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Seeing our self reflected in the world around us: The role of identity in making (natural) environments restorative

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ABSTRACT

Exposure to nature has been shown to restore cognitive capacities and activate intrinsic motivational states. The present research considered the role of salient identities in determining these effects. Three studies demonstrated that salient identities modify how people respond to natural environments. Exposure to images of natural environments increased the strength of intrinsic over extrinsic aspirations, and improved cognitive capacity, only when nature was central to a salient identity (Studies 1 & 2), or when the specific nature portrayed was connected to the salient identity (Study 3). Conversely, when nature was inconsistent with a salient identity, exposure had deleterious effects on aspiration and cognition. Together these studies suggest that the restorative potential of environments is determined, at least in part, by social and psychological processes connected to identity. These findings invite a more nuanced approach to understanding the possible psychological benefits of exposure to nature, and suggest that a variety of environments (natural and urban) can have restorative potential.

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1. Introduction

Urban life typically entails exposure to a variety of stressors – including crowding, noise, pollution and poverty – all of which can compromise physical and mental health. Conversely, living close to, or even just spending time engaged with, nature has been shown to benefit individual well-being. For example, research has demonstrated that: growing up in the country (versus the city) is associated with reduced brain reactivity to stress (Lederbogen et al., 2011); walking through nature (versus urban environments) improves cognitive and emotional functioning (e.g., Berman, Jonides, & Kaplan, 2008; Berman et al., 2012; Berto, 2005; Bratman, Hamilton, Hahn, Daily, & Gross, 2015; Hartig, Evans, Jamner, Davis & Garling, 2003; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; Nisbett & Zelenski, 2011); having views of nature increases children's self-discipline (Faber Taylor, Kuo, & Sullivan, 2002), and; exposure to natural objects (e.g., plants) or even images improves working memory (Berman et al., 2008), increases pro-social responses (Weinstein, Przybylski, & Ryan, 2009), reduces

stress (Ulrich et al., 1991) and might facilitate physical recovery from illness (e.g., Mitchell & Popham, 2008; Ulrich, 1984). Accordingly, many in the literature have characterized contact with nature as broadly “restorative” for human health and well-being.

However, evidence for the restorative effects of nature is less consistent than is often assumed. Indeed, a meta-analysis of this field found that the benefits of exposure to nature varied considerably across subjective and objective measures (Bowler, Buyung-Ali, Knight, & Pullin, 2010). Improvements in self-reported emotion (i.e., mood) are most commonly studied in this literature and reveal the most robust effects. Improvements on performance in cognitive tasks and assessments of physiological states are less well studied in this literature and effects on these variables are less reliable. This meta-analysis included only studies that involved direct exposure to nature, but the general pattern is reflected in at least one recent study of exposure to natural (versus urban) images (Beute & de Kort, 2014). Here, there were reliable effects on self-reported environmental preference and, to a lesser extent, self-reported mood; but there were limited effects on physiological states and unreliable patterns across assessments of cognitive performance (see Bratman, Daily, Levy, & Gross, 2015; for a similar pattern).

The prevalence of effects of contact with nature on self-report

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measures could raise questions about the degree to which these represent conscious expectations versus more fundamental consequences for psychological functioning and well-being. However, in the context of the literature it seems unlikely that direct or indirect exposure to natural environments would have *no* implications for individual functioning. A more reasonable hypothesis is that benefits may be contingent on other factors — for example, individual differences in background experiences and associations with nature, and variations in the social context within which nature is experienced or evaluated (Bowler et al., 2010).

Contributing to this picture, the present research aimed to explore the role of identity in shaping the effects of exposure to different environments. To foreshadow our argument, we suggest that the psychological benefits of environmental exposure are, at least partly, contingent on the social-psychological connection between the individual and the environment to which they are exposed, a connection that is framed by identity. By picking apart identity and environment, we also believe it is possible for exposure to a variety of environments — urban and natural — to be psychologically beneficial versus distracting. In the space below, we summarize in more detail the theoretical literature that led us to this hypothesis before presenting three experimental studies in which it is tested.

