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RESEARCH ARTICLE

Noticing nature: The role of environmental awareness in promoting well-being

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Abstract

1. Spending time in natural environments is associated with enhanced well-being, including reduced stress and improved cognitive restoration. This experimental study investigates whether these benefits can be amplified by providing environmental prompts to direct attention towards specific features (natural versus human-made) within the environment.
2. Seventy-nine participants were randomly allocated to one of three conditions: Restorative prompting; Human-made prompting; or control. In the Restorative prompting group, participants were asked to notice natural features within the environment (natural sounds, smells, views, plants and biodiversity). In the human-made prompting group, participants were asked to notice built elements in the environment (buildings, pathways, and human-made sounds). Participants in the control group received no instructions.
3. This study was conducted at Royal Horticultural Society (RHS) Wisley botanical gardens. Measures of state well-being (Short Warwick Edinburgh Mental Wellbeing Scale), positive affect (Discrete Emotions Questionnaire) and perceived restoration (Restoration Outcome Scale) were taken before and after participants spent 20 minutes in the garden completing attentional prompting activities.
4. Participants in the restorative prompting group reported significantly higher state well-being, positive affect and restoration compared to those in the human-made prompting group and the no prompting controls.
5. These findings suggest that the well-being and restorative effects of spending time in natural environments are enhanced when individuals actively attend to nature and emotions. This has significant practical implications for the design and management of natural spaces, both public and private, such as parks and gardens that attract visitors seeking leisure and relaxation. The study provides valuable insights into how people can get the most out of these visits to support and enhance their well-being, highlighting the potential of interventions such as interpretive signage, digital trails or guided experiences to promote more meaningful engagement with nature.

KEYWORDS
environmental psychology, nature and health, nature based interventions, nature connection, wellbeing, wellbeing gardens

1 | INTRODUCTION

Spending time in natural environments is associated with beneficial outcomes for one's health and well-being (Callaghan et al., 2021; Marselle et al., 2019). This understanding is underpinned by two key theories in environmental psychology. Attention restoration theory (ART) proposes that nature supports the recovery of directed attention, which can become fatigued through prolonged effortful focus. According to ART, natural settings are restorative because they gently hold attention without requiring cognitive effort, thereby allowing the directed attention to rest and replenish (Kaplan & Kaplan, 1989). In contrast, stress reduction theory (SRT) emphasises the affective and physiological responses to certain natural environments that elicit immediate emotional reactions and facilitate recovery from stress (Ulrich, 1983). Both theories emphasise that certain landscape characteristics (e.g. natural sounds, smells, views, plants) are important features that support the restoration of stress and mental fatigue. Consequently, much research to date has focused on observing the benefits that individuals experience from viewing natural settings, with the aim of understanding and identifying the environmental characteristics that promote restoration. As a result, there is existing research linking specific environmental characteristics such as plant colour (Hůla & Flegr, 2016; Jang et al., 2014; Zhang et al., 2023; Wilms & Oberfeld, 2018), scents (Donelli et al., 2019; Moss & Oliver, 2012; Rahbardar & Hosseinzadeh, 2020), and natural sounds (Alvarsson et al., 2010; Bates et al., 2020; Ratcliffe, 2021) to various well-being outcomes including reduced stress, positive emotions, and perceived restoration. However, this existing research assumes that restorative effects occur passively through unstructured exposure to natural settings. Although Kaplan (2001) suggested that mindful awareness of environmental characteristics could enhance the overall restorative experience of spending time in nature, fewer studies have examined how actively directing attention to features of the environment may influence well-being. If ART proposes rest from effortful attention, what happens when individuals are prompted to actively notice elements of the environment? Does all directed attention contribute to cognitive fatigue, or might certain forms support the restorative experience? These questions raise important theoretical implications and highlight the need to explore intentional forms of engagement with natural environments for enhancing well-being.

Previous literature indicates that actively noticing restorative environmental characteristics when engaging with natural environments can help enhance well-being outcomes (Ballew & Omoto, 2018; Capaldi et al., 2017; Lim et al., 2020; Martin et al., 2020; Pritchard et al., 2020; Richardson, Hamlin, et al., 2021; Richardson, Passmore, et al., 2021; Russell et al., 2013; Scott et al., 2021). For example, an individual can have two very different experiences in the same natural environment. One can sit and be absorbed in current thoughts or distracted by another activity, hardly noticing the restorative features that could promote well-being. Conversely, one can allow themselves to become immersed in the natural surroundings and take the time to pay attention to the restorative features around them, allowing it to encapsulate their attention and notice the resulting positive emotions. Lin et al. (2014) tested how awareness of trees impacted restoration. Participants were shown streetscapes without trees; streetscapes with minimal trees; streetscapes with trees; or streetscapes with trees to which participants were specifically told to pay attention. Measures of attentional performance and perceived restoration were taken. The results showed that participants actively paying attention to the trees showed better attentional performance and restoration than conditions with lower awareness of the trees. This suggests that the restorative effects of nature are greater when individuals engage in activities that involve actively noticing restorative environmental characteristics (Lin et al., 2014). Similarly, Fleming et al. (2024) explored how intentional visual attention to natural (green) versus human-made (grey) elements in urban environments affects well-being. Using eye-tracking technology during a 45-min walk, participants were instructed to focus on green, grey or mixed elements. Results showed that greater visual attention to green elements was associated with reduced anxiety and increased perceived restoration, whilst attention to grey elements had the opposite effect. The findings suggest that encouraging visual engagement with urban nature may be a simple yet effective strategy to improve mental health in cities. Additionally, studies have found that focusing on nature and the resulting affective responses can also enhance well-being outcomes. For example, Passmore and Holder (2017) asked participants to notice the everyday nature they encountered and how it made them feel over 2 weeks. This was compared to participants who were asked to notice built objects and resulting feelings, and a control group who did nothing. Findings show that individuals who actively noticed nature and how it made them feel reported significantly higher measures of well-being than participants who noticed the built environment. This evidence suggests that the well-being benefits of spending time in nature can be enhanced by prompting people to actively notice natural features along with focusing on the resulting sensory and emotional reactions (Ballew & Omoto, 2018; Capaldi et al., 2017; Lim et al., 2020; Martin et al., 2020; Pritchard et al., 2020; Richardson et al., 2020; Richardson, Hamlin, et al., 2021; Richardson, Passmore, et al., 2021; Russell et al., 2013; Scott et al., 2021).

