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Exploring the Facilitating Environment for Mindfulness Meditation: Establishing a Framework through Analysis of Means and Exploratory Factor Analysis

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Abstract

Objective While mindfulness meditation is an established practice for improving well-being, the physical environment for this activity awaits further exploration. This research aimed to explore how the physical environment facilitates mindfulness meditation and to establish a framework through Analysis of Means (ANOM) and Exploratory Factor Analysis (EFA). The framework was intended to provide guidance for organisations and individuals to better design or modify physical space to support their mindfulness meditations.

Method This study used methods to establish an initial research framework from the literature on mindfulness, architectural design, and environmental psychology. A survey of UK mindfulness practitioners was conducted in 2021–2022 to provide insights from a quantitative perspective. The data were analysed using ANOM and EFA to obtain a comprehensive framework based on the responses.

Results Through a review of the literature and empirical study, nine physical factors with controllable elements were identified, ranked by their relative importance. Quietness, the use of supportive tools, and natural sounds were found to be the most important.

Conclusion This research suggests the priority elements for groups and individuals to consider when adapting the physical environment for mindfulness meditation. The results revealed quietness as the most beneficial controllable element for its facilitation. Additionally, the use of supportive meditation tools was also important. Considering these top elements first could support practitioners' mindfulness meditation more effectively and efficiently.

Preregistration This study was not preregistered.

Keywords Mindfulness · Mindfulness Place · Mindfulness Meditation · Spatial Design Guidance · Research Framework · Wellbeing · Environmental Facilities · Analysis of Means · Exploratory Factor Analysis · UK-Wide Questionnaire Survey

In recent years, the concept of mindfulness has gained significant attention for its potential to enhance well-being and promote mental health (Ginexi et al., 85; Matthias et al., 2024). Mindfulness meditation has become an increasingly popular tool for finding peace and serenity amidst the hectic pace of modern life. Concurrently, the role of the environment and its influence on human experiences has also come under careful examination (Bernheimer, 2017). The intersection of these two domains — mindfulness and place (environment) — holds remarkable potential not only for our understanding of human wellbeing but also for the broader implications in spatial design for individuals, communities, and society. Yet a notable gap exists in understanding how the environment can effectively facilitate mindfulness practices from the perspective of mindfulness practitioners. While mindfulness is recognised for its potential to improve individual mental health, research addressing the specific spatial qualities and characteristics that optimise mindfulness experiences remains limited (Porter et al., 2017). Hence, further research is needed to explore which environmental elements mindfulness practitioners view as

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influential on their practice, and how these elements can be optimised to enhance the benefits of mindfulness meditation and contribute to better mental health.

In essence, Buddhist mindfulness involves being fully aware of the present moment (MN10, 2008), with an ardent, alert and watchful mind (DN22, 2000; Shonin & Gordon, 2014), and not forgetting the known object, such as the virtuous qualities and the nature of the mind (Mipham, 1997; Sodargye, 2015), to cultivate a pervasive and enduring feeling of calm and spiritual wellness (calm-abiding), and to gain insight into the non-self or empty nature of self and reality (wisdom, insight) (Van Gordon et al., 2015). Secular mindfulness originally rooted in ancient Buddhist tradition, on the other hand, is seen as a form of meditation that enables individuals to systematically regulate their attention and energy, transform the quality of their experiences and realise their full potential as human beings, as well as their relationships with others and the world (Kabat-Zinn, 2003, 2011). It has been adapted and rebranded for a Western audience and is now widely used as a technique for promoting mental and well-being in their daily lives (e.g., Fincham et al., 2023; Zhang et al., 2022).

From schools to workplaces (Doyle Fosco et al., 2023), healthcare settings (Keune et al., 2023) to personal relationships (Bailey et al., 2023), mindfulness is being practised in a variety of settings as a means of reducing stress and anxiety (Oyler et al., 2023; Scarlett et al., 2023), finding inner calm, and cultivating a greater sense of self-awareness and well-being (Bowles et al., 2022; Kim & Hunter, 2023). Despite the different intentions behind these practices, the physical environment where mindfulness meditation takes place should support the cultivation of these qualities, allowing practitioners to develop the right mindfulness with the right intention (Marques et al., 47), and gain appropriate insights. Given the rapidly changing nature of modern life, there is an increasing need to understand how physical environments can support individuals' mindfulness meditation to promote better mental health.

Throughout history, dedicated spaces for mindfulness and other contemplative practices have been created, such as monasteries, temples, and retreat centres, in order to foster a sense of calm and achieve a higher state of practice (Longchenpa, 2017; Santideva, 2016). As famously said by Winston Churchill in 1943, "we shape our buildings, and afterwards our buildings shape us" (UK Parliament, 2024), humans are influenced by the physical spaces they inhabit; and they, in turn, shape those spaces based on their experiences. While mindfulness can be practised anywhere at any time, from the comfort of one's own home to a busy city street, there is evidence to suggest that certain physical environments can be particularly conducive to cultivating the state of mindfulness (Shantideva, 2008; Sodargye, 2015).

Emphasis on the ideal place for practice is evident in dedicated Buddhist places. The environmental elements and qualities deemed important in both historical and contemporary Buddhist practice places are documented in Buddhist texts (e.g. Santideva, 2016; Shantideva, 2008), and also evident in existing built structures (e.g. Chen et al., 2022; Wei, 2012). Key characteristics include silence (quietness) (e.g. Lodro, 2017; Zangmo, 2022); solitude (alone, away) (e.g., Kragh, 2013; Shantideva, 2008); elimination of distractions (e.g. mobile phones) (e.g. Sodargye, 2015; Zhicheng, 2018); incorporation of natural elements such as sounds, views, and greenery, to encourage contemplation on impermanence (Khyentse, 2012); an open and ventilated space conducive to certain practices, appropriate lighting, and cleanliness (Sodargye, 2009 & 2010). Additionally, burning specific scents may facilitate the state of practice, and objects such as Buddha statues or Thangka may aid in focus (Sodargye & Mipham, 2019).

Apart from Buddhist literature and Buddhist places, environmental psychology offered insights into spatial elements that may support formal mindfulness practice. Several key theories in this field suggested how the environment may facilitate mindfulness meditation, including the Biophilia Hypothesis (Wilson, 1984), Stress Reduction Theory (SRT) (Ulrich, 1983), and Attention Restoration Theory (ART) (Kaplan & Kaplan, 1989). These theories emphasised that exposure to nature or natural elements has a restorative effect on well-being, promotes calm and tranquility (e.g. Bell et al., 2001; Cox et al., 2017), and can improve tasks requiring high level of directed attention, such as meditation (e.g. Kaplan, 1995 & 2001).

Built on these theories, design principles have been developed to improve people's well-being and task performance in the built environment. In particular, biophilic design (Kellert, 35) proposes that integrating natural elements and characteristics into architectural design could enhance the innate connection between humans and natural environment, resulting in a more restorative built environment. Recent empirical study and meta-analysis of nature-based mindfulness also provided further evidence to indicate the positive effect of nature on mindfulness (e.g. Burger et al., 2024; Lymeus et al., 2022). Such approaches align with places recommended for mindfulness practice suggested in Buddhist teachings (e.g. Shantideva, 2008). Both disciplines acknowledge the benefits of nature for mental health and promote mindfulness practices that support long-term well-being (Table 1).