1.1. The positive effects of exposure to nature

Although multiple theories have been used to explain the psychological benefits of exposure to nature (e.g., Ulrich, 1984; Wilson, 1984), much of the contemporary work in this domain is informed by attention restoration theory (ART; Kaplan, 1995). ART proposes a distinction between two different forms of attention: involuntary and voluntary. Involuntary attention occurs when a stimulus is inherently interesting and important and therefore captures attention spontaneously and effortlessly. Voluntary, or directed, attention involves situations in which mental processes need to be engaged to direct attention to the stimulus or task at hand. Voluntary attention involves mental effort and cognitive control, and as such is susceptible to fatigue.

According to ART, one way in which people can restore fatigued cognitive capacities is to switch to tasks that involve involuntary attention. Interacting with nature is thought to be particularly beneficial in this regard because nature is “rich with inherently fascinating stimuli (e.g., sunsets) [that] invoke involuntary attention modestly, allowing directed-attention mechanisms a chance to replenish” (Berman et al., 2008, p. 1207). In contrast to this, urban environments contain “stimulation (e.g., car horns) that captures attention dramatically and additionally requires directed attention to overcome that stimulation (e.g., avoiding traffic, ignoring advertising, etc.)” (p. 1207). Because of this, exposure to urban environments is thought to drain attentional resources leaving these depleted for subsequent tasks that involve mental control. The distinction between voluntary and involuntary attention, and the environments that engage each of these, is taken to explain why exposure to natural environments improves (and exposure to urban environments diminishes) performance on tasks that specifically require cognitive capacity and mental control (i.e., directed attention): the physical properties of nature engage attention in a way that allows for restoration of the mental resources, whereas the properties of urban environments deplete this.

Research supporting this possibility has examined the consequences of both direct and prolonged exposure to nature (e.g., residential environments, nature walks), as well as more incidental exposure (e.g., via office plants or natural images), and has drawn

on a variety of cognitive tests as dependent measures. Reflecting the conceptualization of directed attention, these tests typically focus on mental effort (i.e. concentration) and executive control rather than more basic cognitive functions (e.g., orientation). For example, tests that have revealed effects consistent with ART have assessed the storage and manipulation of information in short-term working memory (e.g., backward digit span, Berman, et al., 2008, 2012; Ottosson & Grahn, 2005; or reading span tasks, Raanaas, Evensen, Rich, Sjøstrøm, & Patil, 2011), sustained attention (Berto, 2005), and the inhibition of competing responses (e.g., the necker cube pattern control task, Tennessen & Cimplich, 1995; Ottosson & Grahn, 2005).

Recently, researchers have also drawn on self-determination theory (SDT) to explain effects of exposure to nature beyond the cognitive domain, specifically with respect to positive motivational states and pro-social behavior. SDT has been applied to many social psychological phenomena (see Ryan & Deci, 2000) and distinguishes between two different forms of motivation: intrinsic and extrinsic. Intrinsic motivation involves the pursuit of goals that are inherently interesting and satisfying to the self, whereas extrinsic motivation involves the pursuit of goals for the attainment of external rewards. Because the pursuit of intrinsic goals satisfies fundamental human needs for competence, autonomy, and relatedness, this is thought to contribute to individual health and well-being and positive social orientations. Conversely, the pursuit of extrinsic goals is thought to compromise well-being and inhibit positive social responding.

Researchers working from this perspective argue that exposure to nature is more likely to support intrinsic goals and motivations than exposure to urban environments, which should instead activate extrinsic goals and motivations. Consistent with this, a series of studies showed that exposure to natural images or objects (i.e., plants) increased intrinsic aspirations and precipitated pro-social behavior, whereas exposure to urban environments increased extrinsic aspirations and reduced pro-social behavior, at least to the extent that participants reported a degree of immersion in the environments depicted (i.e., an interactive effect; Weinstein et al., 2009). Importantly, the effects of exposure to natural environments, in combination with self-reported immersion, were mediated through the experience of autonomy and relatedness to nature—supporting the idea that it is the particular capacity of natural environments to satisfy basic human needs that determines their effects on the self and behavior (see also Ryan et al., 2010).