Visitors to natural environments may direct their attention to many different environmental features when they visit them, resulting in different experiences and potentially influencing the well-being potential of even the most thoughtfully designed spaces. As such, in this study, we aim to experimentally test the effect of

directing one's attention towards natural or human-made features within the environment and examine its impact on well-being outcomes. Specifically, we aim to understand how different prompts (restorative, human-made, control) influence well-being outcomes and which environmental features participants report noticing. Based on previous literature, this study includes subjective assessments associated with one's experience of state well-being, positive over negative affect (Ballew & Omoto, 2018; Richardson et al., 2016) and perceived restoration (Korpela et al., 2008; Marselle et al., 2021). Subjective well-being is typically defined as a state of being comfortable, healthy or happy and regularly experiencing more positive over negative affect (Diener, 2000; Linton et al., 2016). Existing literature on nature and well-being typically uses various measures associated with the psychological quality of an individual's life, including one's experience of happiness (MacKerron & Mourato, 2013; McMahan, 2018), positive over negative affect (Ballew & Omoto, 2018; Richardson et al., 2016) and particularly perceived restoration (Korpela et al., 2008; Marselle et al., 2021).

1.1 | Research questions and hypotheses

This study addresses the following research questions:

1. Does prompting garden visitors to actively notice restorative environmental characteristics enhance state well-being, positive affect and perceived restoration?
2. How does prompt type (restorative, human-made or control) influence the environmental features noticed by participants?

H1. It is hypothesised that prompting participants to actively notice restorative environmental characteristics will result in increased subjective well-being, higher positive over negative affect, and perceived restoration, compared to human-made characteristics or no prompting controls (Passmore & Holder, 2017).

H2. Participants who receive restorative prompting will be more likely to report noticing natural features (e.g. plants, bird song, scent), and participants who receive a human-made prompt will be more likely to report noticing human-made features, compared to the no prompting controls.

2 | METHOD

2.1 | Participants

There were 79 adult participants, of which 62 were females and 17 were males. The mean age of participants was 55 years (SD = 12.5) with the youngest being 20 and the oldest 75 years old. Participants included RHS members and non-members. Participants were recruited through the RHS members' newsletters and website, the University of Surrey, and social media, including local community groups on Facebook, Twitter and LinkedIn. Recruitment adverts invited people to come and participate in an experiment at RHS Wisley exploring how spending time in a garden impacts their well-being.

There were 4 males and 23 females, and the mean age for this group was 52.5 (SD = 14.7). The human-made prompt group has 26 participants, which included 4 males and 22 females. The mean age for this group was 56 (SD = 15.7). There were 26 participants in the control group, with 9 males and 17 females. The mean age for this group was 56.6 (SD = 7.03).

2.2 | RHS Wisley well-being garden

This research is carried out in the RHS Wisley's Wellbeing Garden, which provided an ideal environment for testing the research questions. The garden was designed by Matt Keightley in collaboration with scientists across a number of disciplines, using different design principles from their expertise to promote well-being. The garden is divided into several zones, with each zone designed to stimulate different senses and emotions for well-being (Figure 1). This is done with the use of planting: colour, scent and different shapes, textures, and forms of plants and their combinations. Natural features within the garden included multisensory planting, scented plants such as rosemary (*Salvia rosmarinus* 'Miss Jessopp's Upright') and lavender (*Lavandula angustifolia* 'Arctic Snow'), a running water feature, and scenic views. Human-made features within the garden included views of the RHS Hilltop building, gravel pathways, wooden benches and sounds of distant traffic (Figure 2).

2.3 | Design

This was a controlled experiment carried out in the well-being garden at RHS Wisley (Figure 1). Full ethical approval for the study was obtained from the University of Surrey SAGE-HDR Ethics Committee (version 3.6, 19/10/2022). Written informed consent was obtained from all participants prior to their involvement in the study. The design of this study consisted of three conditions in which participants were exposed to one of three different conditions: a restorative prompting group, a human-made prompting group, and a control group. All participants were asked to spend 20 min seated in the garden whilst they completed the activity relevant to their condition. Participants were free to choose where they sat within the wellbeing garden whilst completing the activity. Participants were unaware of the true aims of the experiment and were told the study was exploring how spending time in a garden impacts well-being. Participants were fully debriefed after completing the experiment.

In the restorative prompt group participants were asked to take in their current surroundings, specifically noticing the natural

FIGURE 1 Overview of the RHS Wisley Wellbeing Garden. RHS/Oliver Dixon.

FIGURE 2 RHS Wisley Hilltop building. RHS.

features around them such as planting, views, wildlife, sounds of birds or running water. This activity also asked participants to notice what senses were being stimulated, which involved specifically noticing sensory aspects such as nature-based sounds, touch, and scents, and their resulting emotional reactions. This activity was based on the 'pathways to nature connection' studies by Lumber et al. (2017), facilitating noticing nature, sensory engagement, and noting emotional reactions (Appendix S1).

