Why people are not mindful: An explorative interview study

SARALIN ZASSMAN, University of Waterloo, Canada

Mindfulness has taken the digital world by storm. The practice, often described as a judgment-free awareness of the present moment, has been shown to and reduce stress and improve mental well-being. A plethora of mobile applications and interactive technologies now exist to teach the practice. However, even with these systems, many people still struggle to be as mindful as they would like. I conducted an interview study to investigate why people are not (more) mindful. I determined four primary obstacles to mindfulness: (1) Failing to see it as a priority; (2) Struggling to maintain a routine; (3) Finding it difficult to clear the mind and concentrate; and, (4) Viewing meditation as too hard and intimidating. Based on these obstacles, I presented corresponding strategies to help people be more mindful.

CCS Concepts: • **Human-centered computing → Human computer interaction (HCI)**.

Additional Key Words and Phrases: mindfulness, meditation

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1 INTRODUCTION

The COVID-19 pandemic has brought about a new era of remote work and learning. People are becoming more reliant on technology to function and complete daily tasks. However, the inability to disconnect has been shown to cause anxiety, depression, burnout, and "technostress" [25]. Mindfulness is an ancient Buddhist practice, often characterized as a judgement-free awareness of the present moment [14]. Studies have determined that consistent practice improves mental well-being, physical health, and peace of mind [7, 13, 31]. While the benefits of mindfulness are widely recognized, many still do not incorporate mindfulness into their daily routine. This work seeks to determine why people are not (more) mindful, and provides strategies to improve technology for mindfulness.

The shift towards an increasingly digital world is expected to continue after the pandemic, with nearly 75% of companies planning to permanently support remote work when the pandemic is over [15]. Despite the numerous advantages of technology, there are several concerns associated with its excessive use. Numerous studies have demonstrated the negative effects of technology, particularly technology overload, on mental health and psychological well-being. In addition to remote work, smartphones and other portable devices are making it difficult for people to separate work from personal life. Accordingly, the European Parliament recently passed a legislative initiative that allows people to ignore all work-related tasks and electronic communication outside of their work hours [16]. However, even with such legislations in place, many will continue to suffer from poor mental health in the digital age.

The term mindfulness was first introduced to HCI research in 2010, and the numbers of mindfulness-related HCI publications has grown substantially in recent years [27]. The term has a variety of different interpretations, making the design and evaluation of mindfulness technology particularly difficult [26]. Mindfulness is more than just an

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awareness of one's current thoughts through meditation. It involves reflecting on past experiences and cultivating a deep understanding of the mind and body [5, 31]. The majority of commercial technologies for mindfulness are centred on guided meditation [9, 19, 23]. Although these products have been shown to reduce stress and even improve focus and attention span, they tend to overlook other important aspects of the practice.

In order to develop more effective mindfulness technology, it is important to first understand why people are not (more) mindful. To answer this question, I conducted a qualitative analysis of a series of structured interviews, and reflected on the practical import of their answers. My two main contributions are as follows: (1) Four primary reasons why people are not (more) mindful; (2) Strategies to help people be more mindful with technology. These contributions will ultimately help more people experience the benefits of mindfulness through the use of interactive technology.

2 RELATED WORK

In this section, I provide a brief overview of the various interpretations of mindfulness in literature. I then discuss how mindfulness has been addressed in HCI, followed by two existing theories on why people are not mindful.

2.1 Understanding Mindfulness

Meditation is commonly thought of as a relaxation technique or a method to cultivating mindfulness [20]. Clinical scientists have made several attempts to define mindfulness in a way that makes it easier measure and teach. One of the most popular and theoretically consistent definitions is a two-component model proposed by Bishop et al. [4]. The first component is a state of self-control, where attention is directed and maintained towards the present moment. The second is an attitude towards that experience of curiosity, openness, and acceptance. This take is considered the most accurate psychological depiction of the Buddhist concept of mindfulness. Despite its recognition, many still believe the definition does not capture the true nature of mindfulness, and it could lead to misinterpretations of the practice [11]. Other popular definitions tie mindfulness to a state of observing and describing [1, 2], creativity [21], or non-reactivity to passing thoughts [2]. Brown and Ryan [6] presented two perspective of mindfulness: the first is a mental state that a person enters in order to be mindful at any given time, and the second is a long-term quality that everyone possesses—a capacity to be mindful that may be enhanced or diminished by different factors. Ragpay and Bystrisky [22] believe definitions of mindfulness, particularly the one provided by Bishop et al., should distinguish between attention and awareness. They state that attention is a dynamic factor of consciousness and awareness is a fixed state of consciousness. The terms are key characteristics of mindfulness in terms of state and purpose. However, they are often used interchangeably in psychology, despite having separate and distinct meanings in Buddhism.

