7. Discussion

7.1 Summary of Chapters and Results

Chapter 1 presented a general introduction to the naturalness research within the field of environmental psychology. We looked at research which showed that naturalness is often associated with increases in restoration, preference and affective quality. We also discussed the findings of Study A, which aimed to look at affective quality and preference for various elements of garden design. The findings of this study took the research in an unexpected direction, however, highlighting the central role which elements of naturalness played in the perceptions of such environments. It also highlighted the fact that there were several elements of naturalness which had either not been previously examined before in the field, or for which there was only limited research. This provided the first evidence for the need to examine the conceptualisation of naturalness in further detail.

In relating the environmental psychology naturalness research to the findings of Study A, several limitations in the operationalisation of the concept of naturalness were also identified, which we felt were likely to cause confusion in the reader: 1) the terms used to describe naturalness; 2) the definitions used; 3) an overreliance on dichotomous nature-urban variables; and 4) the type of naturalness under investigation; perceived or ecological. To examine these in a more systematic way and determine how big a problem these were in the research, we decided to carry out an in-depth literature review of the operationalisation of naturalness within environmental psychology research. This was the subject of the next chapter.

Chapter 2 consisted of a in-depth literature review of 95 papers from three environmental psychology journals. This review built upon the suggestions made in Chapter 1, and those of researchers such as Lamb and Purcell (1990), providing a more systematic and up-to-date examination of the current state of the research. It also served to extend the findings of those examining other areas of research, such as greenspace (e.g. Taylor & Hochuli, 2017) and the health effects of viewing landscapes (Velarde et al., 2007).

The review looked firstly at the key terms used to describe both high and low naturalness. One-hundred and fifty-two key terms were found to describe naturalness in the reviewed papers. This large number suggests a lack of agreement regarding the most appropriate terms to use in the field. An approximate mean of six key naturalness terms were used in each paper, with up to 14 terms used in some papers, and terms often used interchangeably to refer to the same thing. The most frequently used terms included those of "natural" (mentioned by 93.7% of papers), "nature" (68.4%), "vegetation" (32.6%), "naturalness" (26.3%), and "green" (24.2%). Most papers also used terms to refer to no or low naturalness, often pitched as an antonym to naturalness, and forming part of the operationalisation of the naturalness concept. There were a fewer number of low/no naturalness terms than those for naturalness, but a number of terms were still used (n = 87). The most frequently used low/no naturalness terms were "urban" (49.5%), "built" (28.4%), "city/ies" (11.6%), "man-made" (7.3%), "artificial" (7.3%), and "barren" (7.3%).

The review also pointed to a lack of clear definition employed by most of the papers. Only 15 papers provided an explicit definition of naturalness, with the majority (n = 71) relying on a non-explicit definition developed through descriptions of environments and conditions, or references to previous literature. Nine papers failed to provide any definition of the naturalness examined in their research. The contents of the 11 explicit definitions of general naturalness were examined, to determine how they conceptualised naturalness. Eighteen elements of naturalness were identified in the definitions. Vegetation was mentioned by all but one of the papers as either constituting or being part of naturalness. Water was mentioned by almost half the papers, as was the idea that naturalness was distinct from the built or urban, without human things or influence. There appeared, therefore, to be something approaching a consensus regarding the presence of these three elements in the concept of naturalness. But for the remaining elements, there was a disparate spread across the papers, and it was harder to claim a consensus regarding their presence in the naturalness definition. There also seemed to be disagreement regarding the extent of the concept, with some mentioning many elements of naturalness, others mentioning just one. This highlighted the need to examine the concept of naturalness in greater detail.

We then looked at how naturalness was measured within the research, finding that it was most often operationalised as a dichotomous variable. Multiple categories and ordinal variables were also commonly used, with very few using interval and ratio level variables. These results therefore served to confirm the assertion of a heavy reliance on dichotomous variables. The limitations in the use of such variables was also discussed.

Finally, the papers were distinguished according to those which measured ecological naturalness, and those measuring perceived naturalness. The majority (84%) measured perceived naturalness of some form, be they the perceptions of their participants, those of an expert sample, or those of the researchers. It was not possible to tease these perceptions apart. And yet, only eight papers stated that they were measuring perceived naturalness. We suggested that the failure to communicate the type of naturalness being examined is likely to lead to an incorrect conclusion about the naturalness concept being investigated.

The results of the review therefore suggested that terms are indeed used interchangeably, that there is a heavy reliance on dichotomous variables, that few employ clear and explicit definitions of naturalness, and that the distinction between perceived and ecological naturalness is rarely made. We suggested that these limitations in the research may indeed result in confusion and should therefore be addressed in future research. We also suggested that a clearer concept of perceived naturalness was needed to guide the terminology and definitions of the concept, and lead to a clearer, more inclusive operationalisation.

Chapter 3 presented the results of an exploratory study designed to elicit detailed qualitative data regarding how lay respondents perceived naturalness. A survey with open-ended questions was designed, with respondents recruited with a mixture of online and paper surveys from the UK and US. Inductive, conceptual content analysis was carried out on the open-ended questions, which were designed to elicit detailed information regarding what respondents perceived to constitute naturalness. A set of themes and subthemes, grouped into theme groups, was developed through the analysis. This structure was repeatedly revised and improved upon, using the language and terminology of respondents in the naming of the themes and subthemes.

The theme structure was then validated by a second coder, who coded a subset of 100 surveys. The level of agreement between the two coders was calculated, showing that for most themes and subthemes, there was either substantial or (almost) perfect agreement. A smaller number received moderate agreement, and only a few, fair or poor agreement. This represented good overall agreement and served to validate the themes and subthemes, whilst improvements were made to other areas of the theme structure.

The theme structure contained 139 themes and subthemes, although this was revised to 138 in Chapter 4. These were organised into six theme groups, which encompassed the features of naturalness, appearance of naturalness, ideas about naturalness, types of natural environment, uses of naturalness, and how naturalness feels and makes you feel. The three most frequently mentioned themes included those representing the absence of humans, human influence and human things (mentioned by 89% of respondents), vegetation (72%), and water (55%). But themes also represented aspects of naturalness less frequently examined in the literature, such as animals and insects (48%), natural events and processes like the weather (45%), other life and living things (40%). The presence of humans, their influence, and their things, in the concept of naturalness for some respondents, also highlighted the problematic nature of the natural-urban dichotomy. The development of these themes and subthemes helps to broaden our conceptualisation of naturalness and identify areas of interest for future research. This new conceptualisation of lay perceived naturalness could also form the basis for a new operationalisation of the concept with future environmental psychology research, and represented our understanding of the concept from this point on in the thesis.

Chapter 4 presented the results of a closed card sort study used to examine whether the new conceptualisation could be understood by another group of lay respondents. It examined whether this group of 23 respondents would organise the themes and subthemes of the theme structure in the same way as the researcher. It also served to examine the names of the themes and subthemes, given the role of these names in communicating meaning to the respondent.