The human-made prompt group completed an activity prompting awareness of built environmental qualities. Participants were asked to take in their current surroundings, specifically noticing the built and human-made features around them such as the building, pathways and any human-made sounds or activities. This group was also asked to notice sensory aspects such as human-made sounds, touch and scents. This activity was based on previous research by Passmore and Holder (2017) asking participants to notice the built environment and how it makes them feel (Appendix S2).

The control group was asked to spend 20 min in the garden with no instruction. Towards the end of the time, the researcher gave participants in the control condition a sheet with questions asking what they were thinking about whilst sitting in the garden, and instructions to write down anything that caught their attention. This was to control for and explore what participants in this condition were naturally paying attention to whilst sitting in the garden without any environmental prompting (Appendix S3).

This study adopted a mixed method design, integrating both quantitative and qualitative approaches. This approach is guided by a pragmatic philosophical paradigm, which emphasises flexibility in selecting methods that best address the research question. Pragmatism values both objective and subjective knowledge and allows for the use of multiple methodologies to capture a fuller understanding of complex phenomena. The study's design reflects this philosophy, combining statistical analysis (via mixed ANOVA and chi-square tests) with qualitative content analysis to offer a comprehensive perspective.

2.4 | Procedure

Participants selected a date that they could attend the experiment, which ran over 10 weekdays through May and June. Participants were randomly assigned to a condition based on the day they attended the experiment, with each testing day pre-designated for either the intervention or control group. It was necessary for the control group to complete on alternate days to the intervention conditions, as they did not have a prompting activity sheet to complete whilst in the garden but were handed a sheet towards the end of the experiment asking them to identify what they were paying attention to and thinking about whilst sitting in the garden (Appendix S3).

Participants in the intervention group were randomly allocated to receive either a restorative or human-made prompt activity. This was done by distributing activity sheets containing the respective prompts in a random order (Appendices S1 and S2). All participants completed the experiment on a weekday at 9 AM before the garden was open to the public to avoid distraction from other visitors.

On arrival to the Hilltop centre, participants were briefed and then asked to complete the questionnaire whilst inside a meeting room (Appendix S4). They were then invited to sit in the garden to complete the activity. Once seated, participants were instructed to follow the printout activity appropriate for their condition. Participants were called back inside when 20 min had passed and asked to complete the questionnaire a second time. After participants completed the questionnaire, they were debriefed and thanked for their time with a £5 gift voucher for the RHS shop.

2.5 | Measures

To measure changes in state well-being, a scale was developed based on the Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS) (NHS Health Scotland, 2008). The survey consisted of seven items and internal consistency of the scale was very good (Cronbach's Alpha = 0.79). This seven-item scale was worded to suit the current state, for example, 'I am thinking clearly', 'I am feeling relaxed'. Participants were instructed to rate how true each statement was of their feelings at that moment on a 5-point Likert scale. Each of the seven-item responses in SWEMWBS is scored from one (definitely false) to five (definitely true), and a total scale score is calculated by summing the seven individual item scores. The minimum score is seven and the maximum is 35.

The Discrete Emotions Questionnaire (DEQ; Harmon-Jones et al., 2016) was used to measure emotional state. The survey consisted of 12 items, and the internal consistency of the scale was very good (Cronbach's Alpha = 0.80). This included positive emotions such as happy, content, and relaxed, as well as negative emotions including bored, tense, and angry. Participants were asked to rate the extent they were experiencing each emotion at that moment on a 5-point Likert scale from definitely true (five) to definitely false (one).

To measure perceived restoration, the Restoration Outcome Scale (ROS) was included (Korpela et al., 2008). The survey consisted of 6 items and internal consistency of the scale was very good (Cronbach's Alpha = 0.92). Items were worded to suit the current state, for example, 'I feel that I have enthusiasm and energy for my everyday routines', 'I feel restored and relaxed'. Participants were instructed to rate how true each statement was of their feelings at that moment on a 5-point Likert scale from definitely true (five) to definitely false (one).

3 | RESULTS

3.1 | State well-being: Short Warwick Edinburgh mental well-being scale (SWEMWBS)

A mixed analysis of variance (ANOVA) was conducted to examine the effects of time (pre vs. post), group type (restorative, human-made, and control), and the interaction effect between the two factors on well-being scores. The analysis revealed a significant main effect of time (pre vs. post), $F(1, 76) = 45.62$, $p < 0.001$, with a large effect size, $\eta^2 = 0.375$, indicating that well-being scores significantly increased from pre- to post-intervention across all groups.

The interaction between time and group was also significant; $F(2, 76) = 4.35$, $p = 0.016$, with a moderate effect size, $\eta^2 = 0.103$, suggesting that the change in well-being scores from pre- to post-intervention varied between the groups.

There were no significant differences in well-being scores between groups prior to the intervention, $F(2, 76) = 0.99$, $p = 0.377$. However, a significant interaction between time and group revealed that the Restorative prompt group showed a greater improvement in well-being from pre- to post-intervention compared to the Human-made and Control groups ($p < 0.001$ for both) (Table 1).

3.2 | Positive and negative affect: Discrete emotions questionnaire (DEQ)

A ANOVA was conducted to examine the effects of the prompting intervention (pre vs. post) and group type (Restorative, Human-made, and Control) on positive emotion scores. The analysis revealed a significant main effect of time (pre vs. post); $F(1, 76) = 43.01$, $p < 0.001$, with a large effect size, $\eta^2 = 0.361$, indicating that positive emotion scores significantly increased from pre- to post-intervention across all groups.

