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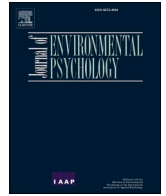
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The impact of nature in challenging times: Comparing direct and mediated nature experiences for well-being during the COVID-19 pandemic and in palliative care

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ABSTRACT

Nature plays an important role in human life, helping to reduce stress and enhance well-being, particularly during difficult times. However, accessing natural environments can be difficult at times, including during the COVID-19 pandemic or while in palliative care. Mediated nature experiences, e.g. watching documentaries, looking at photos or listening to nature sounds, offer an alternative way to connect with nature despite possible barriers. Yet, their impact remains underexplored. No studies have directly compared the impact of direct versus mediated nature on palliative care patients and individuals in other difficult situations. We conducted 12 semi-structured qualitative interviews with palliative care patients and 18 interviews with members of the general public during the COVID-19 pandemic. Our findings indicate that mediated nature can improve well-being and contribute to better health. For palliative care patients, engaging with nature through media is particularly meaningful, providing a connection to inaccessible places and evoking memories of past experiences.

1. Introduction

Nature plays an important role in human life because of the inherent connection humans have with the natural environment and other living beings (biophilia hypothesis; Wilson, 1984). Contact with nature has been shown to influence health and psychological well-being in various ways, offering health-promoting, preventive, and therapeutic effects (Abraham et al., 2010; Blair et al., 2013; Fuller et al., 2007; Gesler, 1993; Hartig et al., 2014; Li et al., 2008; Rathmann, 2021; Tyrväinen et al., 2014; Ulrich, 1984). Exposure to natural environments can hereby decrease stress, enhance attention, and reduce the risk of depression (Hartig et al., 2014; Stevenson et al., 2018; Ulrich et al., 1991). Additionally, spending time in nature can improve respiratory function by providing cleaner air and increased oxygen levels, further contributing to overall well-being (Hartig et al., 2014; Pretty et al., 2005) and individual resilience (White et al., 2023). Just 120 min a week in nature can be enough to significantly improve well-being (White et al., 2019). Biodiversity and species richness in nature in particular can have a

decisive influence (Dallimer et al., 2012; Fuller et al., 2007; Sandifer et al., 2015), with various theories, such as the stress recovery theory (Ulrich, 1984; Ulrich et al., 1991), the attention restoration theory (R. Kaplan & Kaplan, 1989; S. Kaplan, 1995b) and nature-based biopsychological resilience theory (White et al., 2023) providing explanations for these effects. Studies indicate that nature holds particular significance for individuals in challenging circumstances, such as palliative care patients (Brandstätter et al., 2014; Fegg et al., 2010). At the same time, nature also plays an important role for people in the general population during difficult times, such as the COVID-19 pandemic (Grima et al., 2020; Robinson et al., 2021). Although natural areas exist in many communities, access is often constrained at the times in which nature might be most beneficial. Palliative care patients are often no longer physically able to visit nature independently. And even during the COVID-19 pandemic, it was often difficult to visit nature recreation areas due to lockdowns and travel restrictions. In these cases, mediated nature experiences could offer a meaningful alternative to help meet the need for nature (Mattila et al., 2020). In this study, mediated nature

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experiences are defined as interactions with nature that occur indirectly through digital or media formats, such as watching documentaries or photos, listening to nature sounds, or using virtual reality applications. We do not use the term ‘virtual nature experience’, since the study includes nature photos and sounds in addition to virtual reality components. In contrast, direct nature experiences encompass all interactions with outdoor natural environments. While extensive research has documented the positive effects of direct contact with natural environments on health and psychological well-being (Hartig et al., 2014; Tyrväinen et al., 2014), an increasing number of studies have begun to investigate ‘virtual’ or mediated nature experiences (Annerstedt et al., 2013; Mattila et al., 2020; Reese et al., 2022; Reynolds et al., 2018; Stevenson et al., 2018; Yu et al., 2018). The results are mixed: some studies confirm positive effects similar to those of direct experiences of nature (Reese et al., 2022; Spano et al., 2023; Yu et al., 2018). Other studies indicate slightly lower restorative effects than direct nature experiences (Stevenson et al., 2018). These differences may result from variations in the intensity and duration of exposure (Stevenson et al., 2018), yet the results still suggest that virtual experiences hold potential for enhancing mental well-being and recovery (Mattila et al., 2020; Reese et al., 2022), especially when direct nature experiences are not possible. However, the details have not yet been analyzed. This study explores the role of both direct and mediated nature experiences, focusing on palliative care patients and individuals during the COVID-19 pandemic. Rather than aiming for definitive comparisons, our goal is to capture the complexity of nature experiences by examining different perspectives. While previous research shows that mediated nature can support well-being and reduce stress, its significance in contexts of heightened vulnerability remains underexplored. By addressing this gap, the study contributes to understanding the unique ways nature may be meaningful for individuals facing particularly challenging circumstances, while acknowledging that palliative care represents a distinct context.

2. Theoretical perspectives on health-related effects of nature exposure

Typically, the beneficial effects of nature are explained by two theoretical approaches (Joye & Dewitte, 2018): attention restoration theory (R. Kaplan & Kaplan, 1989; S. Kaplan, 1995a), which explains that nature restores depleted attention by engaging effortless fascination, and stress recovery theory (Ulrich, 1979, 1984; Ulrich et al., 1991), which states that stress is reduced by evoking positive feelings and reducing physiological arousal due to contact with nature.