The above reviewed theoretical construct has contributed to the establishment of an initial research framework (Table 2). More theories, including Optimal Healing Environment (OHE) (Jonas & Chez, 2004) and contemplative landscape (Krinke, 2005), have been reviewed to help derive the initial research framework. In addition,

Table 1 List of abbreviation/acronyms

Abbreviation/Acronyms	Full Name
ANOM	Analysis of Means
ART	Attention Restoration Theory
BOS	Bristol Online Surveys
BREEAM	Building Research Establishment Environmental Assessment Method
CFA	Confirmatory Factor Analysis
DN	Digha Nikaya (The Long Discourses)
EFA	Exploratory Factor Analysis
LEED	Leadership in Energy and Environmental Design
M	Mean
MN	Majjhima Nikaya (The Middle Discourses)
OHE	Optimal Healing Environment
SD	Standard Deviation
SRT	Stress Reduction Theory

design assessment criteria related to well-being and wellness from Well (2020), Living Future (2022), BREEAM (2023), Fitwel (2023), and LEED (2023) have been examined. They were developed with input from a wide range of users, design practitioners, building scientists, and public health experts across the globe, and provide an additional level of design guidance to support one's well-being (BREEAM, 2023).

Across disciplines, diverse elements that considered to be positive to well-being have been proposed. Thus, it is crucial to methodically classify these elements to explore how influential they are on mindfulness practice. The literature review on Buddhist and secular mindfulness, places for mindfulness, environmental psychology principles, design approaches, and design assessment criteria has provided valuable insights. The establishment of the initial research framework involves reclassifying controllable objective individual elements based on sensory perception (sight, hearing, smell, and touch; the "taste" element has been excluded, as it is not typically involved in formal mindfulness practices) (Birtwell et al., 2018). The framework is based on the premise that people have the ability to perceive and modify their environment (Bell et al., 2001). Uniquely to this research, a new column named "control" has been added, to indicate whether the element could be fully or partially controlled by practitioners. Only controllable elements were included; elements that are not controllable, such as "time", are not included. This initial framework provides an understanding of the influences of elements on mindfulness meditation and is subject to modification.

In summary, the primary objective of this research was to explore the relationship between mindfulness meditation and its physical setting, as perceived by mindfulness practitioners. The study examined how specific environmental elements influence the mindfulness experience, aiming to provide insights into utilising individual and group spaces that support mindfulness practice and enhance overall well-being. This research sought to contribute both to academic discussions and practical applications that enhance individuals' quality of life through thoughtful designs.

Method

Participants

This study specifically aims to explore how mindfulness practitioners perceive the role of the physical environmental elements in their formal meditation practice and how they may facilitate their mindfulness meditation. Thus, a mixed-methods approach that quantified qualitative data through the use of a UK-wide online questionnaire survey was deployed. A total of 203 participants in the UK responded in the online questionnaire "Mindfulness and Place", fulfilling both the minimum requirement for a valid survey result based on the finite population sample size calculation (Kallio, 31), and the minimum of 150 sample size for factor analysis (Fidell & Tabachnick, 21).

$$n\prime = \frac{n}{1 + \frac{Z^2 \times \hat{p}(1-\hat{p})}{\varepsilon^2 N}}$$

where:

z = z score.

ε = margin of error.

N = population size.

$\hat{p}$ = population proportion.

According to Simonsson et al. (62), 15% of British adults have practised mindfulness at least once and 9% are regular practitioners, and this leads to an estimated population size of 55,380,000 for $\hat{p}$; the confidence level table indicates that the value of z for a 95% confidence level is 1.96. Substituting the given values into the formula, a sample size of at least 196 participants is necessary for estimating the proportion of UK mindfulness practitioners with a 95% confidence level and a margin of error of 5%.

Table 2 *Initial research framework (*Ananth, 3*;* Benko, 6*;* BREEAM, 10*;* Browning et al., 11*;* CABE, 13*;* CABE, 14*;* Čavić & Beirão, 15*;* Dijkstra et al., 18*;* Fitwel, 23*;* Kaplan, 34*;* Khyentse, 37*;* LEED, 41*;* *Living* Future, 43*;* Lodro, 44*;* Mitchell & Gunning, 50*;* Neargarder, 52*;* Olszewska et al., 53*;* Shantideva, 60*;* Sodargye, 63*;* Stark, 68*;* Therachat, 70*;* Ulrich, 73*;* Well, 77*;* Zangmo, 80*)*

Item	Senses		Elements		Sub-elements		Controllable	References
1	**A**	**SOUND**	**1**	**Quietness**	1	Absence of sound	Fully	BREEAM, 10*;* Kaplan, 34*;* Lodro, 44*;* Well, 77*;*
2			**2**	**Natural sounds**	1	Sound of water	Partially	Ananth, 3; Browning et al., 11; CABE, 14; Čavić & Beirão, 15; Dijkstra et al., 18; Khyentse, 37; Shantideva, 60; Well, 77; Ulrich, 73;
3					2	Sound of wild birds	Partially	
4					3	Sound of wind	Partially	
5					4	Sound of rain	Partially	
6			**3**	**Artificial sounds**	1	Meditation bell	Fully	Mitchell & Gunning, 50*;* Neargarder, 52*;* Sodargye, 63*;* Stark, 68*;* Therachat, 70*;*
7					2	Background Zen music	Fully	
8					3	Clock ticking	Fully	
9					4	Instruction	Fully	
10	**B**	**VISUAL**	**1**	**View at the practice space**	1	View of greenery	Partially	Benko, 6; Browning et al., 11; CABE, 14; Čavić & Beirão, 15; Dijkstra et al., 18; Mitchell & Gunning, 50; Well, 77; Ulrich, 73
11					2	Open, unblocked view	Partially	Čavić & Beirão, 15*;* CABE, 13*;* Shantideva, 60*;*
12			**2**	**Natural lighting**	1	Direct natural lighting	Partially	Benko, 6*;* BREEAM, 10*;* CABE, 14*;* Dijkstra et al., 18*;* Mitchell & Gunning, 50*;* Čavić & Beirão, 15*;* Well, 77*;* Fitwel, 23*;* *Living* Future, 43*;* LEED, 41
13					2	Indirect natural lighting	Partially	
14			**3**	**Artificial lighting**	1	Warm artificial lighting	Fully	Benko, 6*;* BREEAM, 10*;* CABE, 13*;* Čavić & Beirão, 15*;* Mitchell & Gunning, 50*;* Well, 77*;*
15					2	Cool artificial lighting	Fully	
16			**4**	**Focus objects**	1	Buddha statue	Fully	Ananth, 3*;* Benko, 6*;* CABE, 13*;* Čavić & Beirão, 15*;* Mitchell & Gunning, 50*;* Olszewska et al., 53*;* Shantideva, 60*;* Sodargye, 63*;* Well, 77*;*
17					2	A vase with flower	Fully	
18					3	Mandala	Fully	
19					4	Artistic objects	Fully	
20					5	Images of nature	Fully	
21			**5**	**Presence of water body**	1	Natural water feature	Partially	Benko, 6; Brownin et al., 11; Khyentse, 37; Shantideva, 60; Mitchell & Gunning, 50; Well, 77;
22					2	Artificial water feature	Fully	
23			**6**	**Colour of the room**	1	Warm room colour	Fully	Ananth, 3*;* Čavić & Beirão, 15*;* Well, 77*;*
24					2	Cool room colour	Fully	
25					3	Harmonious room colour	Fully	
26					4	Strong contrasting room colour	Fully	