1.2. The role of identities in relating to (natural) environments

The above approaches share a common assumption, namely that positive effects arise from something in nature *itself* — either its capacity to direct attention in a particular way and to restore diminished cognitive reserves, or its capacity to support particular forms of human motivation. In contrast to this focus on the inherent power of nature, a variety of perspectives outside psychology highlight the role of socio-cultural processes in determining what humans see in nature and what they take from it. Historians, cultural geographers, and anthropologists, have noted that the apparent value of nature as an idealized environment for humans shifts across time and place, and that the conception of nature is rarely independent of human culture or human concerns. For example, the extent to which people viewed nature as a site of relaxation versus fear has shifted across the late 19th and 20th century (Cronon, 1995). Colonial societies also actively changed the landscapes in their new territories thereby crafting nature in their own image (e.g., Neumann, 1995; Steinbach, 2011), and breaking

down the distinction between what was “theirs” and what is now “ours” (see Duncan, Johnson, & Schein, 2008, Chapter 25; for a summary). Consequently, many of the environments that we look upon as “natural” are not particularly natural at all. Reciprocally, what is seen as nature (e.g., Descola, 2013), and what type of nature is preferred (e.g., Buijs, Elands, & Langers, 2009), varies across social and cultural settings. So too, the often-cited relationship between rural (versus urban) residence and individual happiness is, in fact, culture-specific (e.g., Berry & Okulicz-Kozaryn, 2009).

These perspectives serve as a reminder that nature is not a unitary concept: Nature means different things to different people in different places and times. Applying this insight to the psychological literature, one might ask whether the specific social meaning of (natural) environments is responsible for at least some of the restorative benefits that have been observed. Responding to this idea, we focus on the role of identities as a lens through which people view, evaluate, experience and respond to their environment. The importance of attending to the social properties of environments, and specifically the extent to which individuals are identified with these, is consistent with the literature on “place identity” that has long been central to environmental psychology (Droseltis & Vignoles, 2010; Proshansky, 1978). This idea is also consistent with the broader social psychological literature on identity that is informed by the social identity approach (Haslam, 2004; for an overview; Tajfel & Turner, 1979; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). We draw on the latter as a framework for the current investigation.

The social identity approach argues that group memberships, including both small-scale physical groups (e.g., work teams) and broader social categories (e.g., based on gender, ethnicity, nationality), are important aspects of self-definition because these provide people with a sense of identity. From this basic premise, the theory articulates a number of key assumptions about the nature of individual identity. First, identities are socially defined. Consequently, the specific ways in which individuals understand their self are fluid and responsive to social dynamics and inputs (e.g., social change, intergroup conflict, intergroup comparisons). Second, and equally important, identity is not monolithic. Instead, individual self-concepts contain multiple bases for self-definition (e.g., personal characteristics, social roles and relationships, group memberships). The degree to which any specific aspect of identity becomes self-defining depends on the relative salience of that identity, either in an enduring sense (i.e., because it is routinely part of how the individual conceptualizes their self) or in a situational sense (i.e., because the immediate context cues the individual to see themselves in a particular way: Oakes, Turner, & Haslam, 1991; Turner, Oakes, Haslam, & McGarty, 1994). Once social identity is salient, either in an enduring or situational sense, individual thought, feeling, and behavior is then said to be regulated by the specific norms and values associated with group membership. Thus, salient identities frame how people approach and interpret their social world.