Terzimehic et al. [27] recognized a lack of consistency in how the term mindfulness is used, and the need for a clearer understanding of what it comprises. They presented three definitions of mindfulness from these areas: Buddhism, therapeutic practices of mindfulness, and psychological concepts of mindfulness:

- In Buddhism, mindfulness is a spiritual concept that involves an awareness of the present, a recognition of the Dharma (i.e., the Buddha's teachings), and the reflection or evaluation of one's inner and outer self [5]. However, many experts believe that mindfulness cannot be explained with words.
- In therapy, mindfulness is used to help people with stress, anxiety, depression, and other health conditions. The practice is typically guided by a therapist or technology.
- In psychology, mindfulness is more of a psychological construct than a technique for improving health or mental well-being. There are a myriad of conceptualizations of mindfulness in psychology alone. However,

Terzimehic et al. [27] found three primary definitions in the selected HCI literature: (1) Mindfulness is simply the opposite of mindlessness; (2) The two-component model proposed by Bishop et al.; (3) The two perspectives of mindfulness by Brown and Ryan [6].

2.2 Mindfulness in HCI

Terzimehic et al. [27] conducted a review and analysis of 38 HCI papers on mindfulness. They determined seven major lines of research: (A) Meditation Practice, (B) Therapy, (C) Reflection & Knowledge Gain, (D) Mindfulness in Daily Life, (E) Mindfulness in Interaction, and (F) Performance Enhancement.

(A) Meditation Practice: 15 of the 38 papers were focused on assisting, improving, or imitating meditation techniques. Technology for meditation is most commonly designed to help users reach and maintain an awareness of inner and outer experiences (e.g., respiration, brain activity). One example is Sonic Cradle [30], an interactive system that uses breathing patterns to generate a soundscape for meditation. Users of the device claimed to feel emotions comparable to those experienced during meditation.

(B) Therapy: This line of research mainly refers to technology that supports MBIs and informal therapies. In this context, mindfulness is seen as a method for treating mental disorders, such as depression or anxiety. One example is the *Sphere* [28], a tangible artifact that detects the user's heartbeat and transmits it back to them with bright lights and pulsing vibrations. Its goal is to help Dialectical Behavioral Therapy (DBT) patients with focus and stability. Seol et al. [24] created a similar system that uses heart rate for Cognitive Behavior Therapy (CBT).

(C) Reflection & Knowledge Gain: Research in this line treats mindfulness as an informal practice of self-reflection. It involves obtaining a richer understanding of oneself through self-observation and reflecting about the past, present and future. *Mind Pool* [17] is a magnetically reactive pool of liquid that promotes focus and self-reflection through real-time feedback of brain activity.

(D) Mindfulness in Daily Life: Papers in this category discuss ways to achieve mindfulness in aspects of daily life, such as sleep, nutrition, or technology breaks. Here, mindfulness is viewed as an elevated awareness of common, everyday events that take place in and around oneself. One example is *Crumbs* [12], a system that gives daily food challenges to promote healthy eating. To complete a challenge, users must take a photograph of food they plan to eat that fits a certain criterion.

(E) Mindfulness in Interaction: This line of research refers mainly to informal practices of mindfulness that promote slow interactions. The *PAUSE* App [8] applies the slow, sustained, and gentle bodily movements of Tai Chi to finger movements—a form of "mindful touch". Rehden and Hengeveld [29] created three interfaces for a kitchen blender that require slow and careful motions to operate. The aim with these devices is to encourage a slow, more purposeful approach towards other aspects of one's life.