Physical surroundings regularly demand direct attention from people in order to perceive or process stimuli (S. Kaplan, 1995a,b). To a certain extent, this leads to a kind of exhaustion. S. Kaplan (1995a,b) as well as R. Kaplan and Kaplan (1989) therefore developed a framework, known as attention restoration theory (ART), that shows the relationship between nature and humans and explains why nature has special characteristics that lead to a recovery effect in humans. According to attention restoration theory (R. Kaplan & Kaplan, 1989; S. Kaplan, 1995a,b) nature contains four different aspects that are important for restorative effects (S. Kaplan, 1995a,b): (1) Nature offers the possibility to change the environment and creates a feeling of “being away”. In line with this, (2) the diversity and richness of nature captivates and inspires individuals. Natural environments evoke *fascination*, a form of involuntary attention (vgl. James, 1892), which is a key element of a restorative experience. Furthermore, (3) the scope and coherence of an environment — basically, the *extent*, how immersive and rich it feels. Additionally, (4) there is a special *compatibility* between an individual and their environment. A compatible environment supports a person’s goals and provides the necessary resources to accomplish them. As a result, the surroundings do not create unnecessary obstacles or demands but instead facilitate smooth and effortless engagement in tasks. In such an environment, individuals can focus effectively, which helps them reduce

cognitive strain while enhancing their ability to restore attention (S. Kaplan, 1995a,b). A systematic review by Ohly et al. (2016) confirms these positive effects of nature regarding attention, but also reveals uncertainty about which specific aspects of attention may be influenced by exposure to natural environments. Building on Ohly et al. (2016), Stevenson et al. (2018) conducted a further systematic review, confirming positive effects of nature exposure. They also identified relevant cognitive domains such as working memory, cognitive flexibility, and attentional control that show improvement following exposure to nature.

The second theory that tries to explain nature related beneficial effects is the stress recovery theory developed by Ulrich (1979, 1984) and Ulrich et al. (1991). The theory suggests that exposure to nature and time spent in natural environments can help alleviate stress, especially emotional and psychological stress. In contrast to the ART, stress recovery theory states that stress will be reduced by eliciting positive emotions and lowering physiological arousal. Especially in comparison to time spent in urban environments, spending time in nature leads to more positive feelings such as affection and happiness and fewer negative feelings such as fear (Ulrich et al., 1991). A meta-analysis conducted by Gaekwad et al. (2023) confirms stress reducing effects of nature compared to urban environments. However, the analysis reveals conflicting findings regarding the role of personal stress levels, suggesting that individual stress does not consistently moderate the effect of nature on psychological stress. Interestingly, the meta-analysis also considers studies that focus on virtual nature experiences for stress reduction.

Virtual reality in particular offers extremely realistic, vivid and immersive experiences (Bohil et al., 2011). In combination with the sounds of nature, for example, this can activate the parasympathetic nervous system, lowering blood pressure and heart rate and thereby helping to reduce stress (Annerstedt et al., 2013; Yu et al., 2018). Mattila et al. (2020) propose that mediated nature experiences can therefore be used to increase well-being and mental health. However, meta analyses by Stevenson et al. (2018) and Gaekwad et al. (2023) suggest that virtual nature may be slightly less effective at reducing stress and promoting restoration than direct nature, although other studies report comparable benefits (Reese et al., 2022; Spano et al., 2023). While the mechanisms underlying the benefits of nature experiences may also apply to mediated nature, further research is needed to clarify their effectiveness, particularly in challenging situations (Annerstedt et al., 2013; Mattila et al., 2020; Yu et al., 2018). Mediated nature experiences could be particularly important for people with limited access to direct natural environments, as nature plays a particularly important role among this group.

3. The role of nature in challenging situations: insights from palliative care and the COVID-19 pandemic

Nature is of additional importance for palliative care patients (Brandstätter et al., 2014; Fegg et al., 2010) and is often incorporated into medical care to support patients with various conditions and enhance quality of life (Annerstedt & Währborg, 2011; Blair et al., 2013; Masel et al., 2018; Rathmann & Brumann, 2017; Ulrich, 1984). Despite this recognized importance and clinical use, palliative care patients frequently report limited access to nature, making it difficult to fully benefit from its therapeutic potential (Fegg et al., 2010). Mediated nature experiences, which include watching documentaries, looking at photos or listening to nature sounds, might enable nature references with low accessibility thresholds. A study of gynecologic cancer patients who watched Disney movies during their treatment showed promising results: Participants reported less stress and tension, indicating that media can help improve quality of life in such situations (Pils et al., 2020). A systematic meta-review of publications from 2006 to 2020 on digital health interventions in palliative care confirms the effective use of digital health interventions in the areas of communication, symptom management, education or decision management (Finucane et al.,

2021). Palliative care patients thus appear to be able to cope with digital interventions and also derive positive effects from watching films, suggesting that mediated nature experiences could also enhance the well-being of palliative care patients and be useful in the care of these patients.

Being a patient in a palliative care unit is a profoundly challenging situation, one that defies easy comparison to other life circumstance. However, during the COVID-19 pandemic, large parts of the general population also faced sudden limitations due to lockdowns and social distancing regulations. Although access to nature was not completely prohibited, familiar forms of engagement such as seeking out nature in more distant areas, traveling, or participating in social hikes were largely restricted. These constraints disrupted typical strategies for relaxation and emotional regulation for many people. Research has suggested that spending time in nature can contribute to stress reduction and well-being, particularly in contexts involving environmental or situational challenges (Grima et al., 2020; McCunn, 2021; Robinson et al., 2021; White et al., 2023). Yet less is known about how nature supports people when their access to it becomes constrained, whether for medical or societal reasons. Therefore, the present study aims to clarify what role nature plays in difficult circumstances, whether during the COVID-19 pandemic or in palliative care settings, leading to the first research question:

RQ1: What role does nature play in challenging life situations?