The lay respondents were asked to sort a series of cards representing the themes and subthemes of naturalness, into various categories which represented the theme

groups. The way in which respondents organised these cards was then compared to the way in which the researcher organised the themes and subthemes within the theme structure. The level of agreement between the two was generally good, with the majority of respondents organising the cards/subthemes in the same way as the researcher. But the exercise did highlight areas in which improvements could be made to the theme structure. Some themes and subthemes were moved as a result, often to locations in which the most respondents had placed them. Changes were also made to the names of some themes and subthemes, to make them more easily understood. The new, modified theme structure was then presented.

Chapter 5 served to evaluate whether it was advisable to incorporate the responses of UK and US respondents for the purposes of further analyses on the theme structure. Respondents had been recruited for the survey study of Chapter 3 from both the UK and US. People from the UK and US were initially recruited because we wanted to gather the views of a range of different people for the new conceptualisation of naturalness. The two samples were chosen, specifically, because the results of the in-depth literature review showed that the majority of environmental psychology research was conducted in the US and Europe. A new conceptualisation based on the responses of people from these two areas would therefore be of the greatest use in the field. The UK was selected from amongst the European countries given the dominant use of the English language. The responses of respondents from both samples therefore both fed into the development of the conceptualisation.

But before combining the data from the two samples (UK and US) for subsequent quantitative analyses, it was important to ensure that the responses from the two were similar enough to justify this incorporation. A series of chi-square analyses were performed to examine whether subtheme presence was associated with country of residence. The results showed that for the majority of themes/subthemes, there was no significant association; suggesting no difference in the perceptions of around 2/3 of the themes and subthemes of naturalness. The remaining themes/subthemes were significantly associated with country of residence, but the strength of these associations was negligible to weak (with the exception of one moderate association). This suggested that there were no large differences between

respondents of the two countries, which, in turn, suggested that it was acceptable to combine the two samples into one, for the purposes of the analyses in Chapter 6.

Chapter 6 examined the associations between each of the themes of perceived naturalness and affective quality (*Pleasant*, *Relaxing*, *Exciting*, *Displeasing*, *Boring* & *Stressful*), as well as two measures of perceived restoration (an ordinal measure, and a comparison between respondents primed to think of restorative and general natural environments). Several significant associations were identified, with themes such as *Quiet & Peaceful*, *Feeling Free from Problems*, and *Relaxed & Calm*, occurring more in those respondents asked to think of restorative natural places. Ideas about the appearance of naturalness, such that it was colourful, unique, and rugged, occurred more in the comments of those who rated naturalness exciting. And sound, plants, and water occurred more in those who rated naturalness as pleasant. There were many more significant associations such as these, and each of them was discussed in relation to previous research from the field of environmental psychology. The present findings echoed many of those of previous research, serving to replicate findings, and strengthen the work of previous research. Replication also served to further validate the themes of the present study, given that the pattern of association with the well-researched psychological variables of restoration and affective quality followed the associations of previous work. More novel findings, with little or no previous research to relate them to, served to extend the findings within the area, and suggest avenues for future research. The findings from this chapter will also form the basis of the following practical recommendations.

7.2 Theoretical Implications

7.2.1 Perceived Naturalness: Beyond the Dichotomy

The in-depth literature review of Chapter 2 showed that vegetation of various forms, water, and the idea that naturalness is distinct from the built or urban, formed the main constituents of the definitions of naturalness in the reviewed papers. It also showed the majority of studies represented naturalness as a categorical variable, most often as a dichotomous one. But the subsequent research of this thesis shows that the concept is much broader than this, with the development of 138 themes and subthemes, organised into six overarching theme groups.

Naturalness is perceived to consist of rocks and stones, hills and mountains, water of various forms, sand, shells, mud, wildlife, living things, animals, insects, aquatic creatures, gardens, parks, the sound of birds, the sound of rain, the sound of rustling leaves, the smell of the sea, the smell of earth, and the feel of textures; amongst many others. It encompasses natural events and processes like the weather, change and growth, the seasons, lifecycles, erosion, sunsets, and the northern lights. It is perceived as colourful, abundant, rugged, unique, ancient, hostile, powerful, fragile, primitive, and unchanged. Its origins are attributed to nature itself, to humans, or to God. It is seen as being quiet, refreshing, spiritual, safe, inspiring, familiar, and fun, and more. And it can make people feel relaxed, free from problems, close to nature, in solitude, able to think, and good or happy.

This re-conceptualisation takes the idea of how lay people (who are the focus of most of our research in environmental psychology) perceive naturalness, well beyond the bounds in which we have constrained the concept to date. It frees it from the confines of the nature-urban dichotomy by showing that people too, along with their influences and objects, are considered natural. Broadening the conceptualisation of perceived naturalness also has numerous implications for our examination of the theoretical links between naturalness and well-being and will encourage us to explore new avenues of research.

7.2.2 Novel Aspects for Future Research

During the development of the new conceptualisation of lay perceived naturalness in Chapter 3, we identified several elements of naturalness (themes and subthemes) for which there was either no or little direct research in the field of environmental psychology. It is hoped that others will use the work of this thesis to help fill the gaps in our collective knowledge of naturalness, as well as building on the other elements discussed in this research. Suggestions for future research have accordingly been provided in the results and discussion sections of chapters 3 and 6. To aid researchers in identifying such aspects, therefore, we have listed some of these more novel elements (for more information on these elements, please see section 3.3.3):

- Sounds of water, vegetation and rustling leaves, the weather, animals, insects, and life;

- Smells, including general smells, the smell of the sea, of vegetation, earth, flowers, and rain and moisture;
- Touch, including touch in general, the feel of materials, of vegetation, and of water;
- The weather, including seeing and being exposed to the weather and climactic conditions (e.g. breezy, crisp, the elements, rain);
- Processes of living things, including lifecycles, death, evolution and the adaptations which creatures have made to live in a particular area, as well as the way in which creatures use the environment for their processes, and the interactions between living things, such as the predator and prey relationship;
- Physical processes, such as forces and geographical processes (e.g. erosion, weathering);
- The seasons;
- Natural phenomena such as sunsets, sunrise and the northern lights;
- A lack of pollution, including: 1) that the environment is generally clean and unpolluted, with an absence of litter; 2) that the air is clean, fresh and crisp, with an absence of human-made smells; 3) that the water is clean, clear, fresh and unpolluted; and 4) that there is an absence of light pollution, so that one can see the sky, stars, and experience darkness;
- The idea of purity and naturalness being untouched;
- The idea that nature is in control;
- The idea that natural environments are free from rules and constraints;
- An absence of chemicals;
- An absence of domestic animals;
- Humans, human influences, and human things as natural, including old human elements and places managed by humans;
- Animals and insects, including fauna and birds;
- Flora (native vegetation), aquatic plants, moss and lichen, and green, verdant and fertile vegetation;
- Life and living things, including wildlife and native life;
- Water and blue space, including water in general, rivers & streams, waterfalls, geysers & hot springs, lakes & dams, ponds, the sea, waves and tides, flowing water, and freshwater and springs;

- Natural materials, including rocks and stones and sand;
- The idea that natural things & places were created by nature, not humans;
- Naturalness is abundant, varied & diverse;
- Naturalness is old, ancient, historical;
- Natural places are unchanged, as they have always been;
- Naturalness can be difficult & hostile for people & other creatures;
- Naturalness is balanced, sustainable & healthy;
- Naturalness is powerful;
- Naturalness is mysterious & unexpected;
- Natural places provide habitats & havens for wildlife;
- Naturalness has resources, such as food & medicine;
- Natural places are great, the best kind of places;
- There is movement in natural places;
- Nature is fragile, endangered & at risk;
- Naturalness is simple, primitive, primal;
- Natural places are culturally significant.