(F) Performance Enhancement: This category explores the connection between mindfulness and performance, particularly in tasks other than meditation. One example is a study [3] that investigated how meditation sessions influence student performance for conceptual modelling exercises. They determined that the students that practiced mindfulness were more efficient (i.e., took less time) in completing the modelling tasks.

(G) Meta-Level Research: This line of research refers to works that aim to develop a better meta-level understanding of mindfulness technology. From a review of 370 mindfulness-related apps, Lukoff et al. [18] determined that the majority of apps were based on meditation and stress relief. They also identified three aspects of mindfulness

apps that go against the Buddhist and/or therapeutic conceptualizations of mindfulness. These are: tracking features (i.e., progress bars) that treat mindfulness as a level of achievement; gamification features (i.e., badges, pins) that relate mindfulness to a series of achievements; and social features that prompt or allow users to compare themselves to others (i.e., daily meditation streaks, high scores).

2.3 Obstacles to Mindfulness

In Buddhism, there are five main obstacles to meditation, known as the five hindrances. The first is **sense desire**, which refers to our innate desire to engage the six senses (the mind is considered the the sixth sense). The eyes want to see, the ears want to hear, and the mind wants to think. Olendzki describes this hindrance as the desire of the senses to find their objects, and stresses how difficult it can be to work against this "habitual form of stimulation." The second hindrance is **ill will**, is our tendency to avoid or withdraw from objects of experience that do not satisfy us. The first two hindrances work against one another, pulling and pushing the senses in different directions. The third and fourth hindrances, **restlessness and sluggishness** are also opposites. Restlessness is a state of too much energy, whereas sluggishness is a lack of energy. Restlessness causes the mind to move relentlessly from one object to another while sluggishness slows the mind down. The objective is to achieve a balance of the two hindrances—a state that is simultaneously calm and alert. The final hindrance is **doubt**, which can takes form as recurring thoughts of self-doubt, or doubt about the overall endeavour of learning such a difficult skill as meditation. Olendzki concludes that maintaining a meditative state necessitates the mind's attention on a specific object,, which is difficult or impossible when any of the five hindrances are present.

Worden proposed that our lack of mindfulness stems from the capacity for language. When engaging in conversation with another person, we are actively attempting to discern their mental state. This could include what the other person knows when we are speaking and what the other person is referring to when they are speaking (e.g., pronouns). The "theory of mind" is rapid and involuntary, which explains why it is particularly difficult for people to be mindful and focus on the present moment.

Rather than attempting to explain why people are not mindful from a theoretical standpoint, like Olendzki and Worden, I conducted an interview study to get observational measures on the matter. To the best of our knowledge, there are no existing qualitative studies that examine why people are not mindful.

3 INTERVIEW STUDY

I conducted an interview study to determine why people are not (more) mindful. Participants were recruited via personal connection (i.e., friends and family) and social media. 38 adults (17 male, 21 female) with ages ranging from 21 and 73 (mean=24.3, SD=9) took part in the study. The majority of participants live in Canada, and were enrolled in or have completed post-secondary education. In order to get a diverse set of responses, there were no criteria to take part in the study. The participant group had varying levels of experience with mindfulness. Nine practiced mindfulness almost every day; eight practiced once a week; seven practiced once a month, seven practiced a few times a year; four had practiced a few times in their lives; and four had never knowingly practiced . The interviews were conducted via Google Forms with the option for people to remain anonymous. Each participant answered a series of questions to determine their understanding and opinion of mindfulness and meditation, whether they would like to be more mindful, and finally, why they are not (more) mindful. Although the focus of the study is on mindfulness, I included questions on meditation to be used as a comparison. Thus, I mainly discuss the findings of the mindfulness-related interview questions.

4 RESULTS

36 of the 38 participants said they would like to be more mindful. Two participants felt satisfied with their current level of mindfulness:

> *I like to think I have a pretty clear and focused mental space. I'm not opposed to more mindfulness but I'm pretty happy with where it is right now.* [P30]

The majority of those who wanted to be more mindful linked mindfulness to reduced levels of stress and anxiety, a higher quality of life, and a better capacity to focus and live in the present. P31 expressed a preference for non-meditative mindfulness:

> *I would like to be more mindful and I think it can be achieved outside of traditional meditation.*

This illustrates how technology that promotes mindfulness should not be centred around meditation. This participant was able to distinguish mindfulness from meditation and recognize that the benefits of mindfulness can be obtained in ways other than meditation.