As previously noted, access to nature during the COVID-19 pandemic was often limited due to lockdowns, personal illness, travel restrictions, and geographic distance from natural environments. These barriers suggest that mediated forms of nature may have played an important role in supporting well-being during this time, paralleling the constrained access to direct nature experienced by palliative care patients. Despite this potential relevance, research on mediated nature experiences in such contexts remains limited (Gaekwad et al., 2023; Stevenson et al., 2018). This motivates the second research question:

RQ2: What role do mediated experiences of nature play in challenging life situations?

Although there are some parallels between the COVID-19 pandemic and palliative care in terms of restricted access to nature, key differences remain. Direct comparisons of the perceived health effects of mediated versus direct nature experiences across different populations, including palliative care patients, are still lacking. This leads to the third research question:

RQ3: Are the health-related effects of mediated and direct nature experiences perceived differently by individuals in challenging situations, with a particular focus on palliative care patients?

4. Method

The aim of this study was to examine the relationship between individuals in exceptional circumstances—namely palliative care patients and people during the COVID-19 pandemic—and nature, with a particular focus on mediated nature experiences. It also aimed to analyze the potential benefits of these mediated experiences for their health and mental well-being.

4.1. Research design and procedure

We conducted 30 semi-structured qualitative interviews. From this group, 12 of the participants (over 50 years, 4 male) were palliative care patients at a University Hospital in Germany. The remaining 18 people (23–69 years old, 10 male) from the general population were recruited as part of a seminar. The interviews, which lasted 7–36 min, were

recorded with the interviewee's permission and transcribed verbatim. As dealing with palliative patients requires more sensitivity, two interview guidelines were developed. The interview guideline for palliative care patients included categories such as "Importance of and access to nature outdoors for patients" or "Nature inside". The interview guideline for the members of the general public consisted of categories like "Nature in everyday life" or "Media use related to nature". All data were analyzed using the thematic analysis (Braun & Clarke, 2006, 2022).

4.2. Sampling and recruitment

The sample size of the present study was determined based on the principle of information power (Malterud et al., 2016), the richness of the data, and the exploratory nature of the research. Even though the concept of data saturation (Glaser & Strauss, 2017; Guest et al., 2006; Saunders et al., 2018) was also taken into consideration, consistent with the assumptions of reflexive thematic analysis (Braun & Clarke, 2021), we acknowledge that the idea of saturation as a fixed point of informational completeness is misaligned with the interpretative and iterative nature of our analytic approach. Rather than viewing meaning as excavated from the data, we consider it to be generated through the interpretive process, which means that decisions about when to cease data collection are inherently situated and context-dependent (Braun & Clarke, 2021). Thus, we did not treat saturation as a rigid criterion but as one of several considerations in the design and conduct of the study. The number of interviews was also shaped by feasibility considerations, particularly with regard to the accessibility and health status of the palliative care participants, which led to the continuation of data collection with this group beyond the initial COVID-19 period.

The sample, consisting of 30 participants and ensuring a diverse range of experiences and perspectives relevant to the study's aims, can be divided into two subsamples: Firstly, the 12 palliative care patients, all of whom were patients in the palliative care ward at a University Hospital in Germany. The palliative care patients were over 50 years old and four of them were male. The exact age cannot be given here, as some participants did not want to provide any age-related information. The palliative care patients were recruited in collaboration with the University Hospital after their ethical approval. A doctor on site specifically asked patients whose state of health permitted it whether they would be willing to take part in an interview. No additional inclusion criteria were applied. An official declaration of consent was obtained from the participants. If the participants agreed and were in good health on the day, we were informed by phone and conducted the interviews on site at the hospital on the same day.

Secondly, the 18 participants from the general public who were interviewed during the COVID-19 pandemic were between 23 and 69 years old, and 10 of them were male. These participants were recruited as part of a seminar at a German university. The seminar participants had the task of asking a person from their environment to take part in the study. To cover a broad spectrum of people regarding sex, and age, quotas were used. Detailed information can be found in Appendix (see Tables 1 and 2). Especially in the results section, these participants are referred to as lay participants.

All participants provided informed consent prior to their involvement in the study. For palliative care patients, informed consent was obtained in collaboration with medical staff to ensure ethical sensitivity and full understanding of the study's purpose and procedures. During the interviews with the palliative care patients, particular care was taken to ensure their comfort and emotional well-being. All study procedures were conducted in accordance with relevant ethical guidelines.

4.3. Semi-structured qualitative interviews

The interviews were executed, transcribed, coded, and interpreted in German. Relevant quotes will subsequently be translated into English.

The interview guide for the palliative care patients comprised two

thematic blocks and an introductory section. The aim was to find out the role nature plays during stays in a palliative care unit. In the introduction portion, the participants were first asked to say how long they had been there in order to start a casual conversation. The first thematic block then focused on the importance of and access to nature outdoors for patients. Therefore, the first question asked was whether the participants had already had the opportunity to go outside or spend time on the terrace in the last few days. If so, they were asked if there were things they particularly appreciated about the nature around the clinic. Participants were also asked to explain whether there are things they miss about the nature around the clinic and whether their relationship with nature and the environment has changed since they have been there. Moreover, in the second thematic block we asked the participants whether they would like to see more nature in the building or in the rooms. Given various restrictions on experiencing nature outdoors as well as indoors, we asked whether participants believed that media or mediated nature could serve as a substitute. Participants were asked specifically about their own media use in relation to nature and the possible benefits of nature images or nature films.