The interaction between time and group was also significant; $F(2, 76) = 5.14$, $p = 0.008$, with a moderate effect size, $\eta^2 = 0.119$, suggesting that the change in positive emotion scores from pre- to post-intervention varied between the groups.

The main effect of group was not significant, $F(2, 76) = 0.796$; $p = 0.455$, indicating that there were no significant differences in positive emotion scores between the groups prior to the intervention.

TABLE 1 Mean scores and SD for state well-being pre- and post-intervention.

Group	Pre-intervention mean (SD)	Post-intervention mean (SD)	Mean change
Restorative prompt	M = 3.63, SD = 0.66	M = 4.31, SD = 0.45	+0.68
Human-made prompt	M = 3.64, SD = 0.65	M = 3.89, SD = 0.62	+0.25
Control	M = 3.63, SD = 0.71	M = 3.97, SD = 0.70	+0.34

Post hoc comparisons for the interaction between time and group revealed that the Restorative prompt group showed a significant improvement in positive emotion scores from pre- to post-intervention compared to the Human-made and Control groups ($p < 0.001$ for Restorative vs. Control, and $p < 0.001$ for Restorative vs. Human-made), indicating the greatest positive change for the Restorative prompt group. The Control group also showed a significant increase in positive emotion scores compared to the Human-made group, $p = 0.034$.

A ANOVA was conducted to examine the effects of the prompting intervention (pre vs. post) and group type (Restorative, Human-made, and Control) on negative emotion scores. The analysis revealed a significant main effect of time (pre vs. post); $F(1, 76) = 24.57$, $p < 0.001$, with a medium effect size, $\eta^2 = 0.244$, indicating that negative emotion scores significantly decreased from pre- to post-intervention across all groups.

The interaction between time and group was not significant; $F(2, 76) = 0.87$, $p = 0.422$, indicating that the change in negative emotion scores from pre- to post-intervention did not differ significantly across the three groups.

The main effect of group was also not significant; $F(2, 76) = 0.13$, $p = 0.879$, suggesting that there were no significant differences in negative emotion scores between the three groups prior to the intervention (Tables 2 and 3).

3.3 | Perceived restoration: Restoration outcome scale (ROS)

A ANOVA was conducted to examine the effects of the prompting intervention (pre vs. post) and group type (Restorative, Human-made, and Control) on restoration scores. The analysis revealed a significant main effect of time (pre vs. post), $F(1, 76) = 32.00$, $p < 0.001$, with a medium effect size, $\eta^2 = 0.296$, indicating that restoration scores significantly increased from pre- to post-intervention across all groups.

The interaction between time and group was also significant; $F(2, 76) = 14.60$, $p < 0.001$, with a large effect size, $\eta^2 = 0.277$, suggesting that the change in restoration scores from pre- to post-intervention varied significantly depending on group type.

The main effect of group was non-significant, $F(2, 76) = 2.65$, $p = 0.077$, indicating that there were no significant differences in restoration scores between the groups prior to the intervention.

Post hoc comparisons for the interaction between time and group revealed that the Restorative prompt group showed a significant increase in restoration scores from pre- to post-intervention compared to both the Human-made and Control groups, with a large effect, $p < 0.001$. The Control group showed a moderate but significant increase in restoration scores from pre- to post-intervention, compared to the Human-made group ($p = 0.013$); but the increase was smaller than that in the Restorative prompt group (Table 4).

The research question 'How does prompt type (restorative, human-made, or control) influence the environmental features noticed by participants?' was asked to investigate how different types of prompts (restorative, human-made, or no prompt) influence the environmental features that participants report noticing. The written text in the participants' activity sheets ($N = 79$) was analysed to identify specific environmental features participants were paying attention to. As these data were qualitative, content analysis was used. Content analysis is a systematic way of identifying and coding characteristics within written text (Krippendorff, 2018). To do this, specific features mentioned by participants were coded, and the frequency of a specific feature

TABLE 2 Mean scores and SD for positive affect pre and post-intervention.

Group	Pre-intervention mean (SD)	Post-intervention mean (SD)	Mean change
Restorative prompt	M = 3.64, SD = 0.71	M = 4.41, SD = 0.53	+0.77
Human-made prompt	M = 3.68, SD = 0.72	M = 3.91, SD = 0.82	+0.23
Control	M = 3.72, SD = 0.81	M = 4.12, SD = 0.76	+0.40

TABLE 3 Mean scores and SD for negative affect pre and post-intervention.

Group	Pre-intervention mean (SD)	Post-intervention mean (SD)	Mean change
Restorative prompt	M = 1.79, SD = 0.84	M = 1.35, SD = 0.42	−0.44
Human-made prompt	M = 1.70, SD = 0.64	M = 1.48, SD = 0.53	−0.22
Control	M = 1.84, SD = 0.66	M = 1.45, SD = 0.68	−0.39

TABLE 4 Mean scores and SD for restoration pre- and post-intervention.

Group	Pre-intervention mean (SD)	Post-intervention mean (SD)	Mean change
Restorative prompt	M = 3.64, SD = 0.53	M = 4.50, SD = 0.49	+0.86
Human-made prompt	M = 3.83, SD = 0.53	M = 4.00, SD = 0.51	+0.17
Control	M = 3.79, SD = 0.74	M = 4.24, SD = 0.68	+0.45

being mentioned was recorded and calculated as an overall percentage mentioned by the number of participants in each group. This allowed the identification of specific environmental features mentioned by participants and their relative importance in the data set and between experimental groups.