7.2.3 Implications for Restoration Theory

In line with previous research on restoration, naturalness in general was shown to be perceived as highly restorative. And several of the themes and subthemes overlapped with concepts described by both the attention and stress restoration theories. Take for example the theme, *Feeling Free from Problems*, which represented respondent comments such as "places for people to go to just 'get away' from life", and "the places allow people to escape the monotony of everyday life". This theme relates particularly well to the component, *Being Away*, of ART. In the discussion of Chapter 6, each of the four components of ART were related to the themes and subthemes of this thesis, demonstrating that many of the themes overlap.

The significant associations between the themes and the single item measure of perceived naturalness help to reinforce the links to restoration, showing that some of what was perceived as natural, was also perceived as restorative. These findings were supported by a similar pattern of results when comparing the restorative and general conditions; where respondents were either asked to think of natural places in

general when writing what was natural, or restorative natural places. The idea that naturalness is hostile, was also significantly associated with low perceived restoration. This relates well to the suggestion of Ulrich et al. (1991) that only unthreatening natural environments are restorative.

Restoration from stress was evident in comments such as “less stressed”, “lack of stress”, “not boring or stressful”, and “they make people relax and feel like they are outside of stressful environments”. The SRT can also be used to explain the similar pattern of associations between some of the themes and the various affective quality and restoration measures. Ulrich (1983) suggests that:

> For individuals experiencing stress or anxiety, most unthreatening natural views may be more arousal reducing and tend to elicit more positively toned emotional reactions than the vast majority of urban scenes (p. 116).

Therefore, it is possible to infer that unthreatening natural environments are also likely to be associated with positively toned, low-arousal affective qualities. In accordance with this proposition, Ratcliffe et al. (2013) found:

> In line with SRT (Ulrich, 1983), bird sounds judged to be restorative also generated affective appraisals of positive valence and low arousal. Bird sounds that were associated with threat or aggression tended to generate appraisals of negative valence and high arousal, and were not considered to be restorative (pp. 226-7).

A similar pattern of results is also evident in the findings of Chapter 6. The affective quality, *Relaxing*, is both “pleasant” and “not arousing”, according to the Russell and Lanius circumplex (1984). Of the 17 themes which were significantly associated with the quality, *Relaxing*, 13 of these were also rated as being either significantly associated with perceived restoration, or with the restoration condition. This suggests that SRT can account for most, but not all of these findings. On the other hand, three themes were found to be *Stressful* (high arousal, negative valence): *Naturalness is Abundant, Varied & Diverse*; *Naturalness can be Difficult & Hostile for People & Other Creatures*; *Naturalness is Balanced, Sustainable & Healthy*. Whilst the last two of these were more associated with the general than the restorative condition, there was no association with either measure of restoration for the first theme. There

were also many more themes which were less associated with restoration then could be explained by this affective quality. This represents mixed support for this proposition therefore.

There were also a number of themes which could be expected to relate to the concepts of restoration in some way. For example, the component of *being away* should align with that of *Feeling Free from Problems*, and we might expect the theme, *Feeling Refreshed*, to relate well to the overall feeling of being restored. And yet, neither of these themes were associated with perceived restoration in the current analyses. In conclusion then, it seems that stress and attention restoration theory can account for many but not all of the associations between the themes and the two measures of perceived restoration.

7.3 Methodological Implications

7.3.1 Online vs Paper Surveys

Riva et al. (2003) compared the use of online and paper-based surveys, finding that "no relevant differences were found in the psychometric properties of the different questionnaires" (p. 73). They concluded that online surveys are a suitable alternative to paper-based surveys. But some still voice reservations regarding the use of online surveys. Schmidt (1997), for example, suggests that "there are a number of potential pitfalls in carrying out survey research on the Web. These problems can result in missed opportunity, missing data, unacceptable and incorrect data, a torrent of duplicate data, and security problems" (p. 276). Whilst steps were taken to reduce these problems, such as automatic prompts to answer a question when it was left blank, respondents were also recruited both online and in paper form for the study presented in Chapter 3. This ensured that checks could be made regarding the impact of survey format on responses, and that a variety of responses could be gathered.

The mean ages of the UK online and papers surveys were similar, being 47 years and 40 years respectively. But whilst the paper survey had a fairly even number of female and male respondents, at 57% females, there was a large bias towards female respondents in the online survey, at 83%. A comparison of the occurrence of themes/theme groups in the text of the two samples, however, showed that there were few differences in their responses as to what made a place natural. Of the 16

themes/theme groups, only three themes significantly differed between the two, with respondents of the online survey mentioning Animals & Insects, Plants/Vegetation, and Other Life & Living Things, more than expected compared with respondents of the paper survey. In addition, the sizes of these associations were only small. This suggests that there was little difference in the perceptions of the two samples, supporting the findings of Riva et al. (2003).

7.3.2 Paying Respondents

The US respondents were recruited on the platform, MTurk, through which respondents are paid to take part in research. This is an internet-based crowdsourcing marketplace, onto which individuals register to enable them to take part in surveys, proofread work, or perform some other pre-defined task. To recruit respondents for the US survey, the researcher registered the details of the study, set the requirements for those taking part, and offered a payment of $1.50 to complete the survey. Respondents willing to complete the survey followed a digital link to the survey and were given a code to paste in to Amazon Mechanical Turk after its completion, to link the respondent with that survey. Once the pre-defined number of surveys had been completed, the researcher was given the opportunity to review the respondent responses and approve them. This enabled them to reject surveys which had been completed in an undesirable way.

This method of recruitment proved to be much easier than those for the UK respondents, and it had a number of advantages. A slight teething problem occurred when the researcher realised a few hours after the survey had gone live, that the surveys were not being completed. There are, however, numerous forums on which researchers and workers (as the potential respondents are called) can discuss any problems, and one such forum was utilised in this way. After posting information regarding the survey, a problem in the restrictions as to who could take part was promptly identified by a worker, and therefore fixed. This community assistance proved very valuable. Once the issue was resolved, all 198 surveys were completed in 48 hours. This made it a very quick and efficient way to recruit the respondents. In addition, there was the advantage of being able to set the required number of respondents, ensuring that enough were collected for the desired analyses. Two of

the respondents failed to complete the survey as required, and so were removed, with the surveys being promptly completed by others.

Given the advantages in this method of data collection then, it is of interest to know how responses might have been affected by respondent payment. The responses of the UK and US respondents were compared in Chapter 5, with analyses demonstrating that there were no differences in the occurrence of the majority of themes/subthemes, and only small sizes of association for the significant ones. Although the varying effects of paying respondents and the demographic characteristics of the two samples cannot be teased apart, this does suggest that there were no substantial effects of recruiting respondents through MTurk, compared with the more traditional recruitment methods used for the UK online survey. It should be noted that there was some financial incentive for the latter sample, however, with their entry into a prize draw, but this was not the same as being paid for their time. Anecdotally, the responses were of a high quality, being well-articulated. These results tally with those of Buhrmester, Kwang, and Gosling (2011), who found that "overall, MTurk can be used to obtain high-quality data inexpensively and rapidly" (p. 3). It is hoped that these experiences will help inform other researchers regarding this relatively new method of participant recruitment.

