEs.

The stream of literature that is closest to our study consists of studies that have explicitly investigated users' GDE preferences linked to an application context but independent of specific systems or user groups. To the best of our knowledge, three such studies exist: in the contexts of PA (Schmidt-Kraepelin et al., 2019a), nutrition (Berger & Jung, 2021), and learning management systems (Schöbel et al., 2016). However, given the context-sensitivity of gamification (Koivisto & Hamari, 2019; Nacke & Deterding, 2017) and the peculiarities of the mindfulness context, the results of these studies are unlikely transferable. Despite the benefits of mindfulness for well-being and the importance of the user perspective for the gamification design, we still lack an understanding of users' GDE preferences in the context of mindfulness.

3. Methods

3.1 Best-Worst-Scaling Approach

In line with extant research on GDE preferences (Berger & Jung, 2021; Schmidt-Kraepelin et al., 2019a; Schöbel et al., 2016), we conducted a scenario-based online survey informed by the BWS approach to elicit users' GDE preferences in MAs. In doing so, we aimed to make our findings comparable and contribute to discussions on the context-sensitivity of gamification.

Pioneered by Louviere and Woodworth (2013), the BWS approach measures participants' preferences for a set of items. A questionnaire based on BWS usually consists of different choice sets (CSs), with each CS containing at least three items of interest. Participants have to repeatedly select two items from a displayed CS until all CSs were presented. The two chosen items from each CS denote the greatest perceptual difference in participants' interests. Compared to other techniques for measuring preferences, like direct ranking mechanisms or rating scales (e.g., Likert scales), BWS offers two advantages: (1) its forced-choice nature ensures the discrimination of items; (2) it is scale-free and avoids potential biases as participants do not need to maintain consistency in calibrating the scale across items.

To define the items in our BWS-based survey (i.e., GDEs), we synthesized the findings from two sources: (1) extant literature reviews regarding gamification in mindfulness and related contexts like stress management or cognitive behavioral therapy (Brown et al., 2016; Cheng et al., 2019; Hoffmann et al., 2017); (2) the chosen GDEs of previous BWS studies on users' GDE preferences in health-related contexts (Berger & Jung, 2021; Schmidt-Kraepelin et al., 2019a). We had to limit our study to the ten most relevant GDEs to ensure feasibility because the number of required CSs depends on the number of incorporated objects. Additional information on the selection of GDEs in our study can be found in the online supplement material[1].

To find a suitable amount of CSs, we constructed them based on the balanced incomplete block design (Louviere et al., 2013). Following the guidelines by Orme (2005), we created 15 CSs where each GDE appeared six times and co-occurred with other GDEs twice under the consideration of four criteria: (1) each CS should include four or five objects; (2) each object should be presented at least three times; (3) each object can only appear at most once in the same CS; (4) use around 15 CSs for ten or fewer objects.

3.2 Data Collection

The online survey for collecting users' preferences and the rationale behind them consists of five steps (see Figure 1). Firstly, we introduced the survey procedure and targeted scenario by asking participants to imagine that they would use an MA, in which they can follow guidelines to practice mindfulness. We then explained all GDEs included in our survey by providing mockups for each GDE (see Table A-1 in the appendix).

[1] http://dx.doi.org/10.13140/RG.2.2.15914.29122

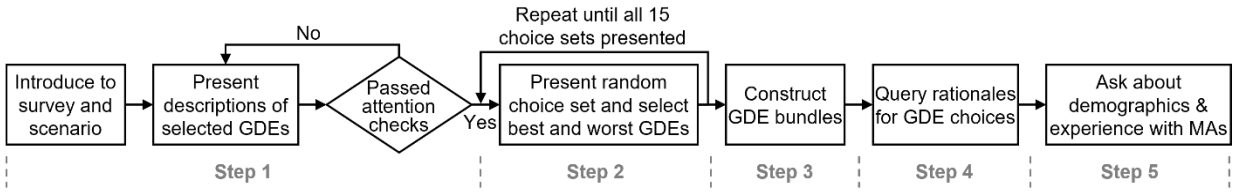

Figure 1. Survey Procedure.