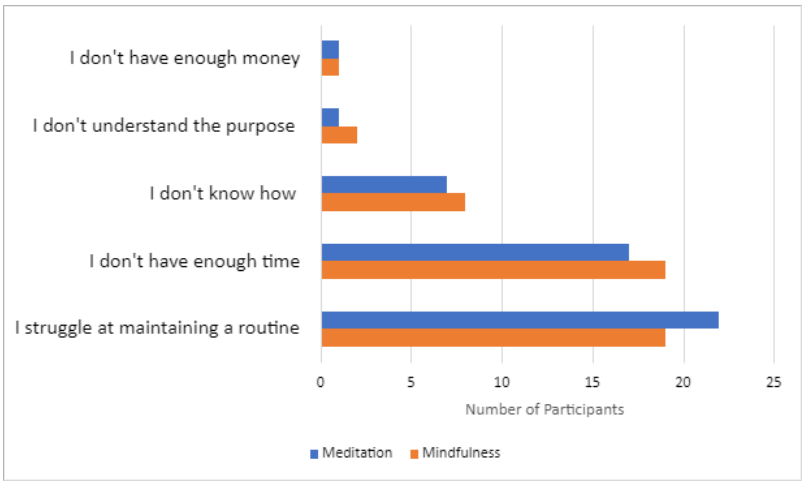

Fig. 1. Results from the interview question: What is stopping you from practicing meditation / mindfulness more often?

9 of the 38 participants (24%) of participants had never used technology to practice mindfulness. Some attributed this to a lack of knowledge or understanding of these technologies, while others claimed it was more due to personal preference. The majority of participants had experience using Headspace[1]. However, several expressed discontent with app and other forms of online guided meditation (e.g., podcasts, YouTube videos):

> *I tried Headspace but I lost interest rather quickly.* [P18]

> *I have tried both the Calm and Headspace apps but I found the free services offered to be too limiting and the ads too intrusive at times.* [P28]

Participants mainly disliked that they were unable to access certain features of Headspace without a paid subscription. Interestingly, participants seemed to prefer the use of technology for more active forms of mindfulness, such as yoga,

[1]http://www.headspace.com.

tapping meditation, and physical exercise. Only two participants had experience using interactive technologies for mindfulness. Muse, a wearable device that employs brain sensing for guided meditation, was used by one participant, and Bellabee, a wearable device that uses electromagnetic pulses to relieve stress and promote sleep, was used by another. They were not reported to be used on a regular basis by either individual.

Similar results were obtained for the questions "What is stopping you from meditating more often?" and "What is stopping you from practicing mindfulness more often?" , as seen in Figure 1. This indicates that people avoid meditation and mindfulness for similar reasons. The majority of participants said they struggle to maintain a routine and do not have enough time to practice mindfulness. Eight participants (21.1%) said they do not know how, two (5.3%) said they do not understand the purpose, and one (2.7%) credited it to a lack of money.

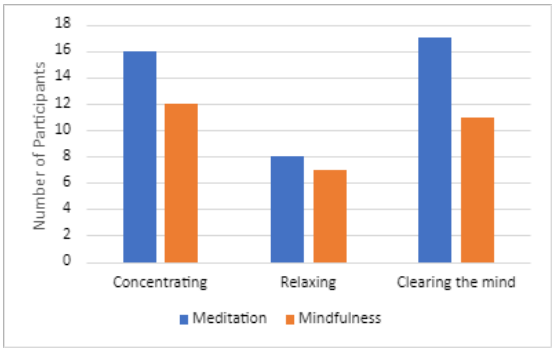

Fig. 2. Results for the interview question: What do you struggle with when practicing meditation / mindfulness?