3.4 | Restorative prompt group

When asked to focus on visual features, 89% of participants commented on the variety of colour, plants, and flowers. Most commented more generally on the variety of colour around the garden, suggesting that it added interest and contrast between the different shades of greenery and pops of colour. Whilst not many identified any specific plants or colours, some mentioned enjoying the colours purple ($n=6$) and pink ($n=5$). Secondly, 44% noted that they liked the large trees because of their prominence ($n=5$), green colour ($n=3$), and the way the leaves moved in the wind ($n=4$). Additionally, 41% mentioned that they enjoyed watching insects such as bees and butterflies around the planting. Finally, 37% of participants mentioned the different textures and shapes of plants, which they suggested provided interest to the planting.

When asked to focus on sound, 78% of participants noted birdsong, which was described as calming. Also, 63% noted the sound of running water where they were seated close to the stream and pond, again suggesting that it was calming. Thirty-seven per cent commented on the sound of a gentle breeze, and 56% specifically noted the sound of tall grasses rustling in the breeze. Whilst these natural sounds provided a positive experience, some participants noted more disturbing noises that made it difficult for them to relax. This included 67% commenting on distant road noise, 26% on aeroplanes, and 22% noting staff noise, which was mostly from the use of machinery.

When asked to focus on scent, 56% mentioned the scent of specific plants including rosemary (*Salvia rosmarinus* 'Miss Jessopp's Upright') ($n=9$) or lavender (*Lavandula angustifolia* 'Arctic Snow') ($n=6$). Forty-one per cent did not comment on any specific scent but instead the general scent of fresh air, which was described as pleasant.

Participants also commented on other features within the garden, including the seating and pathways. Specifically, 59% mentioned the bench and pebble seating, commenting on the smooth texture of both, and suggested that it was a nice surface to sit on. Additionally, 22% commented on the enclosed seating spaces, which they felt provided a sense of privacy and safety. Forty-eight per cent of participants mentioned the pathways, commenting on the interesting curves and pleasant texture of the gravel, which some thought made a nice crunch sound as they walked across it ($n=9$).

When asked how they felt after the intervention, participants in the restorative prompt group reported feeling calmer and more relaxed, experiencing slowed breathing, and feeling less stressed after the intervention. Some participants mentioned feeling more connected to nature and more aware of their bodies (Figure 3).

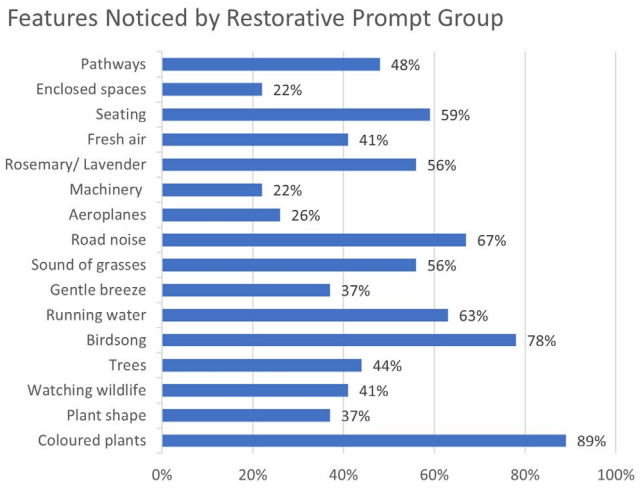

FIGURE 3 Features noticed by the restorative prompt group while in the garden. Total number of participants = 27.

3.5 | Human-made prompt group

When asked to focus on human-made aspects of the environment, 62% of participants indicated that they liked the shape and materials of the RHS Hilltop building (Figure 2). Conversely, 23% did not like the building, commenting that it was too modern and dominated over the more natural features. Additionally, 35% mentioned that they liked the planting; however, nobody commented on any specific plants.

When asked to focus on scent very few participants were able to identify anything; only 15% mentioned specific scents including rosemary (*Salvia rosmarinus* 'Miss Jessopp's Upright') ($n=1$), lavender (*Lavandula angustifolia* 'Arctic Snow') ($n=2$), and just a general floral scent ($n=1$).

When asked to focus on sounds within the environment, 80% mentioned staff noise, which included talking and sounds of machinery; 65% noted distant road noise; and 54% commented on the noise from aeroplanes. All participants commenting on these sounds described them as unpleasant and disruptive. Thirty-one per cent of the participants mentioned the sound of birdsong.

Participants also commented on other features within the garden, including the seating and pathways. Sixty-nine per cent of participants commented on the pathways; however, preference was varied. Some thought the paths were smooth and clean, making it feel safe to walk across and explore ($n=7$). Others commented on the noise the gravel made as people walked on it, with some saying it was a nice crunching sound ($n=2$); although most participants who commented on the gravel sound were negative about it, suggesting it was noisy and disturbed the peace ($n=8$). Some also thought the white colour of the path was too bright and the glare from the sun was harsh on their eyes ($n=3$). Forty-six per cent mentioned the wooden bench seating, which was described as having a nice texture and interesting curved shapes.

When asked how they felt after the intervention, participants in the human-made prompt group reported that they enjoyed

spending time in the garden but generally felt more negatively about their experience. For example, where they noticed pleasant things such as birdsong, they commented that it was difficult to enjoy it over the sounds of traffic, aeroplanes, and staff noise (Figure 4).