Table 2 (continued)

Item	Senses		Elements		Sub-elements		Controllable	References
27			**7**	**Feature of time**	1	Seasonal changing vegetation	Partially	Benko, 6; Browning et al., 11; CABE, 14; Čavić & Beirão, 15; Dijkstra et al., 18; Khyentse, 37; Mitchell & Gunning, 50; Shantideva, 60; Well, 77;
28					2	Visibility of shade movements	Partially	
29					3	Sun/moon passage	Partially	
30	**C**	**SMELL**	**1**	**Natural aroma**	1	Smell of cut grass	Fully	Benko, 6; Mitchell & Gunning, 50; Shantideva, 60; Sodargye, 65
31					2	Smell of other natural elements	Partially	
32			**2**	**Artificial aroma**	1	Burning incense	Fully	Sodargye, 63
33	**D**	**TOUCH**	**1**	**Temperature**	1	Warm temperature	Fully	BREEAM, 10; Browning et al., 11; CABE, 14; Well, 77; Fitwel, 23; Living Future, 43; LEED, 41
34					2	Cool temperature	Fully	
35			**2**	**Use of tools**	1	Use of cushion	Fully	Goldstein, 25; Mitchell & Gunning, 50; Sodargye, 63; Zangmo, 80
36					2	Use of bench	Fully	
37					3	Use of mat	Fully	
38					4	Use of chair	Fully	

The requirements for participants were adults over 18 in the UK at the time of completing the questionnaire, and practised mindfulness meditation at least once was a criterion for inclusion in this study. A total of 998 respondents opened the survey and 203 of them completed the survey, achieving 20.34% of response rate. All participants were adults over 18 and practised mindfulness meditation at least once. For the demographic distribution, 99 (48.77%) participants were Buddhists, and 104 (51.23%) participants were non-Buddhists. There were 131 (64.53%) participants who have practised more than 275 h and 72 (35.47%) participants practised up to 275 h. There were 130 (64.04%) females, 67 (33.00%) males and 6 (2.96%) participants preferred not to say. A summary of participant demographics is provided in Table 3.

Procedure

This questionnaire, intended for mindfulness practitioners in the UK to evaluate the influence of elements based on their experiences in places where they practise the most, was distributed via email (Outlook) and social media platforms (e.g. Facebook, LinkedIn, WeChat, etc.) to over 500 mindfulness centres and individual practitioners in the UK (England, Wales, Scotland and Northern Island) during 2021–2022. A snowball sampling strategy was employed to mitigate the impact of COVID-19 pandemic and associated lockdown measures, encouraging further participation and inviting additional respondents. Mindfulness centres include both Buddhist centres (of different traditions, for example, Vajrayana, Mahayana, and Theravada) as well as non-Buddhist centres (e.g. health and wellness centres, yoga studios, and centres that offer mindfulness courses). These potential participants then received a link attached in the emails/messages to the anonymous survey that was accessible through the Jisc Online Survey (formerly BOS). By clicking the link, the potential respondents were guided to an instruction page and a consent form. The principal researcher's contact email was also provided. The main body comprised 20 questions, divided into three sections: introductory questions; actual practice experience questions; and demographic questions. These questions are essential in considering the background characteristics of respondents and were intended to investigate the attributes and elements that influence respondents' practice the most. Participants were required to complete all compulsory questions (with a choice of "*N/A*" provided) in all three sections before submitting their responses. Incomplete responses were not included in the analysis, ensuring data accuracy and reliability.

Measures

Demographic Characteristic: The demographic characteristics assessed included gender, age, religion, and occupation, to understand the composition of the target population and its characteristics, as well as to explore and facilitate comparisons between different groups.

Mindfulness Practice Status: The information related to respondents' practice status was also assessed, including

Table 3 Summary of demographics and mindfulness practice status

Demographics			
		$n=203$	%
Gender:			
	Female	130	64.04
	Male	67	33.00
	Prefer not to say	6	2.96
Age Distribution:			
	18–24	10	4.93
	25–29	25	12.31
	30–34	8	3.94
	35–39	15	7.39
	40–44	18	8.87
	45–49	26	13.79
	50–54	22	10.84
	55–59	26	12.81
	60–64	22	10.84
	Over 65	29	14.29
	Prefer not to say	2	0.99
Occupation:			
	Employed full-time (incl. furlough)	75	36.95
	Employed part-time (incl. furlough)	30	14.78
	Other	66	32.51
	Student	26	12.81
	Unemployed	6	2.96
Mindfulness Practice Status		$n=203$	%
Total Mindfulness Practice Hours:			
	More than 275 hr	131	64.53
	176–275 hr	10	4.93
	101–175 hr	8	3.94
	50–100 hr	17	8.37
	Fewer than 50 hr	37	18.23
Posture:			
	Sitting	161	79.31
	Kneeling	22	10.83
	Standing	1	0.49
	Other	19	9.36
Most Practised Location:			
	At home indoors	176	86.70
	In a mindfulness centre	6	2.96
	In a park	2	0.99
	In a retreat centre	2	0.99
	In my own garden	5	2.46
	Other	12	5.91
Religious Belief:			
	Buddhist	99	48.77
	Christian	19	9.36
	Muslim	3	1.48
	Hindu	1	0.49
	Jewish	1	0.49
	No religion	61	30.05
	Other	19	9.36

total practice hours, practice frequency, practice posture, and most frequent practice location.

Mindfulness and Place Questionnaire: The Mindfulness and Place Questionnaire is a 38-item self-report questionnaire, developed specifically for this study and designed to explore how physical environment influences mindfulness meditation from practitioner's perspective. The questionnaire was based on the research framework derived from extensive literature review to ensure its validity. Individuals were asked to indicate on an 11-point Likert scale (-5 = *very negatively*; 5 = *very positively*; *N/A* = if the element was not present in their practice environments) how much each controllable element influences their mindfulness practices. The 38 items were organised under four main categories: sound, visual, smell, and touch. Analysis of Mean (ANOM) was first used to create the influence scale, followed by the Exploratory Factor Analysis (EFA). The Cronbach's Alpha value is 0.88, indicated response values for each participant across a set of questions are consistent. The McDonald's Omega reliability estimate of 0.93 (> 0.70), indicated an acceptable internal consistency.