Figure 2 shows what participants struggle with the most when practicing meditation and mindfulness. The majority of participants struggle with clearing the mind and concentrating. The figure revelas that people struggle to concentrate, relax, and clear the mind during meditation than when practicing mindfulness. It also suggests that people find meditation more difficult than mindfulness.

Participants were then asked to explain why they are not (more) mindful. Many said that they are easily distracted and have trouble concentrating on one thing at a time. One participant mentioned that when they try to relax and clear the mind, they find themselves thinking about what they have to do later or what happened earlier in the day—a struggle to remain in the present. Some participants said they lack the discipline to be more mindful, and a few said they do not understand the benefits enough to make the practice a priority. The majority of participants stated they are too busy to practice mindfulness or meditation on a regular basis, as expressed here:

> *I think my problem with exercising mindfulness involves my perception of what it does for me. To me, the issue is a duality: I only want to practice mindfulness when I am feeling anxious or I need to focus my thoughts. But because I am already in a state of duress/frustration, it's hard to attempt mindfulness.* [P28]

This participant recognizes how we typically want to be more mindful during periods of struggle (i.e., increased stress, trouble concentrating), but practicing mindfulness at these times is considerably more challenging. Another participant reported that they always feel like they could be doing something more productive. This comes back to the idea of making mindfulness a priority, and fully understanding the practice and its associated benefits:

> *I do not have enough time in the day to get everything done. I have not made mindfulness a priority over physical health (running/cycling etc.).* [P19]

This participant does not feel that they have enough time to incorporate both mindfulness and physical exercise into their daily routine. They would rather spend their free time on things like running or cycling over say, meditation or yoga. The benefits of physical activity (e.g., physical appearance, disease prevention) take precedence over the benefits of mindfulness for this individual. P24 had a similar response but with schoolwork, stating how they find it difficult to justify spending time on mindfulness when they could be studying:

> *Setting aside time for yourself is a lot easier said then done. It's easy for me to get caught up in the ways and routines of everyday life. Plus, humans are naturally resistant to change. Changing a routine to include mindfulness takes time and practice, both of which are virtues. I would have to be a lot more invested in what mindfulness is and the benefits associated to truly spend time on practicing mindfulness.*

This participant emphasizes several important factors involved in the journey towards mindfulness. Apart from being busy with everyday tasks and responsibilities, humans have an innate resistance to change. In order to begin practicing mindfulness on a regular basis, we must have a strong desire to overcome this resistance. Forming a habit can be difficult, especially when the habit (i.e., mindfulness) does not come easily for many people. The participant concludes that if they were to devote time to being more mindful, they would need to be committed to mindfulness and the advantages it brings.

Some participants said they forget to practice mindfulness and believe that reminders (i.e., self-made reminders, mobile app notifications) could be helpful in forming the habit. One participant suggested that linking the practice with a daily task like breakfast could serve as a personal reminder. Two participants said that would benefit from having another person—a mindfulness buddy—to hold them accountable. However, as stated earlier, social features go against the principles of mindfulness [18]. Thus, buddy systems would need to be designed in a way that prevents users from comparing themselves to one another. For the final interview question: "What would help you start being more mindful?", many participants expressed interest in a scheduling device, with reminders and other features to help form a consistent routine. It seems the issue lies more in the the ability to form a habit than the actual format of existing technologies for mindfulness.

> *I find that ability to concentrate has declined throughout the years. For example, I find it much easier to focus on a short TikTok videos, rather than a long YouTube video... I think that using my phone less would help me be more engaged in real life and stay more mindful.* [P3]

This participant connects their inability to focus with phone usage. They now find it difficult to watch the long video format on YouTube, which was once the standard before TikTok and Instagram Reels. Decreased phone usage (or technology in general) is a somewhat unexplored aspect of mindfulness that is particularly relevant given the current state of the digital age.

5 DISCUSSION

All of the participants seemed to have a general understanding of mindfulness and its associated benefits. This indicates that a lack of knowledge or awareness is not at the root of why people are not mindful. The participants mainly connected mindfulness with relaxation, stress relief, and increased concentration. Despite the fact that enhanced sleep is one of the key features of applications like Headspace and Calm[2], none of the participants associated mindfulness with better sleep. This is likely due to the sample size, as sleep issues are more common among seniors and only two participants were over the age of 25. The majority of the participants reported having used mindfulness technology

[2]https://www.calm.com

before. However, of the participants who want to be more mindful, only a small number use technology for mindfulness on a regular basis. While some do not like or need to use technology for mindfulness, others expressed concerns about the devices themselves.