In addition, we asked participants if they were familiar with the presented GDEs prior to the survey. Before step 2, participants had to answer two control questions to ensure that they were attentive to the introduction. Once participants passed the attention checks, we asked them to choose their most and least preferred GDEs in the MA from one of the CSs. This step was repeated until all 15 CSs were presented. Throughout this step, participants had access to the associated descriptions and mockups introduced at the beginning of the survey. In step 3, participants were asked to construct a bundle of their preferred GDEs freely. Following this task, participants were asked to explain which elements they liked best and why by responding to the question "*Please describe briefly which elements you like best and why*". Finally, we collected participants' demographics and asked whether they had already used an MA in the past. Before rolling out our survey to participants, we pre-tested it with six experienced researchers to ensure its feasibility. This resulted in only minor phrasing modifications and the clarification of the term mindfulness.

3.3 Data Analysis

To analyze participants' GDE preferences (RQ1), we calculated a counting analysis to define the ranking positions, followed by conditional logistic regression analysis to verify the ranking. In addition, we examined bundles of GDEs that participants preferred to construct.

To investigate possible reasons for the variation in users' preferences (RQ2), we conducted an open coding process on the responses to the open question. First, two authors directly engaged with the responses from participants, extracted the most relevant statements that described rationales for their preferences and conducted an initial coding resulting in first-order constructs. Afterward, the two authors analyzed commonalities and differences across the first-order constructs and iteratively discussed them with two additional authors, which led to the identification of seven second-order constructs. For example, the statement "*Progress [...] help(s) me the most just to see how far I've come*" was coded as the first-order construct *see achievements*. In addition, the statement "*I prefer elements which keep track of my progress by collecting points*" was coded as the first-order construct *track progress*. Later, those two first-order constructs were merged into the second-order construct *opportune feedback*. In the final step, we categorized the refined second-order constructs under the consideration of contextual dependency.

4. Results

4.1 Sample Description

We recruited the participants via social media by sharing our survey in several Facebook groups related to mindfulness and publishing our survey in university-related groups and on LinkedIn. 198 participants completed the questionnaire. We excluded 30 answers due to failed attention checks. For data analysis, 168 responses remained, of whom 92 self-reported their gender identity as female (54.76%), 73 reported themselves to identify as male (43.45%), and three preferred not to specify their gender (1.79%). The age range covered 17 to 56 years (M = 26.36, Mdn = 23, SD = 9.90). The majority of our sample had at least a bachelor's degree (81, 48.21%). 57 participants (33.93%) confirmed prior experience with MAs.

4.2 Users' Game Design Element Preferences in Mindfulness Applications

Through a counting analysis and a conditional logistic regression analysis, we identified which GDEs users of MAs prefer. We used the R programming language and the RStudio application for these analyses. The results are summarized in Table 1.

Table 1. Results of BWS analyses.

GDE	Counting Analysis				Regression Analysis		Rank
	B	W	Std. Mean	SD	Coef.	SE	
Progress	622	38	0.579	0.363	2.632	0.082	1
Levels	395	41	0.351	0.358	2.049	0.077	2
Goals	463	121	0.339	0.353	2.030	0.077	3
Points	256	114	0.141	0.387	1.567	0.074	4
Badges	214	200	0.014	0.462	1.270	0.072	5
Stories	202	257	-0.055	0.511	1.155	0.072	6
SI	127	372	-0.243	0.507	0.699	0.070	7
VG	128	421	-0.291	0.518	0.599	0.071	8
LB	80	385	-0.303	0.443	0.558	0.071	9
Avatars	33	571	-0.534	0.422	-		10

SI: Social interaction; LB: Leaderboards; VG: Virtual goods

In our counting analysis, we calculated the times each GDE was chosen as most or least preferred, listed under 'B' (best) and 'W' (worst). Beyond that, we determined the standardized mean score (std. mean) for each GDE. To do so, we first calculated the difference between the number of times each GDE was chosen as most preferred ('B') and the times it was chosen as least preferred ('W'), then divided this difference by the frequency of occurrence in a set (six times in our case) and multiplying this quotient with the number of participants (Finn & Louviere, 1992). For example, the element *goals* was chosen 463 times as the most preferred and 121 times as the least preferred element in all displayed choice sets. The calculation was as follows: (463-121) / (6*168) = 0.339. The corresponding scale ranges from -1 to 1, considering a higher score as more preferred and vice versa. According to our calculation, the three most preferred GDEs are *progress*, *levels*, and *goals*. Our participants chose *avatars* as the least preferred element, followed by *leaderboards* and *virtual goods*. We verified these results of the counting analysis by conducting a conditional logistic regression analysis. To avoid the dummy variable trap, one independent variable had to be omitted from the model (Flynn et al., 2007). We excluded the lowest-ranked element *avatars*. All other GDEs' coefficients reflect the difference in utility to the element *avatars*. Overall, the results of the regression analysis confirm the results of our counting analysis given the same ranking positions.