The interview guide for the members of the general public also consisted of a welcome and introductory section. Participants were first asked to describe their everyday life in general terms during the COVID-19 pandemic, specifically during the lockdown, and to talk about any new hobbies or other new routines they developed since the beginning of the pandemic. In the first thematic block, nature in everyday life, participants were then asked specifically about the extent to which they encounter nature and how often they consciously visited it. They were also asked to what extent they feel a certain effect on their health or well-being when they are out in nature. The second thematic block then made specific reference to media use related to nature. First, participants were asked to report on the role media plays in their everyday lives and whether they use nature-related media in any way. They were also asked specifically how often they watched nature documentaries, series or films related to nature, viewed nature images on Instagram, listened to sounds or podcasts, or read certain books and magazines, and whether this has changed since the start of the COVID-19 pandemic. Next, participants were asked whether using such nature related media had any specific effects on them regarding health, well-being, or stress levels. Finally, participants were thanked for participation. Table 3 provides a general overview of the questions asked.

4.4. Data collection

The first round of interviews was conducted over a period of six weeks in September and October 2020. Due to COVID-19, we had to stop conducting interviews with palliative care patients. The second half of the interviews was then conducted in the first half of 2021. The interviews took place in the palliative care unit of a University Hospital in Germany. The interviews with the members of the general public were conducted in December/January 2020/2021 during the COVID-19 pandemic and an ongoing lockdown in Germany. The interviews were mainly conducted online due to COVID-19 restrictions. While in-person interviews are often considered the gold standard in qualitative research (Johnson et al., 2021; Lobe et al., 2022), there are also strong reasons to conduct interviews online. For palliative care patients, in-person interviews were chosen as they were more feasible given their health status. For the members of the general public, by contrast, online interviews were more appropriate due to COVID-19 restrictions. The choice of interview mode was therefore tailored to the participants' circumstances (Johnson et al., 2021) with the understanding that previous studies have suggested that online interviews can provide data of comparable quality to in-person formats (Archibald et al., 2019; Johnson et al., 2021).

All participants were informed about the audio recording of the conversation, which was started with their consent. The duration of the interviews varied between 7 and 36 min ($M_{Duration} = 16.34$ for palliative

care patients; $M_{Duration} = 23.21$ for lay participants). Due to the fragile health of some palliative care patients, a few interviews were shorter than others. While this limited the amount of information obtained from these participants, all interviews still provided valuable insights.

4.5. Analysis strategy

After conducting the interviews, the recordings were transcribed to facilitate further analysis (Dresing & Pehl, 2018). The transcription of the interviews with the palliative care patients was conducted by an external provider. The transcription of the interviews with the members of the general public was carried out by the respective seminar participants. The transcription process followed the guidelines of the basic transcription system by Dresing and Pehl (2018). The collected data were then examined using thematic analysis (Braun & Clarke, 2006, 2022). The researchers decided to form two groups to analyze the data, as the content of palliative care patients differs to some extent from that of the members of the general public and important information from each group should be considered in a focused way. Subsequently, the themes developed in each group were compared and merged. The process consisted of six different steps (Braun & Clarke, 2006, 2022) that will be presented in the following: First (1), familiarizing with the data. After all interviews were transcribed and available in written form, they were read and scanned several times. Initial thoughts about the transcripts were discussed during the seminar. Furthermore, the researchers together with two research assistants also discussed first thoughts about the interviews with the palliative care patients. Initial notes were written down. The second step (2) involved coding the initial findings. For this purpose, the transcripts of the palliative care patients were reread by two research assistants as well as one researcher, and preliminary findings were highlighted. The interviews with non-palliative participants were also reviewed by another research assistant and one of the researchers, with key findings being highlighted. In a third step (3), the individual codes were summarized by each group of researchers to develop corresponding themes. This revealed overarching themes that were evident in both the interviews with palliative care patients and the interviews with participants from the general public. These included, for example, the positive evaluation of nature. The research assistants hereby discussed the themes with two of the researchers. In a fourth step (4), it was examined whether the themes function in relation to the coded excerpts (Level 1) and the entire dataset (Level 2). Subsequently (3), the relevant themes were identified and carefully reviewed by the researchers. It was essential to thoroughly reflect on each theme to ensure clarity and distinction. For example, it became clear that two themes addressed related topics but with a distinct focus on palliative care patients and participants from the general public. Therefore, it was once again considered in detail whether different themes should be put forward for the two groups or whether common themes would be suitable. The decision was made to pursue both approaches and to develop both individual theses for the specific group and joint theses, as this corresponds to the data structure. The final step (6) involved writing down the results. For this purpose, a results draft was written, containing the individual theses and memorable quotes. Subsequently, this paper was written.

5. Findings

In our analysis, we identified four different themes:

- *The importance of nature in coping with difficult situations*
- *The role of multisensory nature experiences in palliative care*
- *Nature-related media use and its functions*
- *Effects of nature and nature-related media exposure on well-being*

All topics were developed as overarching themes, even if the detailed analysis revealed differences between palliative care patients and

members of the general public, which are explained in the respective chapter. Only the second theme focuses in particular on the role of multisensory experiences of nature in palliative care.