Data Analyses

This study aimed to determine strongly correlated classifications and factors, and cover as many controllable elements influencing the practice as possible in the questionnaire design. The results were comprehensively analysed to understand the factors affecting formal mindfulness practice. The means of the data were first calculated using IBM SPSS (Version 27.0). A higher mean value, closer to 5, indicates a more positive influence, while a lower mean value, closer to -5, indicates a more negative influence. The means were analysed using ANOM, "a common statistical procedure in quality assurance for comparing several treatment means against an overall mean (grand mean) in a variety of experimental design and observational study situations" (Pallmann & Hothorn, 56, p.1541). This method was used to compare means for each element (as groups) in the research framework based on questionnaire responses, using R (Version 4.4.0). The grand mean of the dataset was first calculated, followed by the mean for each group. The deviation of each group mean from the grand mean assisted in interpreting the results and identifying any significant differences among the groups.

The data sets were then analysed using SPSS to evaluate the influence of each element on mindfulness practices through EFA which facilitated the re-categorisation of factors for the refined research framework. This assisted in exploring the underlying relationships between different (observable) variables by introducing factors (new variables), where the number of factors is fewer than the original variables (Alkarkhi & Alqaraghuli, 2; Griffith, 26). KMO and Barlett's test were conducted to confirm the suitability of dataset for performing EFA in this study. The KMO value for this data set was 0.83 (over the "minimum" 0.60 and "adequate" 0.80), indicated the sampling is adequate (Pallant, 55). The *p*-value from Bartlett's Test of Sphericity was < 0.01, i.e. lower than the significance level of 0.05, confirming the dataset's suitability for EFA (Pallant, 55). Analysis was performed on 38 elements from the initial research framework (Table 2) categorized under controllable spatial elements. Numerical data values, originally ranging from –5 to 5, were assigned with corresponding scale of 1–11 for analysis.

The number of factors was determined by extraction using the Principal Component method with an eigenvalue of 1 or more (maximum iterations for convergence of 25), with a scree plot produced to be cross-examined, and in this case the factors generated were 10. The rotation method was Varimax which minimise "the number of variables that have high loadings on each factor" (IBM, 27), which could simplify the interpretation of the factors. which then produced a Total Variance Explained table to be inspected.

Results

Comparisons of Means

As previously stated, the Cronbach's Alpha value of 0.88 indicated that response values for each participant across a set of questions were consistent, and the McDonald's Omega reliability estimate of 0.93 indicated an acceptable internal consistency. The results of ANOM provided the impact rankings of the various elements (Table 4). Among the 38 elements evaluated, seven showed an average score over 2, and they were deemed supportive of mindfulness practitioners according to the survey: (1) use of cushion ($M = 2.98$, $SD = 1.92$); (2) view of greenery ($M = 2.64$, $SD = 2.16$); (3) use of mat ($M = 2.40$, $SD = 2.09$); (4) open, unblocked view ($M = 2.30$, $SD = 2.12$); (5) absence of sound ($M = 2.17$, $SD = 2.55$); (6) direct natural lighting ($M = 2.08$, $SD = 2.07$); and (7) meditation bell ($M = 2.02$, $SD = 2.23$).

The analysis facilitated the comparison of these means against the grand mean, identifying elements with significant deviations, indicating their more pronounced impact on mindfulness practice. The survey results displayed several trends. Buddhist practitioners and non-Buddhist practitioners displayed divergent ratings in the questionnaires, due to their distinct value systems. For Buddhist groups, the "Buddha statue" ($M = 2.78$) was the top element, followed by the "use of cushion" ($M = 2.88$) and "absence of silence" ($M = 2.35$). For non-Buddhist groups, the "use of cushion" ($M = 3.08$) was the top, followed by "view of greenery" ($M = 3.02$) and "open, unblocked view" ($M = 2.59$), suggesting that they value visual elements more than auditory elements.

Framework Modification via *EFA*

Before the analysis, the suitability of the dataset for EFA was confirmed: the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.83, and Bartlett's Test of Sphericity was significant ($p < 0.01$). Factor extraction was performed using the Principal Component method with an eigenvalue threshold of 1, and the Varimax rotation method was applied to minimise the number of variables with high loadings on each factor. Ten factors were extracted, explaining the varying degrees of variance: 29.9%, 6.6%, 6.2%, 5.2%, 4.2%, 4.1%, 3.8%, 3.3%, 3.1% and 2.8%. These ten factors together accounted for 69.2% of the variance. The scree plot was also examined to confirm the number of factors.

Out of the 38 elements analysed, 32 were categorised into nine factors based on the highest factor loadings (Table 5). The higher the correlation coefficient, the more the variable is related to the given factor (Pallant, 55). The six exceptions included: "direct natural lighting", "burning incense", "sound of water", "artificial water feature", "warm room color", and "use of chair". Specifically, "use of chair" did not load onto the nine factors mentioned. The former five elements exhibited cross-loadings: "direct natural lighting" on Factors 1 and 6; "burning incense" on Factors 2, 7, and 8; "sound of water" on Factors 1, 4, and 5; "artificial water feature" on Factors 1, 2, 3, and 5; "warm room colour" on Factors 1, 5, and 6. Therefore, it is necessary to adjust the total number of factors and the attributed variances via theoretical justification and content interpretation.

Based on the initial research framework and the results of the EFA, these elements were re-categorised into appropriate factors. Specifically, "direct natural lighting", grouped better with other elements such as "indirect natural lighting", which contributed to warm room ambience (see Table 6 for detailed factor grouping), rather than with other "Views in/of the room" elements such as water features. "Burning incense" related more with other smell elements in Factor 9 (Table 6). "Sound of water" was more appropriate to be grouped with other natural sound elements (such as wind and wild birds). "Artificial water feature" was part of the visual elements in the room (Table 3), therefore more appropriately

Table 4 Summary Table for Controllable Elements (Descending order, where *n* = sample size; *SD* = Standard Deviation)