As to why people are not (more) mindful, the rest of this section is divided into four main parts. Based on participant responses, the main obstacles to mindfulness are: (1) Not viewing it as a priority; (2) Struggling to maintain a routine; (3) Finding it difficult to clear the mind and concentrate; (4) Feeling intimidated by meditation. Strategies to solve each obstacle are discussed in each section.

5.1 Prioritizing Mindfulness

5.1.1 Obstacle. People do not prioritize mindfulness enough to commit to being more mindful or make changes to their routine. To prioritize something one must understand what it is, be aware of its benefits, and be interested in achieving at least one of those benefits. The results of the interview study indicate that most people know the purpose of meditation/mindfulness, as seen in Figure 1. However, the extent of this knowledge could vary among participants. Some may only know a few of the advantages of mindfulness, and hence do not feel the need to be more mindful.

5.1.2 Solution. Apps and other devices should begin to include more information on mindfulness and what practicing on a consistent basis entails—apart from just stress relief or better sleep. For example, beginners could be asked to watch an introductory video or complete a series of lesson plans before accessing the rest of an app for mindfulness. This would benefit people who want to be more mindful but do not know enough about it to make it a priority. A more difficult-to-implement strategy is to integrate mindfulness into the North American educational curriculum. This would not only help more people understand and prioritize mindfulness, but it would also aid students in coping with school-related stress.

5.1.3 The Cost of Mindfulness. In terms of technology, participants were most familiar with Headspace and Calm. However, several claimed to dislike the paid subscription model that these apps impose. Interestingly, only one participant (2.7%) claimed that they do not have enough money to be mindful, as seen in Figure 1. It comes down to the idea of mindfulness as a priority—only when people prioritize mindfulness will they consider investing in a paid subscription. If people do not fully understand or believe in the benefits of mindfulness, they will not want to pay for the service. There is also a level of commitment involved with paying for a subscription. Meditation and mindfulness are already intimidating to many individuals. These people may be hesitant to invest in an app like Headspace out of fear that they will not be able to meditate properly, or that they will waste their money and fail to practice on a regular basis. Overall, I am unsure of whether people do not like mindfulness-related apps because of they are only familiar with the free services, or because of the format of the app itself. It would be worth investigating how paying for mindfulness technology impacts the user experience. Do people feel more obligated to use these apps when there is a certain level of monetary investment involved? Or does the practice begin to feel like more of a chore than a form of self-care?

Several participants also use YouTube and Spotify for practicing mindfulness. Users have unlimited access to these platforms without a paid subscription. However, the advertisements can be distracting and disrupt the flow of meditation. The advantage of audio-based guided meditations, such as those available on Spotify, is that they are convenient to do discreetly in public places. Visual components are required for more active forms of mindfulness such as yoga and Pilates.

Only two participants had experience with wearable devices for mindfulness (Muse[3] and Bellabee[4]). The majority of the participants are in their 20s and therefore unlikely to have a steady enough income to afford more advanced devices for mindfulness. The older generation, on the other hand, may not be aware of mindfulness gadgets outside of the app store. The interview study reveals that mobile applications are able to reach a much larger audience than other forms of technology for mindfulness. Therefore, if the goal is to help more people be mindful, we should focus on mobile applications when designing technology for mindfulness.

5.2 Maintaining a Routine

5.2.1 Obstacle. Another common reason people are not (more) mindful is they lack the discipline to practice on a regular basis. This relates back to the idea of priorities, as people will discipline themselves to do something when they see it as a necessity. Many individuals, for example, are very disciplined when it comes to maintaining a workout routine because physical health is a top priority for them. However, some people are simply more disciplined than others, just as some people find it easier to form and stick to a routine. The interview study shows a gap in existing technology that focus on developing the habit of mindfulness. Several participants expressed the desire for daily reminders to make sure they do not forget. Interestingly, Headspace and Calm do have a reminder system that is even presented as a way to build the mindfulness habit. Participants simply may realize that this feature exists without the paid subscription. Alternatively, people may gravitate more towards a mindfulness app that focuses on scheduling and reminders alone.