3.6 | Control

The control group was not asked to focus on anything whilst they spent time in the garden. Questions were asked towards the end of the session which included asking what they noticed whilst sitting in the garden. Seventy-three per cent noted watching the grass swaying in the breeze and 27% commented on insects including bees and butterflies, suggesting that these elements provided a sense of calm. Fifty-four per cent of these participants commented generally on the planting suggesting that there was a nice variety of plants, but no comments were made on scents or colours. Forty-six per cent mentioned the peaceful sound of birdsong. However, 69% also commented on the disturbing sounds of road noise, and 50% noted staff noise which included machinery. Just 12% mentioned the curved shapes of the wooden bench seating being pleasant. No comments were made on the pathways or building. Only 8% of these participants mentioned any scent including rosemary (*Salvia rosmarinus* 'Miss Jessopp's Upright') ($n=1$) and lavender (*Lavandula angustifolia* 'Arctic Snow') ($n=1$).

When asked what they were thinking about whilst sitting in the garden, most participants reported thinking about engagements at home, work, and relationships (Figures 5 and 6).

A series of chi-square tests of independence were conducted to examine whether the likelihood of noticing various environmental features (plants, birdsong, disruptive noise and scent) differed by experimental group. Results for each feature are reported below, along with effect sizes using Cramér's *V*.

Plants. There was a significant association between group and noticing plants, $\chi^2(2, N=79)=16.70$, $p<0.001$, Cramér's $V=0.46$, indicating a medium to large effect size. Participants in the restorative prompting group were significantly more likely to notice plants than expected; whereas participants in the human-made and control group were less likely to notice them.

Bird song. A significant relationship was also found for noticing bird song, $\chi^2(2, N=79)=12.24$, $p=0.002$, Cramér's $V=0.39$, suggesting a medium effect size. Participants in the restorative prompting group were significantly more likely to notice birdsong than expected; whereas participants in the human-made and control group were less likely to notice.

Disruptive noise. No significant association was found between group and noticing disruptive noise; $\chi^2(2, N=79)=1.48$, $p=0.478$, Cramér's $V=0.14$, indicating a small and nonsignificant effect. This suggests that participants across all three groups were equally likely to notice noise in the environment.

Scent. No significant association was found between group and noticing scent, $\chi^2(2, N=79)=4.96$, $p=0.084$, Cramér's $V=0.25$, representing a small to medium effect. This suggests that participants across all three groups were equally likely to notice scent in the environment.

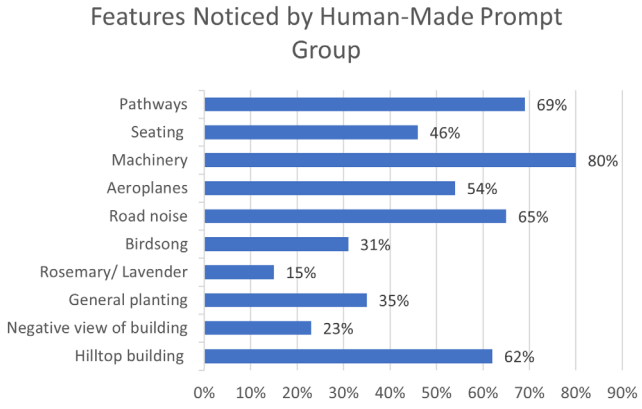

FIGURE 4 Features noticed by the human-made prompt group while in the garden. Total number of participants = 26.

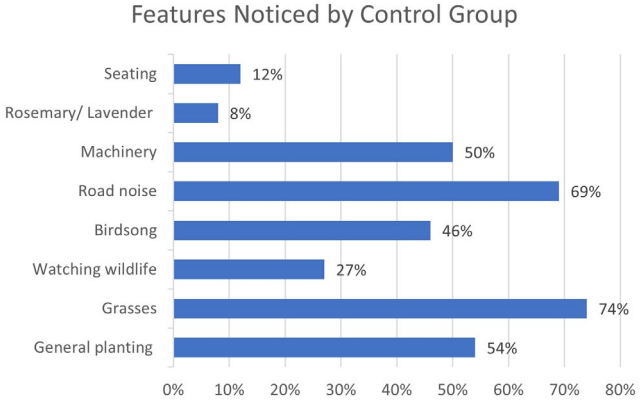

FIGURE 5 Features noticed by the control group while in the garden. Total number of participants = 26.

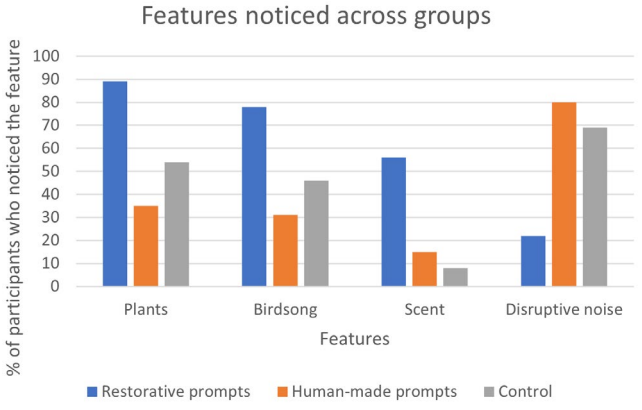

FIGURE 6 Comparison of features noticed between the different groups. This graph shows how the similar environmental features noticed differed between the groups. This is based on the percentage of participants in each group who noticed the feature.

4 | DISCUSSION

This study aimed to explore if prompting people to actively notice restorative environmental characteristics could increase state well-being, positive affect, and perceived restoration. The findings indicate that the nature-based intervention significantly enhanced well-being, positive affect, and psychological restoration, with the most pronounced effects observed in participants exposed to the restorative prompting. These results underscore the potential of nature-based interventions to promote overall well-being, particularly when designed to elicit restorative experiences. Evidence highlights that prompting people to notice the restorative environmental characteristics can enhance well-being outcomes (Capaldi et al., 2017; Richardson, Hamlin, et al., 2021; Richardson, Passmore, et al., 2021; Russell et al., 2013). The current study provides evidence of the importance of what one pays attention to whilst spending time in natural environments. These findings suggest that post-intervention well-being and restorative effects of spending time in natural environments are enhanced when individuals engage in activities that involve actively noticing nature, bodily sensations, and emotional responses (Lin et al., 2014; Passmore & Holder, 2017; Richardson, Hamlin, et al., 2021; Richardson, Passmore, et al., 2021).