5.1. The importance of nature in coping with difficult situations

The present study indicates that nature plays an important role for the respondents managing the challenges of their respective situations. For the participants interviewed during the COVID-19 pandemic, it became clear that spending time in nature was actively used to increase well-being or pass time. Awareness of the importance of spending time in nature and in the fresh air has therefore increased during the COVID-19 pandemic. Noah (lay participant, 24 years) noted:

“I deliberately went out more often to get some fresh air. During normal times, you didn’t say “I’m going out now to get some fresh air” as often as you do now during the corona period, because you were outside at some point one way or another.”

It is also noticeable that participants often combined a stay in nature with sporting activities as Tom (lay participant, 23 years) and Martin (lay participant, 60 years) stated:

“Whenever I do sport, I’m actually out in nature. So in winter I go skiing or in summer I like to go hiking or sometimes I go out to take photos. So, for me, nature is actually quite strongly associated with sport and sporting activities.” (Tom, lay participant, 23 years)

“Riding my bike to and from work or going for a walk in my free time. I also do Nordic walking with my wife from time to time, or yes, the garden behind the house. I did a lot there, especially in summer and during the first lockdown.” (Martin, lay participant, 60 years)

Overall, the participants felt better after spending time in nature, “both physically and mentally” (Carl, lay participant, 26 year) because “lungs become free and the mind becomes free” (Gertrud, lay participant, 69 years). Meredith (relative of a palliative care patient) confirmed that nature increases well-being: “It just feels good. You can’t really describe it.” Heidi (palliative care patient, 58 years) described how nature has a soothing effect on her, helping her to physically relax:

“I always thought I’d feel better there, because I take a completely different breath and somehow calm down. I sit down and then I really move all my limbs away from me so that they slowly relax. And - yes, it just feels good, this relaxation phase, where one part of the body after the other just sinks and releases and rests.”

It can enhance mood (Vera, palliative care patient, 76 years), promote relaxation (Andie, palliative care patient), and serve as a distraction, potentially reducing the need for pain medication. Wolf (palliative care patient, 66 years) said: “And that’s what calms a patient down and they need less painkillers. Because a happy patient thinks about something else and then automatically has less pain.” The physical consequences of nature were also emphasized. According to Wolf (palliative care patient, 66 years), for example, the fresh air is good for him for many reasons: “Because, firstly, I need fresh air for my lungs and it’s so wonderful. When I was healthy, I used to ride my bike for hours in the countryside. A dog with me - yes, what could be better.”

5.2. The role of multisensory nature experiences in palliative care

The analysis of the interviews revealed a special phenomenon, particularly with regard to palliative care patients. The perception of nature with all the senses played a particularly important role for these interviewees. This included sounds such as the singing of birds, the rustling of leaves, the rippling of water and animal noises. Different smells were also mentioned. Louise (palliative care patient) explained:

“I definitely prefer pleasant scents—natural ones, you know. Not perfume, but rather everything nature has to offer. I’ve felt that way

since I was a child. Whether it’s the scent of tree bark or something else—so many things are beautiful when you consciously take them in.” (Louise, palliative care patient)

Haptics also played a special role in this context, although the participants noted that they were often unable to touch nature because they could not go outside. They explained that in this case it was even more important to evoke the other senses. Thus, it was often mentioned that a large window was essential as it helped them get a view outside. When different senses are stimulated when looking outside, this triggers a feeling of happiness in the participants, which they described as follows:

“I spend a lot of time sitting by the window at home, watching my birds in the garden and everything around me—it lifts me up. It lifts me up again and again. Seeing how it all works gives me strength and the motivation to say, “Keep going!”” (Max, palliative care patient, 64 years)

Meredith (relative of palliative care patient) explained that hearing the noises of the animals when the window is open has special significance for palliative care patients: “You open the window, you can hear these animal noises, which is also very important.” Jo (palliative care patient) described it as “extremely precious” to have his large window in the palliative care unit.

5.3. Nature-related media use and its functions

“Well, it distracts you. And you just think about how it used to be.” (Rainer, palliative care patient)

As accessing nature was sometimes difficult during the COVID-19 pandemic, just as it often is for palliative care patients, the relevance of access to mediated experiences of nature became clear. Interviewees from the palliative care unit reported using nature films as a source of comfort as well as a mere pastime, as their disease severely limits their freedom of movement. Heidi (palliative care patient, 58 years) said that she consciously uses nature documentaries: “I look for that specifically. They also report so many well-founded things in their documentaries. And then the speakers are very pleasant. And that’s something, I really enjoy being lulled to sleep by it.” Nature documentaries are therefore used specifically to calm down. Moreover, especially noteworthy is the function of nature-related media content as a mental bridge to past periods of life by bringing back pleasant memories and fulfilling a compensatory function. Heidi (palliative care patient, 58 years) explained: “I won’t be able to see it like this anymore. And that’s why I like that I can still watch it.” Rainer (palliative care patient) confirms that: “That is, of course, beautiful – it brings back memories.” In general, it was found that elderly people in particular, regardless of whether they are in the palliative care unit or not, noted that nature-based media can remind them of their past: “I think it often helps me to look at pictures or videos or media contributions or something from nature again to remind me of the place and my experience there. That always helps me to process everything.” (Martin, lay participant, 60 years). Similarly, participants interviewed during the COVID-19 pandemic noted that nature-related media evoked a longing for nature, as Lisa (lay participant, 25 years) described: “Sometimes you do get a bit of wanderlust, because somehow you don’t get to travel and watch nature documentaries about faraway countries instead of going there yourself”. This longing can be both positive: “Um, so I think they arouse a bit of anticipation, a desire to travel” (Alex, lay participant, 24 years), and negative, with sad and melancholy feelings often coming to light: “Sometimes, yes, of course, I’m um a bit sad when I see something that I’ve not been to yet.” (Bernd, lay participant, 64 years). Bernd (lay participant, 64 years) explains that this was also the reason why he actively decided to use media to experience this kind of wanderlust: “You can’t travel every few weeks, but nevertheless, when I come back from a trip, I want to experience something new again and then perhaps satisfy my wanderlust in this way”.