Summary Table for Controllable Elements								
Rank	**Item No**	**Element**	***Mean***	***n***	***SD***	**Min**	**Max**	**Range**
1	D-2.1	Use of cushion	2.98	187	1.92	-3	5	8
2	B-1.1	View of greenery	2.64	165	2.16	-4	5	9
3	D-2.3	Use of mat	2.41	170	2.09	-3	5	8
4	B-1.2	Open, unblocked view	2.30	164	2.12	-5	5	9
5	A-1.1	Absence of sound	2.18	194	2.55	-5	5	10
6	B-2.1	Direct natural lighting	2.08	181	2.07	-5	5	10
7	A-3.1	Meditation bell	2.02	177	2.24	-5	5	10
8	A-2.2	Sound of wild birds	1.99	187	2.15	-5	5	10
9	A-2.1	Sound of water	1.83	150	2.35	-4	5	9
10	A-2.4	Sound of rain	1.81	187	1.96	-4	5	9
11	B-4.1	Buddha statue	1.79	168	2.42	-5	5	10
12	D-2.4	Use of chair	1.70	175	2.37	-5	5	10
13	B-2.2	Indirect natural lighting	1.67	184	1.93	-3	5	8
14	B-5.1	Natural water feature	1.62	145	2.17	-5	5	10
15	B-7.3	Sun/moon passage	1.55	164	1.88	-4	5	9
16	B-6.3	Harmonious room colour	1.53	171	1.76	-3	5	8
17	C-1.2	Smell of other natural elements	1.46	168	1.80	-4	5	9
18	D-2.2	Use of bench	1.44	162	2.42	-5	5	10
19	B-7.1	Seasonal changing vegetation	1.40	168	1.97	-5	5	10
20	A-2.3	Sound of wind	1.34	180	2.08	-5	5	10
21	B-4.5	Images of nature	1.30	158	1.94	-5	5	10
22	D-1.1	Warm temperature	1.24	196	1.90	-5	5	10
23	B-6.1	Warm room colour	1.20	168	1.72	-5	5	10
24	C-2.1	Burning incense	1.14	180	2.64	-5	5	10
25	B-3.1	Warm artificial lighting	1.09	180	1.73	-5	5	10
26	B-4.2	A vase with flower	1.07	164	2.01	-5	5	10
27	A-3.4	Instruction	0.88	170	2.60	-5	5	10
28	C-1.1	Smell of cut grass	0.79	163	2.09	-5	5	10
29	B-7.2	Visibility of shade movements	0.68	160	1.85	-5	5	10
30	B-4.3	Mandala	0.68	141	2.01	-5	5	10
31	B-5.2	Artificial water feature	0.65	144	2.20	-5	5	10
32	B-4.4	Artistic objects	0.59	159	1.92	-5	5	10
33	B-6.2	Cool room colour	0.28	163	1.70	-5	5	10
34	A-3.2	Background Zen music	0.11	150	3.19	-5	5	10
35	D-1.2	Cool temperature	-0.16	190	2.21	-5	5	10
36	B-3.2	Cool artificial lighting	-0.29	161	1.97	-5	5	10
37	B-6.4	Strong contrasting room colour	-1.12	156	2.01	-5	5	10
38	A-3.3	Clock ticking	-1.38	168	2.32	-5	5	8

placed within Factor 1: "Views in/of the room". "Warm room colour", contributing towards the warm room ambience, was therefore more appropriately place with other room ambience elements (e.g. "warm temperature", "warm artificial lighting") in the factor "warm room ambience".

The one element, "use of chair" did not cross-load into any of the previous factors identified. Given its atypical use in traditional mindfulness practices where the prevalent posture was sitting in the lotus position (Sodargye, 66), this result was reasonable. Chairs were typically reserved for individuals who were unable to assume the lotus position – as a supportive tool for meditation, along with cushions, benches and mats. Hence, it was appropriate to group the "use of chair" with "use of cushion", "use of bench", and "use of mats" under one factor rather than as a single factor. By re-categorising these variances, the total number of factors was reduced to nine.

The nine factors were then named and organised based on their mean values, reflecting their level of influence (Table 6) in the following order: Factor 1 – "Views in/

Table 5 The Rotation Component Matrix (initial generation)

	Rotated Component Matrix (values above 0.30 in bold)[a]									
Item	**Variance**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
B-7.1	Seasonal changing vegetation	**0.75**	0.12	0.15	0.18	0.00	0.16	0.10	0.12	0.13	0.11
B-7.3	Sun/moon passage	**0.65**	0.16	0.30	0.17	0.11	0.13	0.16	0.10	-0.19	0.08
B-7.2	Visibility of shade movements	**0.65**	0.00	**0.36**	0.25	0.03	0.13	0.06	0.16	-0.12	-0.10
B-1.1	View of greenery	**0.63**	0.29	-0.11	**0.33**	0.15	0.10	0.08	0.15	0.01	0.17
B-5.1	Natural water feature	**0.62**	0.30	0.11	0.15	**0.45**	0.03	0.15	0.10	0.16	-0.01
B-2.1	Direct natural lighting	**0.61**	0.16	-0.02	0.20	0.08	**0.32**	-0.13	0.16	0.00	0.24
B-1.2	Open, unblocked view	**0.41**	**0.30**	-0.10	0.29	0.33	0.15	-0.07	**0.35**	0.04	0.29
B-4.4	Artistic objects	**0.35**	**0.73**	0.07	0.06	0.09	0.11	-0.03	0.04	0.16	-0.14
B-4.1	Buddha statue	0.04	**0.71**	0.03	0.06	-0.13	0.14	0.25	0.03	-0.21	0.19
B-4.3	Mandala	0.06	**0.70**	0.15	0.03	0.20	0.04	-0.02	**0.35**	0.11	-0.12
B-4.2	A vase with flower	0.28	**0.68**	0.25	0.12	0.00	0.25	0.18	-0.09	0.11	0.06
B-4.5	Images of nature	**0.52**	**0.53**	0.15	0.13	**0.35**	-0.01	-0.05	0.12	0.13	-0.02
C-2.1	Burning incense	0.12	**0.45**	-0.02	-0.17	0.07	0.09	**0.37**	**0.43**	-0.23	0.06
D-1.2	Cool temperature	0.02	-0.02	**0.74**	0.08	-0.17	-0.09	0.11	0.11	-0.10	0.11
B-6.4	Strong contrasting room colour	0.30	0.07	**0.66**	0.09	0.25	0.12	-0.11	0.04	0.07	-0.04
B-6.2	Cool room colour	0.25	0.27	**0.65**	0.14	**0.31**	0.05	-0.02	0.05	-0.02	0.14
B-3.2	Cool artificial lighting	0.19	0.23	**0.57**	0.08	0.06	**0.36**	-0.13	0.08	0.21	0.01
A-3.3	Clock ticking	-0.07	0.12	**0.53**	0.12	0.18	0.27	-0.22	0.06	0.13	-0.18
A-2.4	Sound of rain	0.18	-0.01	0.09	**0.82**	0.18	0.17	0.09	0.03	-0.06	-0.07
A-2.2	Sound of wild birds	**0.30**	0.10	0.02	**0.78**	0.07	-0.08	0.05	-0.01	0.11	-0.03
A-2.3	Sound of wind	0.25	0.02	0.28	**0.78**	-0.01	0.06	0.02	0.06	0.06	-0.00
A-3.1	Meditation bell	-0.20	0.24	0.05	**0.47**	0.24	0.10	**0.39**	**0.33**	-0.14	0.11
A-3.2	Background Zen music	0.14	0.12	0.05	0.11	**0.74**	0.10	-0.07	0.07	-0.00	0.08
A-3.4	Instruction	-0.02	-0.07	0.07	0.09	**0.71**	0.10	0.07	0.10	0.03	-0.04
A-2.1	Sound of water	**0.32**	0.11	0.11	**0.50**	**0.56**	-0.12	0.00	0.17	0.03	0.16
B-5.2	Artificial water feature	**0.48**	**0.31**	**0.31**	0.04	**0.53**	0.08	0.07	0.11	0.23	0.04
B-6.1	Warm room colour	**0.33**	0.30	0.23	-0.02	**0.43**	**0.43**	0.29	-0.10	-0.02	-0.03
B-3.1	Warm artificial lighting	0.06	0.21	0.15	0.11	0.10	**0.78**	-0.00	0.11	0.18	0.08
B-2.2	Indirect natural lighting	0.34	0.19	0.20	0.10	-0.04	**0.63**	-0.06	0.20	-0.00	0.21
D-1.1	Warm temperature	0.22	-0.10	-0.19	-0.15	0.36	**0.51**	0.22	0.03	-0.00	-0.00
B-6.3	**Harmonious room colour**	**0.38**	**0.33**	0.22	0.06	0.22	**0.46**	**0.36**	-0.26	-0.02	-0.01
D-2.3	Use of mat	0.07	0.13	-0.03	0.16	-0.05	-0.03	**0.85**	-0.01	-0.05	-0.00
D-2.1	Use of cushion	0.07	0.06	-0.21	0.04	0.15	0.13	**0.60**	0.19	0.24	-0.04
D-2.2	Use of bench	0.26	0.00	**0.36**	-0.03	-0.14	-0.10	**0.40**	0.19	**0.32**	0.22
C-1.1	Smell of cut grass	0.26	0.12	0.28	0.09	0.13	0.11	0.06	**0.73**	0.06	-0.04
C-1.2	Smell of other natural elements	**0.45**	0.12	0.10	0.14	0.22	0.09	0.17	**0.68**	0.11	-0.02
D-2.4	Use of chair	0.00	0.06	0.05	0.05	0.08	0.15	0.07	0.04	**0.85**	0.08
A-1.1	Absence of sound	0.03	-0.02	0.06	-0.04	0.07	0.13	0.01	-0.03	0.09	**0.86**