5.2.2 Solution. Future work on mindfulness apps should examine how different types of reminders impact our capacity to form a habit. Would some sort of buddy system be more effective, where either a real or virtual "friend" holds the user accountable? A similar idea would be reminders with consequences, where for example, a user loses x amount of points if they ignore the reminder. Forest[5] is a popular mobile app for focus that kills a hypothetical tree if users leave the app during the time they set to work or study. This approach could provide people with the discipline they need to practice mindfulness on a regular basis.

5.3 Struggle to Clear the Mind and Concentrate

5.3.1 Obstacle. The results from the multiple-choice section of the interview study (Figure 2) indicate that when practicing mindfulness, people find it most difficult to clear the mind and concentrate. Mindfulness experts stress that a focus on relaxation may overlook the full potential of mindfulness as a contemplative practice [18]. Although a certain level of relaxation is required to practice mindfulness, an overemphasis on it could take away from the concentration and awareness at the core of mindfulness.

5.3.2 Solution. Mindfulness technology should focus more on helping users clear the mind and concentrate, as these are the dimensions of mindfulness that people struggle with the most. Since I only examined three aspects, for future work I would like to conduct a more in-depth study on what people find difficult during meditation/mindfulness. This could include options such as relaxing the body, relaxing the mind (as opposed to just relaxing), remaining in the present, or letting thoughts pass without judgement.

[3]Muse headband, http://www.choosemuse.com
[4]https://www.bellabee.org/
[5]https://www.forestapp.cc/

5.4 Mindfulness without Meditation

5.4.1 Obstacle. The results of Figure 2 also demonstrate that people find meditation more challenging than mindfulness. The participants find it more difficult to concentrate, relax, and clear the mind during meditation than when practicing mindfulness. This makes intuitive sense as several mindfulness practices involve some sort of movement (e.g., yoga, walking, Tai Chi) or action (e.g., journalling, painting), which tend to help with focus and relaxation. While guided meditation is the main feature of applications like Headspace and Calm, promoting mindfulness instead could increase downloads. People may be hesitant to begin their journey towards mindfulness because they find meditation intimidating or too difficult, and they are unaware of other forms of mindfulness.

5.4.2 Solution. Technology that promotes mindfulness could present meditation as more of a level to work towards than a primary or standalone feature. These apps should not, however, present meditation as something that can be achieved, as this would violate basic Buddhist principles.

6 LIMITATIONS

A major limitation of the interview study is that the interviews were held online via Google Forms. For future work, I plan to conduct in-person interviews allowing us to ask follow-up questions and gain a better understanding of each participant and their opinion on mindfulness. Some of the responses were rather brief, which made it difficult to decipher exactly what the participants were saying. Another limitation is the diversity of the sample. All of the participants live in North America and the majority were below the age of 25. Thus, the results reflect only a small subgroup of the general population. Mindfulness is practiced by people all over the world. To truly determine why people are not (more) mindful, the sample group would need to include people from a range of different backgrounds and age groups. The lower mean age of participants may have worked to our advantage, however, because younger people tend to have more experience with apps and other technologies for mindfulness.

A more general limitation of this work is the very idea of mindfulness technology. Traditional mindfulness does not involve the use of technology. Although mobile apps and interactive devices are effective tools for learning and practicing mindfulness, many experts believe that students should strive for a routine that does not rely on a tool or teacher [18].

7 FUTURE WORK

As stated in Section 1, the ultimate goal of this work is to design and evaluate a system for mindfulness based on the results of the interview study. Eventually, I would like to compare the system with existing technologies or the current state of the art. Several interesting ideas were brought up by participants that could be promising avenues for future research. One participant suggested technology breaks as a form of mindfulness. This is a new take on mindfulness that to the best of our knowledge, does not exist in industry or research. It is, however, increasingly relevant given the current use of technology and the issue of phone addiction. Another fruitful area of research is guided journalling (i.e., a combination of guided meditation and journalling), as a few participants expressed that they practice mindfulness solely through journalling. I am also interested in determining how reminders and advertisements can be better designed for mindfulness technology. Is there an efficient way companies can profit off of mindfulness apps without having to rely on costly memberships or obtrusive advertising? What types of notifications or reminders are most effective in instilling the mindfulness habit?