Thus, mediated nature experiences can serve multiple functions, including providing distraction, influencing mood, and addressing a longing for nature.

5.4. Effects of nature and nature-related media exposure on well-being

Maria (lay participant, 49 years) talked about plant photos and animal videos that fascinate her by having an “incredibly calming effect”. Documentaries in particular (‘Unsere Erde’; Paul, lay participant, 28 years), as well as narrative fictional content (Gertrud, lay participant, 69 years) are described as a resource for positive emotions. Gertrud (lay participant, 69 years) thinks that watching series with a connection to nature “reduces stress [...] because you immerse yourself in a completely different world.” This break from daily life appears to be a key factor in the use of nature-related media, with escapism playing a particularly significant role:

“I simply forget about everyday life and can get involved in a show like this. Just forget a bit about what happened today or what’s coming up. At the moment, I’m just there, enjoying this light-heartedness that nature gives me.” (Maria, lay participant, 49 years).

Overall, participants emphasized the positive emotional impact of both direct and mediated nature experiences on their well-being. Beyond feelings of calm and relaxation, nature-related media were described as offering moments of escapism, fascination, and immersion that provided a welcome break from everyday concerns. These accounts suggest that mediated nature can support emotional regulation and contribute to well-being in ways that complement direct encounters with natural environments.

6. Discussion

The aim of the present study was to explore the role of both direct and mediated nature experiences in palliative care and during the COVID-19 pandemic in order to capture the complexity of nature experiences from multiple perspectives.

Analysis of the interviews revealed two central themes that help answer RQ1: first, *The Importance of Nature in Coping with Difficult Situations*, and second, *The Role of Multisensory Nature Experiences in Palliative Care*. During the COVID-19 pandemic, individuals reported turning to nearby parks or gardens to manage confinement and uncertainty, which is consistent with prior research on the restorative effects of nature (Grima et al., 2020; McCunn, 2021; Robinson et al., 2021). Palliative care patients also emphasized the importance of nature, noting that even a simple view out of the window could be meaningful. This supports previous findings that exposure to natural settings can reduce stress and aid recovery (Ulrich, 1984). Ulrich (1984) found that patients having a room with a view to a nature setting had shorter postoperative stays and required less pain medication than those facing a brick wall, highlighting how visual access to nature contributes to well-being. Although participants did not explicitly mention biodiversity, they highlighted the importance of diverse sensory impressions, including sights, sounds, and smells, suggesting that a rich sensory environment contributes to well-being (Dallimer et al., 2012; Fuller et al., 2007; Sandifer et al., 2015). Thus, biodiversity can be understood here as the diversity of sensory impressions and not just the diversity of species. In line with the attention restoration theory (R. Kaplan & Kaplan, 1989; S. Kaplan, 1995a,b) and the stress recovery theory (Ulrich, 1979, 1984; Ulrich et al., 1991), these findings indicate that nature can have both healing and restorative effects, particularly in challenging situations such as a pandemic or a stay in palliative care. Overall, the study extends existing research on the role of nature in people’s lives to contexts of heightened vulnerability, demonstrating its significance for coping with difficult circumstances (Blair et al., 2013; Masel et al., 2018; Rathmann, 2021; Rathmann & Brumann, 2017; White et al., 2019).

In addition to direct nature experiences, this study also explored

mediated nature experiences (RQ2) and how mediated and direct nature experiences are perceived differently by individuals in challenging situations (RQ3). Two central themes emerged from the interviews that help answer RQ2 and RQ3: first, *Nature-related media use and its functions*, second, *Effects of Nature and Nature-Related Media Exposure on Well-Being*.

Participants described how consuming nature-related media could have restorative effects, consistent with the assumptions of attention restoration theory. Similar to findings in previous studies (Mattila et al., 2020; Yu et al., 2018), they associated these experiences with stress relief, relaxation, and positive emotions. Notably, participants reported only psychological benefits, without reference to physical advantages, suggesting that mediated experiences provide comparable mental health benefits but lack the embodied intensity of direct exposure (see also Gaekwad et al., 2023; Stevenson et al., 2018). However, it should be noted that these effects are self-reported perceptions and may not correspond to objectively measured health outcomes.

Beyond psychological restoration, participants highlighted motivational aspects: nature-related media often encouraged them to seek out direct encounters with nature. This desire for nature is also set out in the biophilia hypothesis (Wilson, 1984) and is a foundational assumption of attention restoration theory (R. Kaplan & Kaplan, 1989; S. Kaplan, 1995a,b). For palliative care patients, mediated experiences also carried deep personal meaning, often serving as a bridge to the past. Given that palliative care aims to enhance psychological well-being (Brandstätter et al., 2014; Fegg et al., 2010), mediated nature experiences may offer a simple and valuable means of care when direct access to nature is limited. Therefore, rather than positioning mediated nature experiences as a substitute for direct nature experiences, it may be more appropriate to view it as a complement, offering similar benefits when direct access to nature is limited.

Taken together, the findings suggest that both direct and mediated nature experiences can support well-being and help individuals cope with difficult situations. While mediated nature offers fewer physical benefits than direct exposure, it still serves important functions: it can provide distraction, shape mood in uplifting or sometimes melancholic ways, and satisfy a longing for nature when access is limited. For elderly participants, particularly those in palliative care, mediated experiences often carried a deeper role by creating a bridge to the past and enabling (re)connection with experiences that were no longer possible in their everyday lives.