7.3.3 Extracting Complex Data from MAXQDA

The data for the open-ended questions of the survey study was analysed using the computer program, MAXQDA (versions 10-12). As stated in Chapter 3, the researcher encountered some problems using this platform, given the large dataset being analysed. Initially, the data was inputted into MAXQDA separately for each survey respondent. But with 846 respondents, this resulted in a very large data file, which the computer was unable to process effectively.

The format for data entry had to be modified, therefore. Twelve spreadsheets were created in Microsoft Excel (versions 14.0-16.0), breaking up the respondents and their associated open-ended responses according to the different samples and conditions used in the survey. But once the data had been analysed, creating a hierarchical structure with many different associated codes and themes/subthemes, it was found that the data could not be exported from MAXQDA (versions 10-12) to IBM SPSS Statistics (versions 19-25) in this format. This was necessary for the

quantitative analysis of the data and required for examination of theme/subtheme occurrence in the UK and US samples, and the associations with perceived restoration and the various affective qualities. It was not practical to re-analyse the data in a different way, given the 15,053 codes which had been assigned, and so a Python code to automate the extraction of the data was developed. This Python code essentially read the MAXQDA (versions 10-12) file and extracted each instance of a theme and subtheme associated with a respondent's response. This code produced a Microsoft Excel spreadsheet (versions 14.0-16.0) for the extracted data, which could then be imported into IBM SPSS Statistics (versions 19-25), in which the desired analyses were competed.

When MAXQDA had initially been contacted to ask whether there was a way to extract the data in this format, they admitted that this was not yet possible, but it was something they were looking in to for the future. It is hoped, therefore, that the Python code presented in Appendix K will be of use to other researchers in the meantime.

7.4 Practical Implications: Recommendations for Environmental Design

Beyond replicating and extending the research, the results of Chapter 6, which built on the work of the earlier chapters, can be used as the basis for a series of practical recommendations regarding the design of environments for restoration and positive affective quality. As previously noted, several significant associations were found between the perceived naturalness themes and the outcome variables. Whilst the chi-square and Mann-Whitney U tests only provided patterns of association, rather than providing information about causality, it is possible to infer the direction of results. For example, the perceived presence of *Plants/Vegetation* was positively associated with perceived restoration. It seems more likely that plants would produce a more restorative environment, than high restoration producing more plants. The findings of previous research also support this interpretation (e.g. Matsuoka, 2010). Based on this assumption then, we can suggest that to create a restorative environment, plants could be included in that environment. The same applies to the preservation of natural environments: If we preserve plants in the environment, then we retain their ability to restore. Such practical implications could be of great use in guiding design

on both a small and large scale. For this reason, creating a set of practical recommendations formed Aim 5 of this thesis.

Based upon the findings of Chapter 6 then, the following recommendations can be made for the creation of spaces of high perceived restoration and high/low levels of various affective qualities. Reference will be made to the subthemes which constitute the themes, the theme descriptions, and original respondent comments, to describe and identify features which may contribute to the creation of each perceived aspect of naturalness. The specific recommendations for design are extrapolated from the data therefore, but further work would be needed to validate these conclusions.

The themes for each section, looking at the associations with restoration and each of the affective qualities, are presented in order from those with the strongest associations, as indicated by the greatest effect size, to the weakest association/effect size. Many have the same effect size, so the associations were secondarily sorted by z score or χ^2 value, as appropriate (largest to smallest). Many themes are associated with both restoration and an affective quality. Therefore, recommendations for increasing or decreasing the presence of a theme will only be made the first time it is mentioned, to avoid repetitions.

7.4.1 Creating Restorative Places – Perceived Restoration

To increase restoration in an environment, it could be designed to promote the following perceptions of naturalness (ordered from strongest to weakest effect size):

- Plants/Vegetation: The use of plants, especially trees, native flora, flowers, and grass should be encouraged. Vegetation should be chosen for its green, lush, verdant appearance, and maintained to ensure its healthy appearance, yet be allowed to grow, spread, and present an unmanicured, free look.
- Water: Many different types of water contributed to this theme, some of which may be more practical to incorporate or enhance within an environment than others. But the designer could choose from forms such as the sea, rivers, streams, canals, lakes, dams, ponds, moving water, and waterfalls. Water in general was mentioned by many, and so other forms could be utilised as appropriate.
- Useful for Activities like Walking: The environment could be designed to be accessible and promote a variety of activities to suit the visitor. Respondents

described carrying out numerous activities in natural places, such as “photography”, “leisure”, “travel”, “cycling”, “climbing” and “boating”.

- An Absence of Humans, Human Influence, & Human Things: Which constitutes a variety of different aspects, from the physical absence of people, to the absence of their things, like buildings, transport infrastructure, businesses and materials, the sounds that humans and their things make, and the pollution that results from their creations. It also includes an absence of the influence and control of humans, and the perceived purity and unspoilt quality of environments which have been less influenced by humans. Practical ways in which such goals could be achieved may include the drowning out of human sounds with more natural ones, screening other people and their constructions, ensuring the place is kept clean and free of litter or water pollutants, avoiding the use of signage and rules to govern those using the space, and avoiding the use of manmade materials such as concrete.
- Natural Materials: Rocks and stones could be incorporated into a space, both big and small, as well as sand, earth, soil, dirt, mud, dust, and shells.
- Other Life & Living Things: Life in general, including wildlife and those species which are highly adapted to their environment, as well as fungi, should be encouraged. Creating the sense of a place being alive and a source of life, could also help to make a place more restorative.
- Feeling Close to Nature: Ways should be found to design a space so that a person feels surrounded by nature and can be physically close to various elements of naturalness.
- Deserts, Empty & Barren Areas could be avoided: This includes areas which appear to be “sparse”, “vast areas of nothingness”, or “desolate”.
- Colourful: The perception of colour varied by respondents and may therefore need to be investigated more to tease apart preferences and responses to various colours. Some simply mentioned the presence of colour, others of varied or vibrant colours, often as a contrast with the greys or the artificiality of the human landscape, and others the blues found in the natural world, or stereotypical ideas of white beaches.

- Natural Things & Places were Created by Nature, not Humans: This is a difficult aspect to address, but it may be that creating a space which looks as if it has been designed by humans or for humans might be more conducive to restoration.
- Beautiful: Spaces should be designed to be aesthetically pleasing and visually balanced, with various objects such as flowers which may be considered beautiful. Further qualitative research could be carried out to identify what people consider to be beautiful and not; perhaps by taking them to a variety of environments and asking them to discuss their thoughts on the matter there.
- Smells: Such as that of vegetation, moisture or rain, earth or soil, salty sea air, and the scent of flowers.
- Beaches & Dunes: These were associated with high restoration, and so could be incorporated into design by borrowing the landscape beyond or mimicking such features on a smaller scale.
- Quiet & Peaceful: Quiet and silence could be promoted in an environment by screening it off auditorily from outside/human noise, or by providing ample space in which the visitor can be physically alone, away from other people.
- Relaxed & Calm: This is more a feeling associated with restorative places than something which can be turned into a practical recommendation.
- Open & Spacious: A sense of openness, of open or big skies, open landscape and open air, space and wide areas.