Significant differences were found across all measures of well-being between the restorative prompt group, human-made prompt group, and no prompt controls, suggesting that paying attention to restorative environmental characteristics results in higher levels of state well-being, positive affect, and restoration (Passmore & Holder, 2017). Additionally, the restoration scores were lower in the human-made prompt group than in the control group, indicating that focusing on built characteristics of the environment may negatively affect restorative experiences in nature. These findings support other studies showing that focusing on human-made aspects of the environment, such as road traffic noise, can reduce aesthetic appreciation of the natural landscape (Anderson et al., 1983; Mace et al., 1999; Weinzimmer et al., 2014). The results also indicate that the intervention led to significant reductions in negative emotion across all groups. This suggests that the intervention was equally effective in reducing negative emotions, regardless of prompting. Indeed, previous research shows that simply spending time in natural environments can support such outcomes (Bowler et al., 2010; MacKerron & Mourato, 2013).

Additionally, qualitative differences were found between the group's overall experiences. After the intervention, most participants in the control group reported that it was nice to sit and rest in the garden; however, a few suggested that they found it difficult to just do nothing. Additionally, most participants in this group reported thinking about engagements at home, work, and relationships. Indeed, ruminating over past or future worries can be linked to anxiety and stress (Watkins & Roberts, 2020). Despite being in natural surroundings known to enhance well-being, participants were consumed by their thoughts, which may have distracted them from experiencing the full restorative potential of the garden (Macaulay et al., 2022). This is different from the experiences of those prompted to notice restorative environmental features. The participants in this group suggested that they felt calmer and more relaxed, experiencing slowed breathing and feeling less stressed after the intervention, which could support overall physiological and psychological health (Corazon et al., 2019). Some participants even mentioned feeling more connected to nature and more aware of their bodies, which can also support overall well-being (Baceviciene & Jankauskiene, 2022). It could be that focusing on natural elements rather than letting the mind wander acts as a form of meditation helping to prevent rumination when quietly spending time in natural environments (Macaulay et al., 2022).

4.1 | Environmental characteristics participants noticed

The results of the chi-square tests of independence revealed significant differences in the likelihood of noticing environmental features between experimental groups for plants and birdsong, but no significant differences for disruptive noise or scent. Specifically, participants in the restorative prompting group were significantly more likely to notice plants and birdsong than those in the human-made and control groups. This finding suggests that restorative prompting had a meaningful influence on participants' attention to natural elements. In contrast, no significant associations were found for noticing disruptive noise or scent, indicating that these environmental features were equally noticed across all groups. The lack of significant findings for disruptive noise and scent suggests that these factors may not have been as influential in guiding participants' attention. Overall, the findings suggest that restorative prompting may enhance participants' awareness of specific natural features, such as plants and birdsong, while having less effect on more neutral or potentially distracting sensory cues like noise and scent. The results from the content analysis offer a comprehensive overview of these findings.

Almost all the participants in the restorative prompt group commented on the colours, forms, textures, and scents of different plants, whilst just over half of the participants in the control group, and about a third of people in the human-made prompt group, noticed the planting. Neither the control nor human-made groups mentioned colour or scents of planting. Indeed, research suggests that actively noticing natural features such as planting can enhance positive emotions, mood, and overall well-being (Lin et al., 2014; Passmore & Holder, 2017). Multisensory planting is also thought to provide interest and arouse the senses (Harries et al., 2023; Marcus & Sachs, 2013). Also, almost half of the participants in the restorative prompt group commented on the enjoyment of watching bees and butterflies around the planting. Again, wildlife and pollinator-friendly planting is thought to be an important factor for promoting well-being (Curtin, 2009). Studies have found that

planting that attracts insects such as butterflies and bees is rated as more attractive and restorative (Hoyle et al., 2019). Research has also found that watching wildlife can be a mindful activity that initiates a sense of awe and wonder, similar to the fascination concept mentioned in attention restoration theory (de Bell et al., 2020; Macaulay et al., 2022).

When asked to notice sounds, almost all the participants in the restorative prompt group focused on birdsong and the sounds of running water. Indeed, research suggests that human-made sounds such as traffic can negatively impact stress (Alvarsson et al., 2010), whilst natural sounds such as birdsong and running water can facilitate relaxation and restoration (Bates et al., 2020; Ratcliffe, 2021). Importantly, all the groups noticed more disruptive sounds including traffic and the noise of gardening machinery such as lawnmowers and leaf blowers used by staff working around the gardens. The restorative and control groups commented less on this and were able to focus more on the natural sounds. The human-made prompt group experienced these sounds negatively, and even where comments were made on noticing birdsong, it was suggested that it was difficult to focus on this over the intrusive human-made sounds. Natural sounds such as running water and birdsong can help foster a sense of serenity and help promote well-being (Harries et al., 2023; Ratcliffe, 2021). When spending time in natural environments with the aim of enhancing well-being, it may also be important to consider human-made noises and attempt to direct attention towards natural sounds within the environment to help buffer any negative effects and increase well-being outcomes (Yofianti & Usman, 2021).