In addition, we included a combination task (i.e., creating bundles of GDEs) to find out how many and which GDEs they would combine in a gamified MA. The majority of responses contained four (22.6%) and five (24.4%) GDEs. The overall mean value was 4.375. The most common combination appeared eight times and exactly consists of the top three GDEs from the BWS analyses (*progress*, *goals*, and *levels)*.

Besides, we looked at control variables that might explain the deviations in users' preferences. First, we investigate the possible influence of gender on preferences. By splitting up the data set, we analyzed female and male participants' preferences separately. We did not observe significant differences for most GDEs. The largest deviation was found for *badges* (female: std.Mean = -0.014, male: std.Mean = 0.062) and *stories* (female: std.Mean = -0.034, male: std.Mean = -0.093). Moreover, we detected a disparity in ranks 7 and 8. While women selected *social interaction* in rank 7, men chose it one rank lower (i.e., switching the order of *leaderboards* and *social interaction*). A Wilcoxon test did not indicate a significant influence of gender on the optimal bundle size ($p = 0.119 > 0.05$). Finally, we performed a Chi-Square test to determine whether familiarity and preferences are correlated. The results indicate that participants prefer to select GDEs they are familiar with (Chi-Square(1) = 50.394, $p < 0.001$).

4.3 Rationales for Users' Preferences

In response to our question about reasons for the preferences, 107 participants explained why they selected or rejected certain GDEs. Overall, seven rationales emerged from our analysis (see Table 2).

4.3.1 Context-independent rationales. Context-independent rationales are not dependent on the applied context and could be valid in contexts other than MAs.

Meaningful Orientation. Our results indicate that users prefer a GDE when it helps them to concisely determine their targets because purposeful activities better orient users to engage with them, especially for a sustained period. For this explanation, *goals* were by far the most mentioned element, owing to their possible effects as remarked by our participants: Setting meaningful goals enables users to "*have something to look forward to*" and "*motivate(s) you to continue because you know what you are trying to achieve*". Meanwhile, many participants valued GDEs which imply concrete milestones (e.g., *levels* and *badges*) to keep them motivated through small and reachable targets. As three participants pointed out, collecting badges can encourage them to "*reach the next level and use the app on a regular basis*" or even "*adapt the use [...] to a daily routine*". A closer inspection of responses shows that participants consider not only the clarity of orientation but also the challenges posed by the targets. Participants reported feeling inspired and motivated if a predefined target indicates ideas which they would not have thought of on their own. This view was echoed by many participants who argued that GDEs like *badges* support users to cultivate new worthwhile directions.

Opportune Feedback. Most participants agreed with the high importance of feedback for their engagement because it reflects personal improvement and the sense of accomplishment encourages them to persevere when they lack motivation. Therefore, users would prefer GDEs implemented to provide information about users' past achievements and status. Named elements sustaining these aspects were primarily *progress*, *levels*, *points*, *badges*, and *virtual goods*. These GDEs primarily boost feedback mechanisms by (1) offering immediate rewards and (2) enabling users to trace their attainments instantly. Consequently, users are stimulated to engage with MAs continually.

Attractive Design. Innovative and aesthetically pleasing GDEs attract our participants. This aspect was particularly highlighted by the selection of *badges* as they visualize "*milestones*" and are "*more exciting than mere levels and numbers*". A minority of participants reported being fascinated by GDEs, which had not been

widely used in practice. They argued that this attraction stems from innovative and unique features. Some participants reported preferences for *avatars* and *stories*, as they found that implementing these two GDEs was much less frequent in released mobile applications.

External Support. Our participants also stated that they could benefit from social assistance, such as exchanging with like-minded people. GDEs like *social interaction* can effectively enable users to "*share [their] own experiences and journey*", which contributes to satisfying social needs such as needs for companionship and belonging. In turn, users can affirm their own value by "*support[ing] others while struggling [...] to reach their end goal*". Two participants especially pointed out that they can benefit from interaction within a small social circle of close friends and relations.