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalisation

[a]Rotation converged in 11 iterations

of the room"; Factor 2 – "Meditation objects"; Factor 3 – "Cool room ambience"; Factor 4 – "Natural sounds"; Factor 5 – "Meditation sounds"; Factor 6 – "Warm room ambience"; Factor 7 – "Use of supportive tools"; Factor 8 – "Smells in/of the room"; and Factor 9 – "Quietness".

The factors were named based on their distinct properties and the specific variances they encompass, as below: "Views in the room" included variances related to views within or outside the room, while visual elements such as lighting and focus objects were categorised separately. "Meditation

Table 6 The nine-factor framework after conducting EFA

F	Name	Original Item	Variances	*M*	*SD*
1	Views in/of the room	B-1.1	View of greenery	2.64	2.16
		B-1.2	Open, unblocked view	2.30	2.12
		B-5.1	Natural water feature	1.62	2.17
		B-7.3	Sun/moon passage	1.55	1.88
		B-7.1	Seasonal changing vegetation	1.40	1.97
		B-4.5	Images of nature	1.30	1.94
		B-7.2	Visibility of shade movements	0.68	1.85
		B-5.2	Artificial water feature	0.65	2.20
2	Meditation objects	B-4.1	Buddha statue	1.79	2.42
		B-4.2	A vase with flower	1.07	2.01
		B-4.3	Mandala	0.68	2.01
		B-4.4	Artistic objects	0.59	1.92
3	Cool room ambience	B-6.2	Cool room colour	0.28	1.70
		D-1.2	Cool temperature	-0.16	2.21
		B-3.2	Cool artificial lighting	-0.29	1.97
		B-6.4	Strong contrasting room colour	-1.12	2.01
		A-3.3	Clock ticking	-1.38	2.32
4	Natural sounds	A-2.2	Sound of wild birds	1.99	2.15
		A-2.1	Sound of water	1.83	2.35
		A-2.4	Sound of rain	1.81	1.96
		A-2.3	Sound of wind	1.34	2.08
5	Meditation sounds	A-3.1	Meditation bell	2.02	2.24
		A-3.4	Instruction	0.88	2.60
		A-3.2	Background Zen music	0.11	3.19
6	Warm room ambience	B-2.1	Direct natural lighting	2.08	2.07
		B-2.2	Indirect natural lighting	1.67	1.93
		B-6.3	Harmonious room colour	1.53	1.76
		D-1.1	Warm temperature	1.24	1.90
		B-6.1	Warm room colour	1.20	1.72
		B-3.1	Warm artificial lighting	1.09	1.73
7	Use of supportive tools	D-2.1	Use of cushion	2.98	1.92
		D-2.3	Use of mat	2.41	2.09
		D-2.4	Use of chair	1.70	2.37
		D-2.2	Use of bench	1.44	2.42
8	Smell in/of the room	C-1.2	Smell of other natural elements	1.46	1.80
		C-2.1	Burning incense	1.14	2.64
		C-1.1	Smell of cut grass	0.79	2.09
9	Quietness	A-1.1	Absence of sound	2.18	2.55

objects" pertained specifically to visual focus objects. "Cool room ambiance" contained variances that contribute to a cooler room ambiance. "Natural sounds" encompassed natural sound variances that aid mindfulness practice. "Meditation Sounds" pertained to audio variances associated with meditation, including background Zen music, audio instructions, and meditation bell. "Warm room ambiance" included variances rated positively by participants, such as warm room colour, temperature, and natural/artificial lighting. "Use of Supportive Tools" comprised tools that support practitioners' sitting/kneeling postures. "Smells in/of the Room" included natural and artificial smells, such as incense oil. "Quietness" contained the variance "absence of sound".

These categories underwent further reordering based on means, resulting in the revised research framework with nine factors, as presented in Table 7. To conclude, by using EFA, nine key factors have been identified and modified, into which the spatial variances were categorised. This revised research framework further added extra columns to suggest how organisations/individuals could change/adapt their practice environment to better support meditation (Table 8).

Table 7 The nine-factor framework after re-ordering based on the factor mean

F	Name	Factor Mean	Original Item	Elements	Controllable	*M*
1	Quietness	2.18	A-1.1	Absence of sound	Fully	2.18
2	Use of supportive tools	2.13	D-2.1	Use of cushion	Fully	2.98
			D-2.3	Use of mat	Fully	2.41
			D-2.4	Use of chair	Fully	1.70
			D-2.2	Use of bench	Fully	1.44
3	Natural sounds	1.74	A-2.2	Sound of wild birds	Partially	1.99
			A-2.1	Sound of water	Partially	1.83
			A-2.4	Sound of rain	Partially	1.81
			A-2.3	Sound of wind	Partially	1.34
4	Views in/of the room					
	1.52	B-1.1	View of greenery	Partially	2.64	
			B-1.2	Open, unblocked view	Partially	2.30
			B-5.1	Natural water feature	Partially	1.62
			B-7.3	Sun/moon passage	Partially	1.55
			B-7.1	Seasonal changing vegetation	Partially	1.40
			B-4.5	Images of nature	Partially	1.30
			B-7.2	Visibility of shade movements	Partially	0.68
			B-5.2	Artificial water feature	Fully	0.65
5	Warm room ambience					
	1.47	B-2.1	Direct natural lighting	Partially	2.08	
			B-2.2	Indirect natural lighting	Partially	1.67
			B-6.3	Harmonious room colour	Fully	1.53
			D-1.1	Warm temperature	Fully	1.24
			B-6.1	Warm room colour	Fully	1.20
			B-3.1	Warm artificial lighting	Fully	1.09
6	Smell in/of the room	1.13	C-1.2	Smell of other natural elements	Partially	1.46
			C-2.1	Burning incense	Fully	1.14
			C-1.1	Smell of cut grass	Fully	0.79
7	Meditation objects	1.03	B-4.1	Buddha statue	Fully	1.79
			B-4.2	A vase with flower	Fully	1.07
			B-4.3	Mandala	Fully	0.68
			B-4.4	Artistic objects	Fully	0.59
8	Meditation sounds	1.00	A-3.1	Meditation bell	Fully	2.02
			A-3.4	Instruction	Fully	0.88
			A-3.2	Background Zen music	Fully	0.11
9	Cool room ambience	-0.53	B-6.2	Cool room colour	Fully	0.28
			D-1.2	Cool temperature	Fully	-0.16
			B-3.2	Cool artificial lighting	Fully	-0.29
			B-6.4	Strong contrasting room colour	Fully	-1.12
			A-3.3	Clock ticking	Fully	-1.38