Comments were made by both the restorative and human-made prompt groups regarding the seating and paving. Participants were generally positive about these structures, suggesting that the seating was a good texture and provided a nice space to sit and enjoy the garden. Indeed, seating is an important feature to consider (Erickson, 2012). Seating should also support compatibility by allowing options for socialising or privacy as well as options to sit in sunny or shaded spaces (Naderi & Shin, 2008). Interestingly, everyone in the restorative prompt group who commented on the paving was positive, suggesting that the paths facilitated interest and provided a nice texture to walk upon. Conversely, those in the human-made prompt group had quite mixed opinions. Whilst a few supported the views of the restorative group, over half experienced the paths negatively, suggesting the texture was too noisy and the white colour too glaring. To support well-being outcomes, pathways should be made of safe and accessible material, encourage exploration around the entirety of the environment, and not be too light in colour to prevent glare from the sun (Harries et al., 2023; Hussein, 2010). Additionally, participants in the human-made prompt group had mixed comments on the RHS Hilltop building (Figure 2). Whilst some suggested that they liked the use of natural materials, others commented that it was too modern and oppressed the naturalness of the garden. Indeed, therapeutic garden design literature suggests that the use of abstract sculptures within hospital settings should be avoided in gardens as they can be interpreted negatively by highly stressed individuals (Marcus & Sachs, 2013). This is especially important as individuals who could benefit most from spending time in the garden are those who are likely to be highly stressed. When spending time in natural environments, it may be beneficial again to direct attention towards more natural features to prevent distraction from more negative aspects of the environment.

4.2 | Limitations

The findings from the current study support previous literature suggesting that the extent to which one pays attention to or notices restorative characteristics within the environment can enhance well-being outcomes (Duvall, 2011; Kaplan, 2001). However, these findings are not without limitations. The participant demographic of this study consisted mostly of women with an average age of 55 years from the South-East England area. Additionally, as they were interested in participating in garden research, these participants were likely to have a particular preference for gardens. Both members and non-members of RHS Wisley were encouraged to participate, but it is not known how familiar participants were with the Wellbeing Garden. Familiarity with the environment could impact results and could be controlled for in future studies. Different populations, cultures, or individuals who are not familiar with gardens may have shown different results. Conducting research in the garden context was a strength of this research as it adds ecological validity by reflecting real-world experiences. One limitation of the current study is the absence of a non-garden environment as a control. This makes it difficult to isolate whether the observed benefits are specifically due to the garden setting or simply the opportunity it provides for participants to detach from their thoughts. A non-natural environment that similarly encourages mental detachment could potentially yield comparable results. Future research should consider including such a control condition to better understand the role of cognitive absorption versus environmental factors. Whilst care was taken to control the environment participants were exposed to, there were still confounding variables that may have impacted experiences and results. This includes where participants chose to sit in the garden; the weather, which varied on different days, with some participants experiencing sunny days and some rainy days; and the level of staff activity, which also varied on different days.

5 | CONCLUSION

People in the restorative prompt group noticed more natural and restorative environmental characteristics than both the human-made and control groups. The restorative prompt group also reported significantly higher state well-being, positive affect, and restoration after spending time in the garden compared to the human-made prompt group. Additionally, participants in the restorative prompt

group reported feeling calmer and more relaxed, experiencing slowed breathing, and feeling less stressed after the intervention. Such comments were not made in the human-made prompt or control group.

Findings from the current study suggest that prompting people to actively notice restorative environmental characteristics along with senses and emotions could optimise well-being outcomes when spending time in natural environments. This has significant practical implications for the design and management of natural spaces, both public and private, such as parks and gardens that attract visitors seeking leisure and relaxation. Currently, most literature in restorative design focuses specifically on the environmental characteristics that may support well-being outcomes. However, utilising the knowledge of person-environment interactions could provide another level to current literature concerned with the well-being benefits of natural environments and further optimise potential well-being outcomes for visitors. It is important to include this knowledge when using greenspaces with the aim of promoting well-being. For example, this could involve encouraging garden users to stop at specific points that are known to be restorative, such as running water, wildlife attracting, and multisensory planting (Harries et al., 2023). This could be achieved with consciously designed landmarks that encourage visitors to sit or pause as they explore the surroundings and/or interactive signposts with activities located near restorative features that encourage visitors to engage their senses with different planting and other restorative features. A printout activity sheet or guided walk could be provided which visitors can do as they explore, again encouraging them to pause and take in the surroundings. The use of such interventions that encourage visitors to stop and actively engage with the restorative features within the natural environment and its links to well-being has not yet been explored. This could be an important aspect to consider for future studies concerned with optimising well-being outcomes from spending time in gardens.

AUTHOR CONTRIBUTIONS

Bethany Harries designed and conducted the experiment and prepared the original manuscript draft as part of her doctoral research. Lauriane Suyin Chalmin-Pui, Birgitta Gatersleben, Alistair Griffiths, and Eleanor Ratcliffe supervised the project, providing input into the study design and reviewing/editing the manuscript. Lauriane Suyin Chalmin-Pui and Alistair Griffiths are affiliated with the Royal Horticultural Society, Wisley, while Birgitta Gatersleben and Eleanor Ratcliffe are affiliated with the University of Surrey.

CONFLICT OF INTEREST STATEMENT

The authors report there are no competing interests to declare.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are openly available in the Dryad Digital Repository at https://doi.org/10.5061/dryad.mw6m9068h.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1. Restorative prompt activity.

Appendix S2. Human-made prompt activity.

Appendix S3. Control activity.

Appendix S4. Questionnaire.

Appendix S5. Violin plots with data points for the wellbeing post scores.

Appendix S6. Violin plots with data points for the restoration post scores.

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