7. Limitations and future research

Several limitations of the study should be noted. The relatively small sample size restricts the generalizability of the findings and calls for caution in interpreting the results. In addition, data collection occurred during the COVID-19 pandemic, which imposed restrictions both on visits to palliative care units and on participants themselves. As a result, the data collection period was extended, and the pandemic may have shaped the responses of palliative care patients interviewed after lockdown. Furthermore, the study took place in southern Germany, and palliative care conditions may differ across regions and countries. The lay participants were recruited with the help of students attending a university seminar, who identified participants in their personal networks. As a result, despite quota sampling, they may represent a selective group with similar social backgrounds. Women were also underrepresented due to dropouts. The format of the interviews also varied, with some conducted in person and others online, potentially influencing the depth and character of responses through factors such as rapport or openness. Taken together, these limitations emphasize the exploratory character of the study and point to the importance of future research with larger, more diverse samples and consistent interview settings. Future work could also examine mediated nature experiences beyond pandemic circumstances and investigate which specific elements of mediated nature are most beneficial, particularly for palliative

care patients with distinct needs.

The findings of this study provide a valuable starting point which can inform practical recommendations for enhancing the well-being of both palliative care patients and members of the general population facing various challenging settings.

CRediT authorship contribution statement

Janine N. Blessing: Writing - review & editing, Writing- original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal Analysis, Conceptualization. **Anja Kalch:** Writing - original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Joachim Rathmann:** Writing - original draft, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Melissa Reismüller:** Writing - original draft, Methodology, Investigation, Formal analysis. **Irmtraud Hainsch-Müller:** Resources, Methodology, Investigation.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT to translate sentences and improve readability of the manuscript. After

using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table 1
Basic demographics of all participants

Pseudonym	Age	Sex	Health Status
Lisa	25	F	Lay participant
Franziska	62	F	Lay participant
Gertrud	69	F	Lay participant
Paul	28	M	Lay participant
Tom	23	M	Lay participant
Felix	31	M	Lay participant
Martin	60	M	Lay participant
Tina	30	F	Lay participant
Carl	26	M	Lay participant
Carmen	63	F	Lay participant
Noah	24	M	Lay participant
Bernd	64	M	Lay participant
Martin	30	M	Lay participant
Alex	24	F	Lay participant
Thomas	43	M	Lay participant
Maria	49	M	Lay participant
Silja	29	M	Lay participant
Edgar	57	M	Lay participant
Wolf	66	M	Palliative care patient
Max	64	M	Palliative care patient
Heidi	58	W	Palliative care patient
Rainer		M	Palliative care patient
Vera	76	F	Palliative care patient
Louise		F	Palliative care patient
Lena		F	Palliative care patient
Meredith		F	relative who speaks for the patient
Andie			Palliative care patient
Jo	76	M	Palliative care patient
Svenja		F	Palliative care patient
Hanna		F	Palliative care patient

Note. Missing values indicate that the participants did not want to indicate their age.

Table 2
Sample Quotation (by sex, and age)

	18–29 years	30–50 years	51+ years
male (n = 10)	4	3	3
female (n = 8)	3	2	3

N = 18.

Note. This table only shows the participants, interviewed during the COVID-19 pandemic, as some of the palliative care patients did not want to provide information about their age.

Table 3
A general overview of the interview questions by participant group

	Palliative care patients	Lay participants
Introduction	<ul style="list-style-type: none"> Welcome and thanks for participating Brief introduction of the context (research project at the University of Augsburg) and objective Note on recording: If you agree, we will record the interview so that we can evaluate it later. Assurance of anonymity: The interview is anonymous, your name will not be asked, and the interview cannot be linked to you; no data will be passed on to third parties Response behavior: There are no right or wrong answers; it is always about your personal opinion 	
Ice-breaker question	To start with, could you briefly tell us how long you have been here and why? (Possibility of asking detailed questions, if necessary)	First, I would like to ask you to give me some insight into your everyday life. How do you currently organize your daily routine? (Possibility of asking detailed questions, if necessary)
The Role of Nature in Everyday Life	<ul style="list-style-type: none"> Have you had the opportunity to go outside or sit on the terrace in the last few days? How did you find these outings? Are there things you particularly appreciate about the nature around the hospital? Are there certain places you particularly like? Has your relationship with nature and the environment changed since you have been here? Are there things you miss about nature around the hospital? Something that you think could be improved. Do you have any ideas on how to improve the natural environment here, perhaps with special plants or something similar? Do you look out of the window or listen to birds singing? Do you feel that being able to experience nature makes a difference to your well-being? 	<ul style="list-style-type: none"> How do you connect with nature? Through which activity? How often would you say you connect with nature (per week)? Are there situations in your everyday life where you consciously long for nature? Why? How do you feel in these situations? How has your contact with nature changed as a result of the pandemic? Do you go out into nature more often? Do you consciously seek contact with nature? How often did you go out into nature before, and why? How often and why now during the pandemic? Have you noticed a change during the pandemic? What effect do you feel when you are in nature? Have you found that nature has an effect on your health or illness? How does nature affect your health or illness?
Media use related to nature	<ul style="list-style-type: none"> Would you like to see more nature in here? Sometimes it is difficult to truly bring nature indoors. Do you believe that media could be a solution here? We are thinking of pictures of different landscapes, nature documentaries, or films—there is even a film here about the forest. Would something like that interest you? Have you watched any films like this recently? What would these offerings have to be like for you to use them? Films can do several things at once: they can help you switch off and experience a bit of nature, and they can convey information. What would be important to you? Do you use any other media offerings related to nature? 	<ul style="list-style-type: none"> To what extent do you use nature documentaries, nature videos, Instagram with nature pictures/videos, Nature sounds (such as rain, jungle), Podcasts related to nature, Series or films in which nature is featured prominently, Books or magazines Are there any specific nature-related media that you remember particularly well? What were they and what characterizes them? Do you enjoy using media related to nature? Films that show nature, series, audiobooks, magazines ... (see examples in the next question) Did you notice any changes in your nature-related media use during the pandemic? What would you say is the effect of nature-related media on you? What is your intention when using nature-related media? What effect do nature-related media have on you? Media use often changes over the course of a lifetime and across different stages of life—thinking back, have you noticed any changes in the way nature is portrayed in the media in recent years, regardless of COVID-19, and if so, what changes?
Conclusion	First of all, thank you very much for the interesting insights into your use of nature and media. We have now come to the end of the interview. Do you have anything to add, or is there anything else you would like to say on this topic that has not yet been addressed but which you feel is important?	