A considerable body of work provides empirical support for these propositions. For example, research from this perspective has shown that (a) identity is fluid and context-dependent (e.g., Onorato & Turner, 2004); (b) social forces (e.g., comparative contexts, intergroup relations) shape how individuals understand the defining features of groups (e.g., Haslam, Turner, Oakes, McGarty, & Hayes, 1992), including those to which they belong (e.g., Simon, 1992), and this has consequences for how they understand their self and act on that basis (e.g., Rabinovich, Morton, Postmes, & Verplanken, 2012), and; (c) people's evaluations of, and emotional reactions to, other people, information, ideas, and events varies as a function of how these things reflect and contribute to

their own salient sense of identity (e.g., Dumont, Yzerbyt, Wigboldus, & Gordijn, 2003; Häusser, Kattenstroth, van Dick, & Mojzisch, 2012; Haslam, Jetten, O'Brien, & Jacobs, 2004; Mackie, Worth, & Asuncion, 1990; Morton, Haslam, Postmes, & Ryan, 2006; Schmitt, Silvia, & Branscombe, 2000).

Of particular relevance to the focus of the current work, a recent line of research has considered how social identities also guide responses to the physical world. Interestingly, these studies have shown that negative environmental conditions, like over-crowding (Alnabulsi & Drury, 2014; Novelli, Drury, Reicher, & Stott, 2013), loud noise (Shankar et al., 2013), and severe cold (Pandey, Stevenson, Shankar, Hopkins, & Reicher, 2014), can all become positive and enhancing experiences when the environments in which these conditions are encountered embody a sense of shared identity with others. Illustrative of this, Shankar et al. (2013) found that levels of noise that met objective definitions of intrusiveness were appraised as more pleasant, interesting, and less uncomfortable, and were listened to longer, by religious pilgrims when they believed that this noise originated from other pilgrims rather than from secular sources. Conversely, it has also been shown that when physical environments do not embody one's identity, or suggest ownership by groups other than one's own, being in these environments can undermine individual self-esteem (Schmitt, Davies, Hung, & Wright, 2010), motivation (Cheryan, Plaut, Davies, & Steele, 2009) and performance (Knight & Haslam, 2010a, b). Together, such studies show that social identities are also a lens through which people experience and interpret their physical world; and, more importantly, that identity can transform the experience of objectively aversive environmental conditions into something subjectively meaningful and affirming of individual well-being.

In line with the above, it seems plausible that the restorative effects of exposure to nature might, at least in part, be driven by the power of nature to reflect valued identities, both in terms of personal identity (e.g., through embodying a notion of one's individual self as “green”) and social identity (e.g., through iconic landscapes that embody national identity). Of course, nature is not the only environment in which people can see their identities reflected: cities can be equally symbolic. While urban environments can be busy and stressful places, they can symbolize personal identities associated with freedom, creativity and individuality. Cities can also reflect social identities, for example, by virtue of being national capitals and containing iconic monuments and buildings. If the meaning of environments—both natural and urban—can vary, then it would be reasonable to expect the effects of exposure to these also to vary. The research presented here tested this proposition.

1.3. The present research

From our perspective, the psychological value, and thus restorative potential, of environments should be contingent on the degree to which these reflect salient aspects of the self. Moreover, this pattern is expected regardless of whether those environments are natural or otherwise. Following this logic, rather than predicting a main effect of exposure to natural images on indices of restoration, we predict an interaction between the environment individuals are exposed to and the identity that is salient to them at that time. The specific form of this interaction is such that when self and environment are congruent, positive psychological consequences (i.e., “restorative effects”) are predicted to be more evident than when self and environment are incongruent.

The three studies reported in this paper were designed to test this interactive hypothesis. The first two studies adapted existing manipulations of identity salience (e.g., Haslam, Oakes, Reynolds, &

Turner, 1999) to vary the centrality of nature to a single self-defining identity prior to exposing participants to images of natural and urban environments. The third study used the more standard form of this manipulation to vary the salience of different identities (personal identity versus social identity) and also varied the degree to which natural images reflected one of these identities (social identity). Across the studies we examined restoration effects via the rated importance of intrinsic versus extrinsic goals (i.e., as articulated by SDT, e.g., Weinstein et al., 2009; Studies 1 & 3) and via assessments of cognitive capacities (i.e., similar to those used in previous research informed by ART, e.g., Berman et al., 2008; Studies 2 & 3).