7.4.2 Creating Restorative Places – Restorative Naturalness

The following recommendations are based upon the differences in the responses of those asked to imagine either a general or restorative natural place. These results need to be interpreted with more caution than the previous ones, given that the themes are simply more associated with one of these conditions, and it is therefore less clear that the presence of a naturalness theme might result in increased restoration. Please bear this in mind, although certain themes will be highlighted which may need particular care taken over their interpretation. Generally, however, I would suggest that to increase restoration in an environment, it could be designed to include the following features of naturalness, except where stated that it would be desirable to avoid certain features (ordered from strongest to weakest effect size):

- Water.

- Plants/Vegetation.
- Sounds – such as those of leaves rustling in the trees, water or the sea, the weather, life, birds and birdsong, animals, and insects. Although, as with all these general recommendations, there are limitations: Ratcliffe et al. (2013), for example, found that whilst birdsong in general was perceived as restorative, certain bird calls were less so.
- Quiet & Peaceful.
- Naturalness can be Difficult & Hostile for People & Other Creatures: Ensuring that an environment feels safe, both from the threats of other humans, and more importantly, from the threats that the environment may present, could help to reduce this perception. For example, an environment could provide protection from the weather, protection from wild animals, where applicable, or provide the essentials required for human survival, such as water and food.
- Relaxed & Calm;
- Smells.
- Creates a Sense of Awe: This theme was more associated with the general than the restorative condition, so designing an environment low in awe may be more restorative. It is possible that an environment with a sense of awe is too arousing to be restorative; hence its association with the affective quality, *Exciting*. Avoiding this perception in the development of a restorative environment therefore, the designer or curator of that environment could avoid a sense of majesty, drama, or amazement.
- Animals & Insects: Creatures of various sizes and species should be encouraged into the environment. Native creatures, or fauna, should also be encouraged, as should birds and insects.
- Deserts, Empty & Barren Areas.
- Feeling Inspired & Informed: This theme was associated with the general rather than the restorative condition, possibly because such spaces require directed attention. More restorative environments could therefore be developed (if that is the aim) by avoiding objects or information in an environment which are considered particularly interesting or a source of knowledge.
- Useful for Activities like Walking.

- Feels Safe or Comfortable: Environments could be designed to be non-threatening by providing a good line of sight, to feel easy by ensuring that the space is easy to find and navigate once there, and to provide warm shelter in inclement weather.
- Natural Things & Places were Created by Nature, Not Humans (negative association): see earlier recommendation
- Feeling Free from Problems: This feeling seemed to be promoted by a sense of escapism from the traps of modern life and responsibilities. Low-tech environments could be designed, where people could get away from modern conveniences and appliances, such as phones, televisions, or shops.
- Appears Unique & Unusual: Avoiding this perception may increase restoration. Elements to avoid might include exotic or rare species of plant, or to avoid introducing species of animal which cannot be found naturally in the surrounding environment. This perhaps stands as a contrast to the native creatures mentioned earlier, which should be encouraged in their stead.
- Touch – including things which permit people to feel water or the sea, vegetation, and materials, like earth, sand, or rocks.
- Views & Panoramas: A sense of having views, being able to see a long way, of having prospect over an area, panoramas, views of the horizon, and scenic spaces.
- Beautiful.
- Nature is Fragile, Endangered & at Risk: As with the previous suggestion, references to the fragility of nature, the status of some species in the environment as endangered, or the ‘at risk’ nature of certain areas of the world could be avoided to increase restoration.
- Open & Spacious.
- Naturalness is Powerful: Respondents wrote of the power and force of nature as evidenced by spectacular nature features like waterfalls, “crashing waves”, “sheer force”, and a sense that nature is unstoppable, that it cannot be controlled by humans. When designing an area therefore, aspects such as water features could be gentler and appear less forceful.
- Coral Reef: As discussed in Chapter 6, it is likely that coral reefs are simply less thought of when considering restorative natural places, due to their

inaccessibility, compared with when asked to consider natural places in general. Avoiding them therefore seems unlikely to make a place more restorative. However, further research could answer this question. Photographs of the sea alone could, in such a study, be compared with those with a coral reef, and the restoration levels of each (measured on a Likert scale) be compared.

- Marshes & Bogs: Avoiding the incorporation of such features could be avoiding in the creation of restorative places.
- Colourful.
- Feeling Close to Nature.
- Natural Places are Unchanged, as they have Always Been: This negative association suggests that a place which appears to change with the time and seasons, rather than a static, timeless space, which looks unchanged and as it used to be, may be more restorative. A restorative space would therefore need to appear less of a snapshot of a past time, and more of an ever-evolving space.
- Other Life & Living Things.
- Shapes & Patterns: Non-human shapes should be encouraged, using curves, irregular, non-uniform, asymmetric shapes, and the lack of straight lines: perhaps through the use of irregularly shaped materials of rock or wood. Patterns and textures may be produced by introducing elements such as water, on which the light can play, or trees, which vary the light hitting the ground.
- Naturalness is Balanced, Sustainable & Healthy: The designers and curators of a place could reduce this perception by avoiding references to sustainability and the balanced and healthy state of the environment. It should be noted, however, that this conclusion is based on the increased presence of this theme in the general compared with the natural condition. This makes its interpretation a little more difficult, as it may simply be that this theme emerged more when respondents were asked to think of naturalness in general than when they were specifically asked to think of restorative natural places. Such conclusions should be treated more cautiously therefore, and in reference to the results tables at the end of Chapter 5.
- Humans, Human Places, & Human Things: Old and attractive human elements, such as old buildings and historical artefacts, could be incorporated into design. Areas could be managed and protected in a sensitive way, such as through the

creation of nature reserves. In addition, the environment could be designed to be conducive to positive human activity, through play (especially for children), somewhere to eat and drink, and space to meet and socialise with others. This recommendation follows from respondent comments regarding the positive presence of humans, such as "…people from around the world", "children… laughing", "baking smells", "native dance", and "like-minded people".

- Able to Think: As with *Feeling Good or Happy*, this is more likely to be a consequence of a restorative environment then something which produces a restorative environment.
- Rock Formations – Caves, Coves, Canyons: Rock formations appear to be more associated with high arousal and should be avoided in more restorative environments, along with cliffs and escarpments.
- Naturalness is Old, Ancient, Historical: Like the previous suggestion, a space which looks as if it has been created more recently, perhaps more obviously by humans than by nature with the passage of time, is likely to appear less ancient, historic, and have less of a sense of time passing.