Note. In addition, several optional questions could be asked as needed. For clarity, these are not listed in full here.

Table 4
Illustrative Quotations for Each Theme

Theme	Illustrative Quotations
The Importance of Nature in Coping with Difficult Situations	<p>“I deliberately went out more often to get some fresh air. During normal times, you didn’t say ‘I’m going out now to get some fresh air’ as often as you do now during the corona period, because you were outside at some point one way or another.” (Noah, lay participant, 24 years)</p> <p>“Riding my bike to and from work or going for a walk in my free time. I also do Nordic walking with my wife from time to time, or yes, the garden behind the house. I did a lot there, especially in summer and during the first lockdown.” (Martin, lay participant, 60 years)</p> <p>“Mountain landscapes. [...] forest and meadow landscapes. That’s wonderful. A few animals, deer or something, that’s beautiful [...] And that’s what calms a patient down and reduces their need for painkillers. Because a happy patient thinks about something else and then automatically has less pain.” (Wolf, palliative care patient, 66 years)</p> <p>“Well, it’s beautiful, of course. Especially here. And, uh, yes, it’s also calming. I do think that nature makes a difference.” (Meredith, palliative care patient)</p>
The Role of Multisensory Nature Experiences in Palliative Care	<p>“I definitely prefer pleasant scents—natural ones, you know. Not perfume, but rather everything nature has to offer. I’ve felt that way since I was a child. Whether it’s the scent of tree bark or something else—so many things are beautiful when you consciously</p>

(continued on next page)

Table 4 (continued)

Theme	Illustrative Quotations
Nature-related media use and its functions	take them in.” (Louise, palliative care patient)
	“I spend a lot of time sitting by the window at home, watching my birds in the garden and everything around me—it lifts me up. It lifts me up again and again. Seeing how it all works gives me strength and the motivation to say, “Keep going!”” (Max, palliative care patient, 64 years)
	“You open the window, you can hear these animal noises, which is also very important.” Meredith (relative of palliative care patient)
	“I can’t touch them because I can’t go outside, but I can see and smell them.” (Wolf, palliative care patient, 66 years)
	“I think that’s excellent, especially because it ends right in the empty field, you can hear the leaves rustling, you can hear a little splashing. I see flowers here, I really enjoy looking out. I like it very much.” (Heidi, palliative care patient, 58 years)
	“Well, it distracts you. And you just think about how it used to be [....]. That is, of course, beautiful – it brings back memories.” (Rainer, palliative care patient)
	“I look for that specifically. They also report so many well-founded things in their documentaries. And then the speakers are very pleasant. And that’s something, I really enjoy being lulled to sleep by it.” (Heidi, palliative care patient, 58 years)
	“I think it often helps me to look at pictures or videos or media contributions or something from nature again to remind me of the place and my experience there. That always helps me to process everything.” (Martin, lay participant, 60 years).
	“Sometimes you do get a bit of wanderlust, because somehow you don’t get to travel and watch nature documentaries about faraway countries instead of going there yourself”. This longing can be both positive: “Um, so I think they arouse a bit of anticipation, a desire to travel” (Alex, lay participant, 24 years)
	“You can’t travel every few weeks, but nevertheless, when I come back from a trip, I want to experience something new again and then perhaps satisfy my wanderlust in this way” (Bernd, lay participant, 64 years).
Effects of Nature and Nature-Related Media Exposure on Well-Being	“I simply forget about everyday life and can get involved in a show like this. Just forget a bit about what happened today or what’s coming up. At the moment, I’m just there, enjoying this light-heartedness that nature gives me.” (Maria, lay participant, 49 years).
	“Well, I don’t know, you can’t really say, but it’s just the smell alone. It just gives you the feeling that it’s good for you. It’s hard to describe.” (Meredith, palliative care patient)
	“Yes, I think it [...] it rather reduces stress [...] because you immerse yourself in a completely different world.” (Gertrud, lay participant, 69 years)
	“Uh, it’s relaxing. It’s kind of relaxing. But it’s always been that way, uh, especially the seasons—and autumn at the lake, for example, with the leaves. So that was always very beautiful.” (Andie, palliative care patient)
	“I always thought that I felt better there because I breathe differently and somehow calm down. I sit down and really stretch out all my limbs so that they slowly relax. And yes, this relaxation phase, where one part of the body after another simply sinks down, let’s go, and calms down, just feels good.” (Heidi, palliative care patient, 58 years)

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