All studies made use of lab classes scheduled as part of an introductory psychology course. As such, sample sizes reflect course enrolment and attendance rates, rather than a-priori power calculations. The one available meta-analysis of the effects of direct exposure to nature (e.g., walking through a park; Bowler et al., 2010) indicated effects sizes ranging from virtually zero on physiological measures, small to medium on cognitive measures, and medium on emotional measures. Although most studies in the literature do not predict or test interactive effects of the kind we are interested in, the studies reported here are all adequately powered to at least detect main effects of exposure to natural versus urban images based on the assumption of medium effect sizes. Moreover, our sample sizes were healthy compared to those reported in previous research testing restorative effects of exposure to natural versus urban images (e.g., Berman et al., 2008; Berto, 2005; Ryan et al., 2010), and comparable to studies that have specifically tested interactive effects that might qualify these (e.g., Weinstein et al., 2009; Zhang, Piff, Iyer, Koleva, & Keltner, 2014).

2. Study 1

2.1. Method

2.1.1. Participants and design

140 psychology students (116 female; mean age = 19.23, $SD = 2.16$) took part in the experiment as part of an introductory course. All participants were students at the University of Exeter, a medium sized city in South West England. The city is well known for both its architecture (in particular, the 15th century cathedral) and the surrounding countryside (in particular, Dartmoor and Exmoor National Parks).

The experiment involved a 2×2 design in which image type and identity content were orthogonally manipulated. Participants were assigned to experimental sessions based on their timetable. Participants in each session viewed slides of either urban images or natural images. Image condition was initially determined by a coin toss, and then varied in turn subsequently. Within sessions, participants were randomly assigned to urban identity versus rural identity conditions via the instructions within the questionnaire they completed prior to viewing the images.

2.1.2. Procedure

Participants were tested at four separate sessions that took place in a single large lecture theatre. The lecture theatre contained a projector screen and lectern where the (male) experimenter stood and delivered the instructions. To minimize the effects of the external environment, blinds obscured the view through the windows.

Once seated, participants completed an initial questionnaire, which manipulated participants' salient identity via an adaptation of the "three things" manipulation (Haslam et al., 1999). In the urban identity condition, participants read a text summarizing Exeter: "a moderately large city with a population of 122 400 [...] a

lively city centre with many restaurants, shops, clubs and bars—just like many other cities". They were then asked to reflect on what it means to live in a city, like Exeter, and to list three things that "you and other people who live in cities, like Exeter, do relatively often". In the rural identity condition, participants also read a text summarizing Exeter, which is situated in Devon: "a large rural county with two national parks [...] famous for its South West Coast path, a footpath that runs along both the north and south coastline". They were then asked to reflect on what it means to live in a rural area like Devon, and to list three things that "you and other people who live in rural areas, like Devon, do relatively often". To reinforce these manipulations, the text was accompanied by a map that depicted Exeter as a large urban space in the middle of Devon (in the urban identity condition) or as a small dot in the countryside a long way from the urban centers of London and Manchester (in the rural identity condition). Thus, the manipulation encouraged participants to reflect on themselves — at least in that moment — as being an "urbanite" in one condition or a "ruralite" in the other condition, and therefore in a way that implicitly positioned nature as more peripheral or central to their identity.

Following this, participants entered a second phase of the experiment in which they were exposed to images depicting either nature or urban scenes projected on the screen at the front of the lecture theatre. Following Weinstein et al. (2009), there were four images in each condition. The natural images were taken from the larger set used by Berman et al. (2008) and included pictures of mountains, forests, and rivers that did not include people or human-made structures (images 3, 4, 27, and 42 of the set accessible via the link in that paper). The urban images were selected to be of comparable quality and included an inner-city apartment block, traffic, the interior of a shopping mall and a city skyline (see Appendix A for examples). Also following the procedures of Weinstein et al. (2009), this was presented as an imagery task. Each image was projected on the screen for approximately a minute while participants were read an imagery script to encourage immersion in the environment depicted (see Appendix B). To further reinforce this, participants were also asked to rate how easy it was to imagine themselves in the space depicted on a 7-point scale.¹