8 CONCLUSION

As humans continue to become increasingly reliant on technology, many are suffering from increased levels of stress and mental fatigue. Mindfulness has become a buzzword in recent years, as consistent practice has shown to help with stress, anxiety, and mental well-being [10]. However, many people have not made mindfulness a part of their daily lifestyle. I set out to determine why people are not (more) mindful, to ultimately gain a better understanding how mindfulness technology can be improved. I determined four obstacles to mindfulness and provided solutions for each:

(1) They do not prioritize mindfulness.
    (a) This can be overcome by promoting a better understanding of mindfulness and its benefits.
(2) They struggle to maintain a routine that involves mindfulness.
    (a) This can be overcome by developing more effective, non-intrusive technology for scheduling and reminders.
(3) They find it difficult to clear the mind and concentrate when practicing mindfulness.
    (a) This can be overcome with mindfulness technology that focuses on these two aspects of the practice.
(4) They find meditation too challenging or intimidating.
    (a) This can be overcome by supporting (and advertising) mindfulness techniques other than traditional meditation.

Several participants also expressed a frustration with apps like Headspace and Calm that offer limited services without a paid subscription. The findings of the interview study indicate several new and interesting ways of designing technology for mindfulness. In terms of follow-up work, I plan to develop a system with the primary purpose of helping people be more mindful. It will likely be in the form of a mobile application to reach a larger audience and help more people as a result. It will focus on helping users prioritize mindfulness and maintain a routine. The app will mainly feature active forms of mindfulness (i.e., yoga, movement meditation, tapping, Tai Chi). To prevent feelings of discouragement, guided meditation will be presented as more of an advanced practice that users can work towards, as opposed to the main feature of the app.

In this work, I determined several important reasons why people are not mindful. The results indicate numerous areas in which existing technologies for mindfulness can be improved. They also provide general insight on the different views people have towards mindfulness and the lack of research on more obscure forms of mindfulness such as journalling and phone breaks. I hope my findings inspire the creation of more innovative and effective tools for mindfulness.

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A APPENDIX

Table 1. **Information on participants.**

	Age	Gender	Location
P1	22	Female	Canada
P2	23	Female	Canada
P3	22	Female	Canada
P4	22	Female	USA
P5	21	Female	Canada
P6	22	Male	Canada
P7	22	Male	Canada
P8	23	Female	Canada
P9	73	Male	Canada
P10	22	Female	Canada
P11	21	Male	Canada
P12	23	Female	Canada
P13	23	Male	Canada
P14	22	Female	Canada
P15	23	Female	Canada
P16	21	Female	Canada
P17	22	Male	Canada
P18	22	Male	Canada
P19	44	Male	Canada
P20	25	Male	Canada
P21	21	Female	Canada
P22	24	Female	Canada
P23	23	Female	Canada
P24	23	Male	Canada
P25	22	Female	Canada
P26	24	Female	Canada
P27	22	Female	Canada
P28	22	Male	Canada
P29	23	Male	Canada
P30	23	Male	Canada
P31	23	Male	Canada
P32	22	Male	Canada
P33	22	Male	Canada
P34	22	Female	Canada
P35	22	Male	Canada
P36	21	Female	Canada
P37	22	Female	Canada
P38	24	Female	Canada

Table 2. **Interview questions.**

	Demographics and Experience
0	Age, gender,
1	How often do you meditate?
2	How often do you practice mindfulness?
	Technology
4	Have you ever used technology to practice mindfulness? If yes, what did you think? If no, why not?
	Meditation
5	What is stopping you from meditating / meditating more often?
	Mindfulness
6	Would you like to be more mindful? Why or why not?
7	What is stopping you from practicing mindfulness more often?
8	What do you think would help you start being more mindful?