Discussion

The study explored how different elements of the physical environment impact the mindfulness meditation experience of practitioners through the UK-wide survey. Key results indicated that factors such as "cool room ambiance" received negative feedback, while elements such as "absence of sound", "use of cushion", and "view of greenery" were rated positively. The findings showed that while preferences can vary widely among individuals, there were clear trends in what contributes to a more supportive mindfulness environment. These results demonstrated the reciprocal relationship between environment and human (the practitioners) described in environmental psychology. With changes in the environment affecting human behaviour and wellbeing, while human actions and their cognition impact the

Table 8 *Revised research framework (Design recommendation based on* BREEAM, 10*;* Fitwel, 23*; Living* Future, 43*;* Well, 77*)*

F	Name	Elements (Fully/Partially Controllable)		Personal Preference	Design Recommendation
1	Quietness	1	Absence of sound (FC)	Consider the practice location	Consider the practice location/plan
				Noise-cancelling headphones/ tools	Improved sound insulation
					Provide landscape buffer zones
2	Use of supportive tools	1	Use of cushion (FC)	Find suitable tools	Consider enough storage space for these supportive tools at the design stages
		2	Use of mat (FC)		
		3	Use of chair (FC)		
		4	Use of bench (FC)		
3	Natural sounds	1	Sound of wild birds (PC)	Consider the practice location	Preserve/introduce habitat by design
		2	Sound of water (PC)	Open/close the window	Introduce water bodies to produce the sound nearby in landscape
		3	Sound of rain (PC)	Open/close the window	Consider façade and building materials
		4	Sound of wind (PC)	Open/close the window	Consider the building orientation in design to avoid direct winds
4	Views in/of the room	1	View of greenery (PC)	Sitting facing towards greenery	Design openings towards the greenery
				Introduce plantings in place	Design green landscape views
		2	Open, unblocked view (PC)	Keep the space tidy, uncluttered	Provide such a view in design stages
		3	Natural water feature (PC)	Consider the practice location	Provide views towards the natural water feature
		4	Sun/moon passage (PC)	Consider the practice location	Consider orientation of the building
				Adjust the openings (blinds/curtains)	Introduce designed openings to enhance the sun/moon passage
		5	Seasonal changing vegetation (PC)	Facing towards these vegetations	Design landscape with seasonal interests in the view
					Create openings towards them
		6	Images of nature (PC)	Hang an image of nature in the room	Design to incorporate symbols and images of nature in the room
		7	Visibility of shade movements (PC)	Have daylight to allow this happen	Incorporate appropriate openings
		8	Artificial water feature (FC)		Introduce physical/symbolic water bodies in the practice environment
5	Warm room ambience	1	Direct natural lighting (PC)	Choose appropriate glazing	Consider the building orientation
				Adjusting the blinds/curtains to introduce preferred level of lighting	Optimise window size and placement for daylight
					Consider skylight, light wells and atriums where appropriate
					Choose appropriate glazing in design
		2	Indirect natural lighting (PC)	Adjust the lighting level	Consider open-floor plan
				Add/remove partitions/furniture to adjust the light level	Use light-coloured and reflective surface materials
					Introduce light diffusers
					Introduce light shelves
		3	Harmonious room colour (FC)	Paint the corresponding colours	Consider room colours and finishes carefully at design stage
		4	Warm temperature (FC)	Adjust to the preferred temperature	Introduce appropriate ventilation and heating/cooling system

Table 8 (continued)

F	Name	Elements (Fully/Partially Controllable)		Personal Preference	Design Recommendation
		5	Warm room colour (FC)	Paint the corresponding colours	Consider room colours and finishes carefully at design stage
		6	Warm artificial lighting (FC)	Purchase the appropriate light bulbs	Install warm artificial lighting
6	Smell in/of the room	1	Smell of other natural elements (PC)	Open/close the window	Preserve/introduce habitat incorporating elements through design
		2	Burning incense (FC)	Burn the incense before practice	Incorporate appropriate ventilation
		3	Smell of cut grass (FC)	Not/Cut the grass before practice	Introduce landscape nearby
7	Meditation objects	1	Buddha statue (FC)	Obtain it from reliable sources	Design appropriate space for the placement of Buddha statue of various sizes
		2	A vase with flower (FC)	Introduce flower with vase in the room	Consider appropriate space for it
		3	Mandala (FC)	Obtain it from reliable sources	Consider appropriate space for it
		4	Artistic objects (FC)	Buy/place objects in sight	Design focal points in the room
8	Meditation sounds	1	Meditation bell (FC)	Use the actual bell or audio in practice	Provide storage space for the bell Consider room reverberation in design
		2	Instruction (FC)	Listen to the instructor online or f-2-f	Provide spaces for instructor and audio equipment
		3	Background Zen music (FC)	Turn on/off the music	Consider room reverberation in design
9	Cool room ambience	1	Cool room colour (FC)	Choose the appropriate colour	Consider room colour at design stages
		2	Cool temperature (FC)	Adjust to the preferred temperature	Introduce appropriate ventilation and heating/cooling system
		3	Cool artificial lighting (FC)	Purchase the appropriate light bulb	Change the cool lighting if unwanted
		4	Strong contrasting room colour (FC)	Paint the corresponding colours	Consider appropriate room colour combination at the design stage
		5	Clock ticking (FC)	Add/remove the clock in the room	Introduce time-indicating design features in the room

environment (Steg & De Groot, 69), which further influences their thoughts and behaviours. Although individuals' opinions may be subjective and can vary from person to person, the collective of a sufficient number of survey results could reflect a certain percentage of the total population. Thus, the qualitative has then been quantified through this process. The research framework developed from this process can be applied in real-life settings to assist practitioners or organisations to modify or design the physical environment for practice, and to better facilitate the mindfulness meditation experience.