4.3.2 Context-dependent Rationales. Context-dependent rationales strongly link to the context of MAs.

Concentrated Attention. A common view amongst participants was that users of MAs usually aspire to an undisturbed environment due to the core principles of mindfulness practice. As one participant suggested, MAs intend to facilitate users to enjoy "*the individual and mindful progress that cannot be rushed*". Accordingly, participants in our survey favored GDEs like progress or levels, which "*primarily focus on the individual growth*" instead of distracting them from their own state and the ultimate object. In contrast, GDEs promoting connections with others can "*harm productivity*" as the pursuit of self-acknowledgment can be overshadowed by the urge to outperform others.

Relaxing Environment. Another context-specific rationale for users' preferences is the level of perceived stress while using MAs. In our survey, an aversion to competitiveness symbolized by *leaderboards* stands out. This is caused by potential impacts of competition on mindfulness, as illustrated by two participants: "*Mindfulness is about less stress […but] social comparison always brings as a side effect*" and "*could potentially skew the actual purpose of the app*". People would avoid comparison symbols in MAs since they usually intend to "*come to peace and try to reach a stress-free mindset*" in the mindfulness practice. Furthermore, participants emphasized the suitability of the element *stories* for the context of mindfulness, especially with pleasant and relaxing storylines.

Emotional Connection. A minority of participants reported that feelings of closeness to specific GDEs, such as *avatars* or characters in *stories*, influence their preferences. This sense of connection attracts participants to sustain a meaningful use of MAs over time because an emotional attachment facilitates users to relate to personal experiences and explore individuals' awareness, which aligns with the essence of mindfulness. For example, one participant expressed that "*an avatar brings [...] the identification [of myself]*" and many responses argued that *stories* are "*associated with more emotions*" and can stimulate "*creativity to adapt the stories to [personal] experiences*".

Table 2. Rationales for Users' Preferences in the context of mindfulness applications.

Category	Rationale	Description	Exemplary Quotes
Context-independent	Meaningful orientation	GDEs are preferred if they can assist users in defining coherent targets with concrete milestones and appropriate challenges.	• "*Have something to look forward to*" • "*Reach the next level and use the app on a regular basis*"
	Opportune feedback	Users favor GDEs which can present immediate rewards, provide information about users' achievements or reflect personal improvement.	• "*They are rewarded immediately and show the importance of specific actions*" • "*Tracking your own progress can be very motivating*"
	Attractive design	Users are enticed by innovative and aesthetically pleasant GDEs.	• "*Badges are aesthetically pleasing which makes them more exciting*" • "*It's a new concept to me*"
	External support	Users value social elements to benefit from external assistance while also having the opportunity to provide support to others.	• "*You can meet new people*" • "*Support others while struggling in order to reach their end goal*"
Context-dependent	Concentrated attention	Users prefer undisturbing GDEs to prevent distraction and promote self-acknowledgment.	• "*Elements that primarily focus on the individual growth of a person*" • "*Non-distracting elements*"
	Relaxing environment	Users appreciate GDEs which promote pleasure and relaxation, as mindfulness is primarily concerned with stress reduction.	• "*Come to peace and try to reach a stress-free mindset*" • "*Mindfulness is about less stress*"
	Emotional connection	An emotional attachment to GDEs can motivate users to explore individuals' feelings, which aligns with the essence of mindfulness.	• "*An avatar brings […] the identification [of myself]*" • "*Associated with more emotions*"

5. Discussion

5.1 Principal Findings

This study reveals preferred GDEs by potential users of MAs and the rationales behind their preferences. Our main findings are discussed in the following.

First and foremost, our results provide a ranking of preferred GDEs based on the preferences of potential MA users. The four most preferred GDEs in a gamified MA turned out to be *progress*, *levels*, *goals*, and *points*, while elements that reflect social aspects (e.g., *leaderboards*, *social interaction*) were ranked lower. This ranking strongly resembles findings of previous BWS studies on users' GDE preferences (Berger & Jung, 2021; Schmidt-Kraepelin et al., 2019a; Schöbel et al., 2016), especially for health-related contexts. A possible explanation for these strong similarities might be that users generally value GDEs that support them to concentrate on individual journeys and self-development toward targeted outcomes, such as healthier lifestyles (Schmidt-Kraepelin et al., 2019a).