The dependent measure was an aspiration index on which participants were asked to rate how important (1 = *not at all important* to 7 = *very important*) each of 25 goals was for their future (Kasser & Ryan, 1993). The list of goals included a mixture of extrinsic aspirations (11 items, e.g., for fame and fortune: "Your name will be known by many people"; "You will have lots of expensive possessions") and intrinsic aspirations (14 items, e.g., "You will teach others the things that you know"; "You will work to make the world a better place") as defined by SDT. Following Weinstein et al. we collapsed these into measures of intrinsic ($\alpha = 0.86$) and extrinsic ($\alpha = 0.85$) aspirations. At the end of the

¹ Immersion was measured in this way in all studies, as were positive and negative affect immediately following exposure to the image set and prior to assessing the dependent measures. Although there were sometimes effects on either immersion or positive and negative affect (1) these patterns were not consistent across studies; (2) in Studies 1 and 2, neither immersion nor positive or negative affect were significantly correlated with any of the dependent measures, and although in Study 3 there were significant correlations between immersion, negative affect and memory, and between immersion, positive affect and intrinsic aspiration; (3) controlling for any effects on immersion or mood did not significantly change the pattern of results reported in any of the studies. For these reasons, and in the interests of space, we do not report immersion and mood effects except in footnotes where these are relevant or interesting. Identification with Exeter was also assessed at the end of Studies 1 and 2 (via 4 items, following Doosje et al., 1995; $\alpha = 0.90$ & 0.85). There were no effects on this variable in either study, $F_s < 3.00$, $p_s > 0.086$, and controlling for identification did not affect the pattern of results.

questionnaire, participants completed demographic measures, including nationality, age and gender.² In this study, these demographic questions included a single item which asked participants “If you had to choose, how would you describe yourself?” This was followed by two choices: “I think of myself as a city person” or “I think of myself as a country person”. On completion of the experiment, participants were fully debriefed.

2.2. Results

To provide some support for our assumption that our identity-based manipulation was sufficient to shift the way participants momentarily thought about their self, we examined responses to the forced-choice self-description item included at the end of the survey. Collapsing across conditions, 50% of participants chose each option, suggesting that these were equally (ir)relevant identities in our sample. However, a chi-square analysis revealed that this response was contingent on the identity condition, $\chi^2 = 4.13$, $p = 0.04$. Participants in the urban identity condition were more likely to describe themselves as “city people” (59%) whereas participants in the rural identity condition were more likely to describe themselves as “country people” (58%). While not absolute, this pattern is consistent with the intention of the manipulation.

Moving to the key dependent measures, intrinsic and extrinsic aspiration indices were positively, but not significantly, correlated, $r = 0.13$, $p = 0.14$. A 2 (identity: urban, rural) $\times$ 2 (image type: urban, nature) $\times$ 2 (aspiration: intrinsic, extrinsic) mixed analysis of variance revealed a significant main effect of aspiration, $F_{(1, 136)} = 581.88$, $p < 0.001$, $\eta_p^2 = 0.81$, 90%CI [0.7648; 0.8409],³ indicating that participants were generally more motivated by intrinsic than extrinsic goals. In addition, there was a significant three-way interaction involving all variables, $F_{(1, 136)} = 18.68$, $p < 0.001$, $\eta_p^2 = 0.12$, 90%CI [0.0472; 0.2077]. This interaction reflects the fact that while participants always endorsed intrinsic aspirations more strongly than extrinsic aspirations, the relative endorsement of these varied across combinations of identity and image type (see Table 1).