In brief, this research analysed the questionnaire distributed to mindfulness centres and individuals across the UK. The results showed that "quietness" is the most crucial element for their mindfulness practice. However, on inspecting the average scores for individual elements, the "absence of sound", which is directly linked with quietness, did not achieve the top rating. Different groups, including those of various faiths, reported both similarities and differences for each element. Despite the differences, participants share some commonalities in their preferences. For instance, regarding the preference of location/environment, the "remote rural environment" gained a much more favourable rating than the other two options. A total of 75.4% of participants reported that they would deliberately set up a specific environment for practice. This shows that where mindfulness meditation is practised matters to the majority of practitioners. Therefore, this revised research framework could provide references for practitioners to change their environments accordingly.

Participants in the study displayed distinct personal preferences for the environments where they practice mindfulness. A notable finding is that participants generally preferred warmer and more comfortable room ambiances, as reflected in the negative mean scores for factors such as "cool room colour", "cool temperature", "clock ticking",

and "strong contrasting room colours" (Table 7). Despite these negative ratings, some practitioners reported that certain elements within the "cool room ambience" factor were positively influencing for their practice. Therefore, this factor was then retained in the framework to acknowledge the diversity of preferences and provide additional considerations for optimising practice spaces. In short, practitioners would intentionally select a specific environment or pay attention to their surroundings while practising. The research framework has identified key aspects and priorities for mindfulness centres and practitioners to consider when enhancing the effectiveness of their mindfulness practices.

Buddhists value the "Buddha statue" ($M = 2.78$) and "quietness" (absence of sound, $M = 2.35$) more than non-Buddhists ($M = 0.62$ & 2.01, respectively). The elements that Buddhists value higher can be categorised as "quietness" (absence of sound) and "Buddhist meditation objects" (Buddha statue, burning incense, vase with flowers, and mandala). This aligns with the statements from Buddhist practitioners and the literature. Non-Buddhists prioritise the "use of cushion" ($M = 3.08$; $M = 2.88$ for Buddhists) and value visual and natural elements more, with "view of greenery" ($M = 3.02$; $M = 2.22$ for Buddhists) and "open, unblocked view" ($M = 2.59$; $M = 2.00$ for Buddhists) ranking high. Overall, Buddhists have lower average scores for most elements compared to non-Buddhists, except for a few specific elements. This may echo Buddhist teachings, where practitioners are encouraged to go beyond the physical boundaries and attachments (Khyentse, 84).

The analysis of standard deviation (*SD*) highlights several important observations. Elements with a high *SD*, namely: background Zen music ($SD = 3.19$); burning incense ($SD = 2.64$); instruction ($SD = 2.60$); and absence of sound ($SD = 2.55$), indicated a wide range of personal preferences rather than uniform design elements. These factors, being fully controllable, showed significant variability in how participants perceive them. When extending the list to elements with the *SD* above 2.20, including "use of bench", "Buddha statue", "use of chair", "sound of water", "clock ticking", "meditation bell" and "cool temperature", it becomes apparent that these preferences are individualised and less about the design itself. In contrast, elements with low *SD* such as various colour and lighting options (e.g. warm/cool room colours, warm/cool artificial lightings) appear to generate more consensus among participants. This suggests a higher level of agreement in their evaluations, indicating that participants tend to have a more uniform view on these elements. Further exploration of these findings can offer valuable insights in understanding how controllable elements affect subjective perceptions of comfort and aesthetics in place design.

Furthermore, the research framework has been expanded by incorporating two additional columns: "Personal Preference" and "Design Recommendation" (Table 8). The former allows individuals to make changes in their environment to enhance their mindfulness meditation experience based on their individual needs and preferences. For example, practitioners seeking a quiet practice space could consider options such as selecting a suitable location, using noise cancelling headphones, or improving sound insulation, depending on the budget and resources available. The latter offers suggestions on design recommendations for designers in architecture, interior design, landscape architecture and urban design when creating mindfulness spaces. By incorporating factors such as appropriate natural light, greenery, and appropriate decoration style, designers can create environments that promote tranquillity and focus, supporting practitioners in their mindfulness journey.

Despite variations between different groups, the revised research framework provides a comprehensive overview of practitioners' preferences. It captures the essential elements valued by mindfulness practitioners across the board such as quietness and use of supportive tools. While acknowledging the diverse perspectives and priorities, this nuanced approach contributes to a deeper understanding of mindfulness practitioners' unique requirements.

Hence, this framework could potentially be helpful for beginners who may be easily distracted and need to develop mindfulness skills, and designers intended to design purposeful spaces. Creating a designated space for mindfulness practice, whether it be a quiet corner of one's home or a dedicated meditation room, can help establish the habit and make it a regular part of one's routine (Towle, 71) and improve well-being (Xiao et al., 79). As they progress in their mindfulness practice, they may potentially become capable of applying mindfulness techniques in any environment with greater ease and effectiveness. Collaboration between mindfulness practitioners and design professionals offers opportunities to create spaces that promote well-being and mindfulness practice.

Limitations and Future Research

The study has a number of limitations that offer opportunities for future research. The study focused solely on mindfulness practitioners in the UK due to limited research scope and time. Therefore, the findings provide insights only into likely situations in the UK and may not be applicable in other countries or cultural contexts. Since people from diverse cultural backgrounds and practice traditions have varying values, the results can differ across the world and may even be entirely different. This research therefore has a cultural context limitation that needs to be acknowledged.

The Covid-19 pandemic in early 2020 led to multiple national lockdowns in the UK, impacting access to resources and resulting in the temporary or permanent closure of

many mindfulness centres and organisations. This posed challenges in reaching potential participants and obtaining questionnaire responses. Additionally, the pandemic altered daily routines, social interactions, and lifestyles, potentially affecting the variables under investigation. As a result, existing research may not fully capture the current reality; and further studies are needed to understand the long-term implications of these changes on mindfulness practice.

While the study has met the minimum numerical requirement for participants necessary to validate the questionnaire, there is still potential to improve the representativeness of the results by recruiting more participants. However, due to time constraints, the study conducted only one round of questionnaires, which limits the extent to which the research framework can be further examined and refined using Confirmatory Factor Analysis (CFA). Therefore, a more comprehensive study with ample time should be conducted to validate the research framework and incorporate more detailed information.

To elaborate, the current research framework can be enhanced through future studies conducted in similar settings. Despite the revisions made in this study, the framework still has room for further refinement and development. For instance, a potential study could involve asking practitioners from a specific centre(s) to rate the controllable elements in their centre using the revised framework. The resulting data could then undergo CFA to validate the findings obtained through EFA. The controllable elements in the framework can be further subdivided into more detailed and quantifiable standards, such as the sound level in decibels (dB), colour choices, plant types, water features, among others. To enhance future research, the quantitative questionnaire can be improved by including images of the spatial setting to better illustrate each element. This framework can also be adapted and tested in different contexts for further examination.

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Data Availability The data presented in this study are available on request from the corresponding author.

Declarations

Ethics Approval This research has been approved by the University of Nottingham Faculty Research Ethics Committee.

Informed Consent By clicking on a link to the anonymous survey, potential participants were first directed to an information page and a consent form, which – only following consent – led to the survey. All participants completed a consent form prior to their participation in the study.

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