What stands out in the ranking is the position of *stories*. This GDE is significantly better scored in our study than in other contexts. Compared to PA or nutrition, mindfulness practice mainly requires high levels of concentration and immersion in the present moment, which might be better guided by *stories* than by other elements. Moreover, it is interesting to note that our participants have contentious views on *goals*. This GDE was chosen as the *best* element 68 times more often than *levels*, while it also got more disapproval than *levels* (80 more votes as the worst element). These contentious views could be attributed to the potentially mixed effects of the element *goals* on the mindfulness practice. Although a concise target may help users continue engaging with MAs, the target itself presents a future state, which moderately deviates from a fundamental concept in mindfulness, namely focusing on the present moment.

Meanwhile, we derived seven rationales for users' GDE preferences from participants' justification. Four of them are context-independent, while three rationales are strongly associated with the context of mindfulness. These rationales help us to better understand how users' GDE preferences for MAs are influenced. Considering the similarities between our ranking and the results of the three BWS studies on users' GDE preferences, the four context-independent rationales seem to form the base of users' preferences (i.e., GDEs that focus on personal improvements, like *progress* or *levels* outweigh GDEs that foster users' representation and connection with others, such as *avatars*, *social interaction*). However, context-dependent rationales contribute to explaining deviations in preferences for specific GDEs in different contexts. This can be illustrated by users' preferences for *stories* in MAs or *leaderboards* in PA. Such discrepancies strengthen the assumption about the particularities of mindfulness and clarify the role of contextual factors in users' GDE preferences.

Besides, the only difference we found between the preferences of men and women was the ranking positions of *leaderboards* and *social interaction*. Women preferred *social interaction* over *leaderboards*, while men ranked it the other way around. These findings reinforce existing literature, suggesting that women prefer to exchange with others more strongly than men and gain better benefits from it (Koivisto & Hamari, 2014). In addition to demographic factors, our results indicated the significant influence of familiarity with GDEs on user preferences. These findings match those results observed in previous studies (Schmidt-Kraepelin et al., 2019a; Schöbel et al., 2016) and further strengthen the assumption that factors independent of context play an important role in influencing users' GDE preferences.

5.2 Implications

Our study yields important implications for research. First, our results reinforce the need for personalized and tailored gamification by revealing that individual and contextual factors can influence users' GDE preferences. On the one hand, we found a significant influence of familiarity with GDEs on user preferences indicating a substantial impact of individual factors as well as context-independent rationales through our qualitative data analysis. On the other hand, we also found differences between the context of MAs and other contexts accompanied by context-dependent rationales stated by participants of our study. Second, our findings raise intriguing questions regarding the dominance of contextual factors in forming user preferences. It is interesting to see that the popular GDEs are similar across all contexts, while only single GDEs show notable deviations within specific contexts. This implies that a large part of the ranking is formed by context-independent factors, whereas context-specific factors play a role but are only decisive for individual GDEs in specific contexts. This challenges the extant research, which has often cautioned the high context-sensitivity of gamification and thereby might have created the impression that context-dependent factors are decisive for user preferences. Third, by shedding first light on these peculiarities of MAs and their implications for suitable gamification concepts, our work sets the stage for more research on gamified MAs since they have been neglected in academia so far, despite their success on the market.

Our study also provides several practical implications for the design of gamified MAs. First, users of gamified MAs tend to prefer elements that focus on individual progress over elements with social aspects like interaction or comparison. In particular, the social comparison was rejected due to users' concerns about its inappropriateness in a serious context like mindfulness, which is related to mental health. In contrast, few but strong user opinions defended integrating social elements on the condition of designing them privately. Thus, designers could provide social elements in MAs as optional and limit their functions to competing with one's own social environment instead of opening them to the public. Second, regardless of the chosen GDEs, our participants emphasized the importance of practicing mindfulness for oneself and enjoying *"the individual and mindful progress that cannot be rushed"*. Accordingly, we support the notion that designers of gamified MAs should implement GDEs in a way that they do not distract users or even hinder them from reaching a mindful state. This is especially important in light of emerging discussions in research about ethical issues of gamification in health care (e.g., Arora & Razavian, 2021) and possible negative consequences such as distraction from the original health purpose or rewarding incorrect executions (Schmidt-Kraepelin et al., 2019b). Third, designers of gamified MAs should also be careful regarding the number of different GDEs that they implement. While careful choice, design, and implementation of a few unobtrusive GDEs can be beneficial for many users, cluttered and overwhelming gamification concepts might result in adverse effects.

5.3 Limitations and Future Research

This study is limited by several aspects that also provide starting points for future research. First, we had to limit our study to ten GDEs to ensure feasibility. Other GDEs exist that may score higher in user preferences than the ones we chose. We aimed to account for this by drawing on established lists of the most prevalent GDEs in the mental health context and cross-checking them with the most popular MAs on the market. Nevertheless, future research could continue investigating user preferences for additional GDEs.