7.4.3 Creating Relaxing Places

Whilst this concept relates to affective quality, it does overlap with perceived restoration, with many of the features of these analyses being in the same direction as those of the restoration analyses. Repetitions will not be referred to again, but the results suggest that to create a place which is perceived to be relaxing, designers could include the following aspects of naturalness:

- Quiet & Peaceful.
- Naturalness can be Difficult & Hostile for People & Other Creatures: Avoiding this perception is likely to lead to a more relaxing space; see earlier recommendation.
- Deserts, Empty & Barren Areas; Avoiding this type of natural environment may also increase the relaxing quality; see earlier recommendation.
- Plants/Vegetation.
- Naturalness is Balanced, Sustainable & Healthy.
- Water.
- Feeling Close to Nature.

- Relaxed & Calm.
- Feeling Free from Problems.
- Beaches & Dunes.
- Animals & Insects.
- Natural Things & Places were Created by Nature, Not Humans: see earlier recommendation to understand how to combat this negative association.
- Smells.
- Views & Panoramas.
- Sounds.
- Countryside & Rural Areas: Promoting a more rural feel than an urban one, particularly at the fringes of the city where the two meet, may help to make a place more relaxing.
- Feeling Good or Happy.
- Natural Materials.

7.4.4 Creating Pleasant Places

- Naturalness can be Difficult & Hostile for People & Other Creatures: This perception is likely to make a place less pleasant; see earlier recommendation.
- Naturalness is Balanced, Sustainable & Healthy: Also associated with a reduced rating for *Pleasant*; see earlier recommendation.
- Quiet & Peaceful.
- Plants/Vegetation.
- Natural Things & Places were Created by Nature, Not Humans: Associated with reduced ratings for *Pleasant*; see earlier recommendation.
- Deserts, Empty & Barren areas: These may make a place less pleasant, and so should be avoided; see earlier recommendation.
- Beaches & Dunes.
- Feeling free from problems.
- Relaxed & calm.

7.4.5 Creating Exciting Places

To create exciting places, the following natural features could be included:

- Creates a Sense of Awe.
- Appears Unique & Unusual: Exotic, rare and unusual elements help to make a place appear more unique and unusual.
- Smells.
- Naturalness is Old, Ancient, Historical.
- Rock Formations – Caves, Coves, Canyons.
- Looks Rugged, Wild & Unmanicured: Such places are also described as being raw, real, and non-uniform. A degree of wilderness could be achieved by making a place appear less manicured, perhaps by allowing leaves to sit on the ground, allowing plants to self-seed in a garden, or planting them in groups as if they have arrived and spread themselves. When respondents described a rugged space, they often referred to a sense that it was less well-kept and rougher around the edges. Respondents described places that were "feral", "not tidy – chaotic", "not too organised", and a "bit unkempt".
- Valleys: Enhancing the view towards a valley may help to increase positive arousal.
- Other Life & Living Things.
- Large or Exciting.
- Feels Fun & Exciting: This is in essence the same as the outcome to which it is associated and so no recommendation can be made beyond incorporating the above elements.

7.4.6 Making Places Less Boring

To make a place appear less boring, the following elements/perceptions could be included (unless where stated otherwise):

- Creates a Sense of Awe.
- Smells.
- Sounds.
- Reduce the perception that a place Feels Familiar: Encouraging respondents to visit different areas of an environment or changing the features such as the planting regularly in a place, may help to reduce feelings of familiarity.

- Reduce the perception that Naturalness is Simple, Primitive, Primal: These places could be made to appear a bit more complex, or more sophisticated in appearance.
- Natural Places are Unchanged, as they have Always Been.
- Incorporate Rock Formations – Caves, Coves, Canyons.
- Naturalness is Old, Ancient, Historical.
- Valleys.
- Absence of Humans, Human Influence & Human Things.
- Beautiful.
- Appears Unique & Unusual.
- Reduce the feeling that the environment is Relaxed & Calm.

7.4.7 Making Places Less Displeasing

In order to make a place appear less displeasing, the following features/perceptions of naturalness should be included (except where stated that they should be avoided):

- Creates a Sense of Awe.
- Beautiful.
- Promote an Absence of Humans, Human Influence & Human Things.
- Plants/Vegetation.
- Reduce the perception that a place Feels Familiar.
- Sounds.
- Quiet & Peaceful.
- Water.
- Touch.
- Views & Panoramas.

7.4.8 Making Places Less Stressful

The following elements/perceptions could be included/avoided:

- Reduce the idea that Naturalness can be Difficult & Hostile for People & Other Creatures.
- Water.
- Plants/Vegetation.

- Reduce the idea that Naturalness is Balanced, Sustainable & Healthy.
- Relaxed & Calm.
- Feeling Free from Problems.
- Beaches & Dunes.
- Reduce the perception or presence of Deserts, Empty & Barren Areas.
- Quiet & Peaceful.
- Feeling Close to Nature.
- Beautiful.

7.4.9 Are the Naturalness Themes Additive in Nature?

Now that these practical recommendations have been made, it is worth discussing whether more naturalness elements might make an environment more restorative or higher in a certain affective quality (e.g. more pleasant). In other words, whether the elements are naturalness are additive in nature. When I asked the respondents to describe naturalness, they listed several elements, with the mean number of elements mentioned being 13.25 (SE = .21; when considering the revised theme structure presented at the end of Chapter 6). This suggests that a natural place is made up of several elements of naturalness, rather than just one. If a place has just one or two elements, then it is therefore likely to be less natural than a place with five or ten elements. Previous research suggests generally that the more natural a place is, the more restorative it is (e.g. Taylor, Kuo & Sullivan, 2002; Tennessen & Cimprich, 1995; Van den Berg, Jorgensen & Wilson, 2014). But some research suggests that there are limits to the beneficial effects of naturalness. Jiang et al. (2015) found that increasing tree density in relatively barren environments resulted in large improvements in preference up until a point, after which the benefits reduced. Barton and Petty (2010) examined the effect of time spent in nature, finding that five minutes of exposure time reaped the highest benefits to self-esteem and mood, and that longer durations were still beneficial, but less so. I would therefore suggest that the effects of the naturalness elements (as described in this thesis) are additive up until a point, after which the effects on restoration and affective quality might lessen.

This hypothesis could be tested under controlled laboratory conditions, by presenting respondents at random with a range of digitally manipulated images of an environment with various additions according to the themes and subthemes, and

asking respondents to rate those scenes on restoration and affective quality. An image with just one element of naturalness such as a patch of lawn, could be compared against an environment with 2 elements of naturalness, such as the same patch of lawn with a tree covering the same area of photograph as the lawn; and so on. This would not only tell us how the addition of a certain number of elements might impact restoration and affective quality ratings, but how important each type of element might be. In the meantime, the recommendations presented below form a guide as to what elements might be used to increase or preserve restorativeness or promote certain affective qualities, but they are presented with the caveat that an environment with twenty of these features is unlikely to be twice as beneficial as one with ten.

7.5 Limitations of the Research Conducted in this Thesis

In the following section, the limitations of the work described in this thesis, both methodological and theoretical, will be discussed. Potential criticisms of the epistemological approach and utility/applicability of the findings will also be addressed.

7.5.1 Exploratory Qualitative Analysis

This was an exploratory study, utilising open-ended questions. Whilst rigorous methods of analysis were employed, it is acknowledged that another researcher may have interpreted the respondent comments differently, resulting in an altered theme structure. But the results from the secondary coding of a subset of these surveys, along with the results of the card sort task, lend support both to the way in which the data was coded, and in the organization of the themes and their constituent subthemes. The card sort task also demonstrates that the themes are readily understood by a lay audience, suggesting that it forms a good representation of lay perceptions of naturalness.

7.5.2 An Inductive Approach to the Analysis

The aim of this thesis was to develop a conceptualisation of lay perceptions of naturalness, and it was decided to do so by asking the respondents what they saw as constituting a natural place. The open-ended respondent comments were analysed using conceptual content analysis, adopting an inductive approach. This ensured that

the respondent comments and the terms they used drove the development of themes and the organisation of these into the theme structure presented.

Another approach which could have been adopted in the place of this inductive one, would have been to use current theory to drive the development of themes and their naming in a deductive, top-down way. Theories which could have been used in such a process, might have included those of biophilia (Wilson, 1984), attention restoration (Kaplan & Kaplan, 1989; Kaplan, 1995), or connectedness to nature (e.g. Schultz, 2002). A deductive approach would have had the advantage of making the themes more easily relatable to existing, well-validated concepts of environmental psychology. It would also have served to further validate those concepts and enhance our understanding of how those concepts may be related (for example, the association between restoration and connectedness to nature). But such an approach would have reflected more the views of the researcher and the field of environmental psychology than the current perceptions of lay respondents. Indeed, whilst we have seen that many of the themes relate well to existing theory, many more have emerged which existing theory cannot explain. In addition, the themes relate to a number of different theories, meaning that it would have been impossible to interpret the themes in relation to just one theory. A deductive approach would also have forced the themes to be organised according to existing theory, taking a rather artificial approach to their interpretation.

The inductive approach, on the other hand, permitted the development of a set of themes with names generated from respondent comments, which can be readily understood by a similar group of lay respondents; as demonstrated by the card sort task of Chapter 4. This in turn provides not only a theme structure which better reflects respondent perceptions, but one which could, with further work, be used to develop a measure of perceived naturalness, to be administered to lay respondents (discussed further later). Adopting a deductive, top-down approach to the analysis would have restricted the terminology and aspects of naturalness to those already identified by previous work. The exploratory approach taken to the research has therefore served to create a more original conceptualisation of naturalness, which better reflects the perceptions of those who are usually recruited for research on restoration, affective quality, and preference.

However, it must also be acknowledged that the use of an inductive approach limits the generalisability of the findings. In the development of the naturalness themes (described in Chapter 3), a convenience sample was used. The use of the inductive approach means that the development of the themes was based upon the language and perceptions of these respondents. Another sample may therefore have used different terminology and had different perceptions. By checking the interpretation of these themes in Chapter 4, some of the concerns over whether the themes were specific to this sample, and could therefore only be understood by them, were allayed. But it would be beneficial for future research to examine the existence of these perceptions of naturalness in other samples, particularly ones which are more representative of the national demographics for the UK and US.

7.5.3 A Snapsot of Time

The way people perceive naturalness has changed throughout human history. Nash (2014), for example, describes how nomadic hunters and gatherers saw wilderness as "a meaningless concept. Everything natural was simply habitat… Nothing was "wild" because nothing was tamed" (p. Preface). For the settlers of the New World, however, "wilderness was very real and very frightening" (p. Preface). Today, naturalness is often considered a desirable place, one of refuge from modern ills. The Guardian (2018) newspaper, for example, wrote an editorial in which they suggest that "the mental and spiritual benefits of time spent in nature go far beyond exercise. Most doctors should prescribe it".

The perceptions of naturalness are therefore not static, and we can expect them to shift according to our individual, societal and environmental needs and conditions. When respondents were asked to write about what they saw as constituting a natural place, they did so according to the influences on them at that time. It is unreasonable, therefore, to expect that the perceptions of naturalness which have been laid out in this thesis, will remain static and unchanging. Instead, it must be understood that this thesis presents a snapshot of the perceptions of naturalness from a specific period. They can be built upon and modified over time as perceptions shift, but they are not definitive or infallible. This means that the generalisability of the findings is limited, given that the findings potentially exist only for this sample at this point of time. It is

for future researchers to use them as a basis for further work, and to monitor how lay perceptions shift with the plethora of influences over time.

7.5.4 Subjective not Objective Naturalness

In the in-depth literature review presented in Chapter 2, we discussed the confusion in the current body of literature as to what aspects of naturalness some studies were examining. The distinction was made between the examination of subjective perceptions and a more objective measure of the actual level of naturalness. The research conducted in this thesis focussed firmly on the subjective perceptions of naturalness and did not look at the more objective ways in which it can be measured, beyond examination of those papers which used such a measure in the review. The results of the present thesis must therefore be understood and applied within the sphere in which it was developed; to subjective perceptions. It cannot be applied to objective aspects of naturalness if we are to avoid the confusion of the past which was described in the literature review. It would, however, be interesting to examine the relationship between lay perceptions of naturalness and more objective measures of naturalness in future research. Previous work by Lamb and Purcell (1990) suggests that the two concepts are related but distinct, and future research using the current conceptualisation of perceived naturalness could serve to replicate this finding. If this was found again to be the case, then it suggests that a place does not necessarily need to actually be more natural to be more restorative or perceived more positively. But rather targeted environmental design, such as those of the practical recommendations discussed earlier, could be used to create the *illusion* of naturalness.

7.5.5 The Complexity of the Theme Structure

Some might question the utility and applicability of the large theme structure developed over the course of this thesis. It does not deal with a single, easily digestible aspect of naturalness, rather it aims to explore the various aspects which contribute to the whole of the concept of perceived naturalness. Whilst this may be harder to interpret, we would argue that it opens up and brings together multiple aspects of naturalness, some of which have been extensively examined in previous literature, some of which have not been identified before. Presenting such a detailed

and varied conceptualisation of naturalness therefore serves to extend our understanding of what naturalness is within the field.

The value of our work can also be found in the finer detail of the themes and subthemes developed from the respondents' comments. Take for example, the subtheme, *Absence of Pollution.* Mace, Bell, and Loomis (2004) discuss the clear views of natural environments which are permitted by clean, unpolluted air, in the absence of haze, writing: "for decades, psychologists, economists, and federal land management agencies have attempted to quantify the value of specific natural resources including clear views of scenic vistas" (pp. 13-14). The idea of clean air, free of pollution, was represented by the subtheme, *Absence of Pollution* in our research. This subtheme was mentioned by 35% of the sample, showing that it formed an important part of the naturalness concept. It was also the second most frequently mentioned subtheme of the theme, *Absence of Humans, Human Influence, & Human Things*, which was in turn positively associated with perceived restoration. These findings therefore help to demonstrate and support the psychological value of an absence of pollution, as an aspect of naturalness.

There is value then in further developing the naturalness concept and relating aspects such as pollution to restoration and affective quality, as has been done in this thesis. It is hoped that the findings will be of use to the many different researchers examining both the naturalness concept as a whole, and the individual components of naturalness, and serve to bring these disparate aspects together into a more holistic view of the perceived naturalness.

7.6 Suggestions for Future Research

The exploratory work of this thesis opens up many different avenues for future research, by generating new findings and highlighting little examined aspects of naturalness and their effects, and by highlighting methodological and theoretical limitations which could be addressed through further work. Several suggestions for future work were made whilst discussing the various findings of the thesis, especially in Chapter 6. But further areas for future work will be discussed in this section.