Second, our introduction of GDEs to participants contained mockups and descriptions only. Participants did not have the opportunity to try the GDEs in a real system. Given possible deviations of users' actual behavior from self-reported preferences in a survey, our findings only provide limited guidance for the design of gamified MAs in practice. It could be worthwhile for future research to integrate the GDEs into a real MA and investigate if and how users' preferences change when they interact with them in a real system. In this regard, it would also be worthwhile to investigate whether users' self-reported GDE preferences and actual engagement with GDEs turn out to be consistent or not.

Third, we visualized and described each of our investigated GDEs with only one specific design. In reality, GDEs allow for a broad range of different designs and ways of implementation. The chosen designs are likely to have a fundamental influence on preferences. For future research, the investigation of preferences regarding different designs of the same GDE might be interesting and could deliver explanations or design improvements for the use of less preferred elements.

Fourth, we analyzed users' rationales for their GDE preferences only based on one open question in our survey. While our results provide first interesting insights, future research should go further and either employ full-fledged qualitative research methods (e.g., interviews) to derive a deeper understanding of the determinants of users' preferences or develop and empirically test thorough theoretical models that are based on existing knowledge about the formation of users' preferences.

6. Conclusion

This study investigated users' GDE preferences in the context of MAs via a BWS-based survey. Comparing our results with similar studies that have been conducted in other contexts and unfolding some of the factors that determine user preferences, we were able to identify congruities but also differences. Our results especially indicate that users' preferences for most GDEs are relatively stable across different contexts. Only single GDEs show notable deviations within specific contexts. By analyzing the collected qualitative data, we identified seven different reasons that users cited to rationalize their decisions, of which four are context-independent, and three are specifically bound to the context of MAs. Future research should build on our results and develop thorough theoretical models that help us explain and predict the formation of users' GDE preferences. Besides the contributions to the literature on contextual differences in gamification perceptions, our study provides a better understanding of gamification in the unique context of MAs. While many popular MAs in practice already successfully implement GDEs, academia has not yet put its attention on investigating the potential effects of gamification and how to successfully design gamification concepts in this context. Given the specific user-system interactions and their interesting implications for suitable gamification, MAs would be an exciting application context for gamification scholars to investigate.

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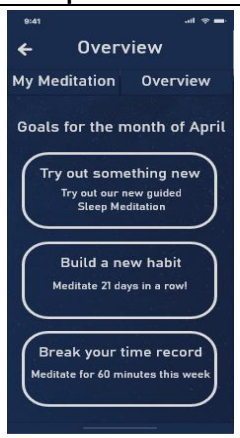
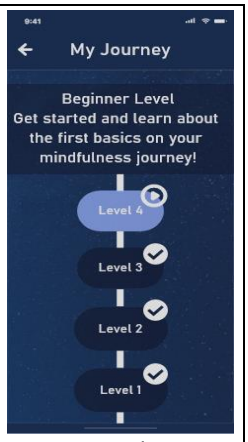
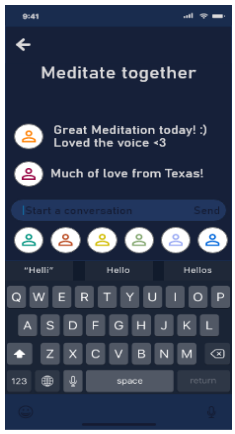
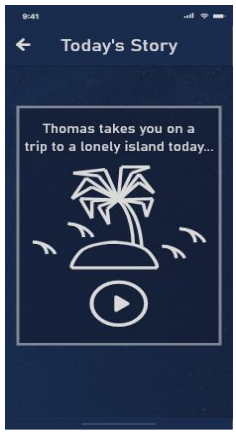
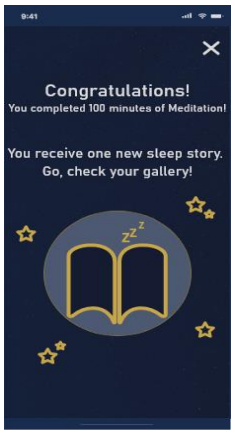
Appendix

Table A-1: Mockups for GDEs used in the survey

				
Avatars	Badges	Goals	Leaderboards	Levels
				
Points	Progress	Social interaction	Stories	Virtual goods