7.6.1 Exploration of Cultural Similarities and Differences

In chapter 5, we looked at whether it was valid to combine the perceptions of the UK and US samples, by looking at whether the responses of the two were significantly different. The two samples did not differ greatly; with more similarities than differences, and small effect sizes for those differences. But the analyses and their conclusions did not go beyond an assessment of whether it was acceptable to combine the responses for the purposes of the analyses in Chapter 6.

It would be interesting to conduct future research for the purposes of examining the cultural similarities and differences in perceptions of naturalness. Research could look at whether the conceptualisation of lay perceived naturalness developed in this thesis could also be understood by those of other cultures; and where any differences or agreements may lie. It would be particularly interesting to extend the conceptualisation of this thesis to other English-speaking countries, such as Australia or Canada, which vary in terms of the objective naturalness present in their countries, to see if they too identify with the themes developed. This could be done by asking such respondents to list features they perceive to be in natural environments and comparing them to the themes developed in this thesis, for example. Or they could be presented with the existing list of themes and asked which they think are present in natural environments.

Understanding how various cultures differ in what they perceive to be natural would have a bearing in how we as researchers discuss the concept with those respondents. But similarly, understanding where those similarities lie would enable researchers to develop a measure of naturalness which could be more universally applied to samples in various countries.

7.6.2 Developing a Measure of Perceived Naturalness

The themes developed in this thesis could be used as the basis for the creation of a measure of perceived naturalness, to gauge the level of naturalness perceived by respondents in an environment. Such a measure would be invaluable in future work, since it would provide a much more detailed, comprehensive, and accurate way to measure naturalness, beyond the simplified measures commonly used in research to date. The generation of a multidimensional measure, which could have dimensions

based upon the main themes or theme groups, would enable researchers to directly examine the contribution of various aspects of naturalness on psychological outcomes, such as perceived restoration. This could be used, for example, to examine which of the various features of naturalness, such as water, vegetation, or natural materials, best promote restoration in various environments like gardens or city streets.

Given the inductive approach taken to the analysis in this research, with the themes developed and named in such a way as to closely echo the respondent comments, the themes would lend themselves well to the generation of a measure to examine how lay respondents perceive naturalness. But some steps would need to be taken to transform the concept presented in this thesis into a measure. For example, there is a need to understand the contribution of each of the themes to the perception of naturalness. Water, for example, may be more important in making a place appear natural than smells. The contribution of each of the themes to the concept of naturalness would therefore need to be established, and their presence weighted to determine the overall amount of perceived naturalness in an environment. The measure would also need to take account of the format of environment presented to participants. Natural environments which are presented to participants as photographs, for example, could not be used to measure the presence of sounds, smells, and touch (unless participants were asked to imagine a scenario). Any measure developed would also need to be validated. But future research could address these issues, resulting in a survey instrument which would be very useful in progressing the field.

7.6.3 Creating a Definition of Perceived Naturalness

The in-depth literature review of Chapter 2 highlighted the need for a more concise definition of perceived naturalness. This is vital in ensuring that researchers are examining a clear concept, and that this concept is clearly communicated to other researchers in the field. Only through such transparency can the field build upon and validate the research of others, arriving at an agreed upon concept. The concept of perceived naturalness presented in this thesis forms a definition of perceived naturalness. We would suggest that the next step should be to refine this definition, through discussion, development and revision with other researchers.

7.7 Conclusions of the Thesis

This thesis began with a consideration of the critiques offered by researchers such as Lamb and Purcell (1990) that "the specification of what is meant by naturalness has been somewhat fuzzy" (p. 350). By conducting a systematic review of the literature on naturalness in environmental psychology, focussing on the four sources of confusion identified in Chapter 1, I successfully addressed Aim 1 of the thesis. I found that the claims of terms used interchangeably (e.g. Lamb & Purcell, 1990; Taylor & Hochuli, 2017), of a heavy reliance on dichotomous nature-urban variables which are unable to capture the complexity of naturalness within real landscapes (e.g. Karmanov & Hamel, 2008; Mausner, 1996; Velarde et al., 2007), and of inadequate definitions of the concept (e.g. Lamb & Purcell, 1990), were systematically examined and established within environmental psychology research. Original research was developed to address the questions of authors such as Hagerhall et al. (2004), who asked what "is meant by naturalness?" (p. 247), with the focus on conceptualising naturalness as an important precursory step to the future development of a more accurate definition of perceived naturalness.

The use of exploratory, qualitative work enabled the gathering of detailed information regarding lay perceptions of what makes a place natural, and fulfilled Aim 2 of the thesis. The scenario encouraged respondents to imagine they were speaking to someone who knew nothing about naturalness and helped to develop a more comprehensive view of naturalness, encompassing views from the more obvious to the more obscure. The inductive approach to analysis was also invaluable in developing a set of themes and subthemes which were grounded in respondent perceptions; enabling the re-conceptualisation of perceived naturalness in a way unguided by the predefined categories of existing research. Aim 3 of the thesis was addressed by using the card sort task to ensure that the conceptualisation could be readily understood by lay people, vital in ensuring its utility in future research.

The themes and subthemes, and their associations to perceived restoration and affective quality, extended the concept of naturalness beyond the aspects currently discussed within the research, and thereby addressed Aim 4 of the thesis. The findings serve to identify several avenues for future research, including work on touch, smells, natural events and processes, animals and insects, native flora and

fauna, and various ideas regarding naturalness, such as its abundance. It also supports the need for more research in emerging areas such as those of sound and water. The presence of humans, their things, and their influence in the concept, also raises interesting questions about the way in which researchers view the role of people in the natural world. It suggests that naturalness cannot be reduced simply to the absence of urbanness, and supports the assertion of Mauser (1996) that "it is critical that naturalness, as defined by user groups, be integrated within the human-made world" (pp. 335-6). Practical recommendations were accordingly made for incorporating or preserving certain aspects of naturalness, thereby addressing the final aim of this thesis, and ensuring its utility to future researchers and practitioners.

The complexity of the theme structure also demonstrates the fallacy in assuming that perceived naturalness can be summarised by one word, or measured by one dimension, such as vegetation. The concept of naturalness to lay people is much more than this; their perceptions are much more complex, varied and nuanced than those currently presented within the research. By capturing the perceptions of a range of lay people, this work helps to shed light on the inherent diversity which exists when they think about what constitutes a natural environment. This research then has gone some way to representing "the complex web of interrelationships which forms the definition of nature" (Mausner, 1996; pp. 345-6).

In summary, this thesis provides a framework by which to better understand the key elements which contribute to making a place natural. The themes and theme structure could be used as a tool box by researchers and practitioners in the specification of the naturalness which they wish to study or develop. Such a tool box will enable researchers to better represent a natural environment in their work or to identify natural elements in need of further examination. It could also guide practitioners in the creation of more natural, more positive, or more restorative environments. Given the current propensity in the field of environmental psychology to rely on simplified, dichotomous representations of naturalness, such a tool box helps to open up research in the area and ensure the relevance of its findings.

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