To simplify the decomposition of this interaction, we created a difference score to represent this relative endorsement by

² We made a first attempt to assess cognitive capacity in this experiment by verbally administering a backward digit span task once only after presentation of the images and before the aspiration index. This experience alerted us to the need to modify this task for use in a large class setting (see Study 2 Method): unlike in one-to-one testing, verbally administering this test to a large room makes it too easy for participants to record their answers while simultaneously listening to the number strings being read by the experimenter, something participants were open about in debriefing. Indeed, scores on this measure were high relative to the first trial in the next study ($M = 4.61$, $SD = 1.34$, versus $M = 3.59$, $SD = 1.26$) and quite negatively skewed, $z = -3.35$, something that was not apparent in either assessment in the next study, $|z|s < 1.48$. For these reasons, we ignore these data from Study 1. There were no significant main or interactive effects of the variables on this measure, $F_s < 2.96$, $ps > 0.088$. After the aspiration index, we included measures of situational self-esteem and self-concept clarity as additional variables of potential interest (e.g., Schmitt et al., 2010), however there were no effects on these measures, all $F_s \leq 1$.

³ Because the F -distribution is one-sided, and eta-squared values can only be positive, consistent with recommendations (e.g., Lakens, 2013) we report 90% confidence intervals around these effects. These estimates correspond to an alpha level of 0.05 for the significance tests.

⁴ The complementary two-way Image Type $\times$ Identity interactions were present on both intrinsic, $F_{(1, 136)} = 4.89$, $p = 0.03$, and extrinsic aspirations, $F_{(1, 136)} = 10.51$, $p = 0.001$. Retaining both indices in a mixed ANOVA, the pattern in the three-way interaction reflects the fact the tendency to endorse intrinsic rather than extrinsic goals was particularly pronounced in the two conditions where image and identity matched, $F_s = 221.61$ & 191.28 , η_p^2 $s = 0.62$ & 0.58 , versus the two conditions in which image and identity were mismatched, $F_s = 99.32$ & 93.79 , η_p^2 $s = 0.42$ & 0.41 . This pattern is captured by the difference score.

Table 1

Means (and standard deviations) for intrinsic and extrinsic aspirations as a function of identity salience and image type (Study 1).

	Rural identity		Urban identity	
	Nature	Cities	Nature	Cities
Intrinsic	6.04 (0.50)	5.81 (0.66)	5.86 (0.63)	6.10 (0.69)
Extrinsic	3.70 (1.10)	4.17 (0.90)	4.10 (0.71)	3.56 (0.91)
Difference (Intrinsic – Extrinsic)	2.33 (1.13)	1.64 (0.89)	1.76 (0.89)	2.54 (1.10)
<i>n</i>	36	38	31	35

Note: Possible scores can range from 1 to 7, higher scores indicate stronger aspiration.

subtracting extrinsic aspirations from intrinsic aspirations.⁴ Logically, the interaction between image type and identity was equally significant when using the difference score as the dependent measure, $F_{(1, 136)} = 18.68$, $p < 0.001$, $\eta_p^2 = 0.12$, 90%CI [0.0472; 0.2077]. The interactive effect was due to opposing effects of image type in each of the identity conditions. When a rural identity was salient, exposure to natural (versus urban) images increased the relative importance of intrinsic over extrinsic aspirations, $F_{(1, 136)} = 8.76$, $p = 0.004$, $\eta_p^2 = 0.06$, 90%CI [0.0118; 0.1342]. Conversely, when an urban identity was salient, exposure to urban (versus natural) images increased the relative importance of intrinsic over extrinsic aspirations, $F_{(1, 136)} = 9.92$, $p = 0.002$, $\eta_p^2 = 0.07$, 90%CI [0.0154; 0.1440].

2.3. Discussion

This first study both establishes our basic experimental paradigm and provides support for our central hypothesis. Exposure to images of nature did not straightforwardly increase aspirations based on intrinsic versus extrinsic goals (i.e., there was no main effect of image type). Instead, the effect of exposure to different environments (natural or urban) depended on how these connected to the identities that were salient at the time participants considered those environments. Exposure to natural images supported intrinsic aspirations (and reduced extrinsic ones) when participants construed their identity in natural terms. Yet when participants construed their identity in urban terms, exposure to images of urban environments was more intrinsically (and less extrinsically) motivating than exposure to images of nature.

3. Study 2

The results of Study 1 confirm that salient identities can determine the motivational consequences of exposure to different environments. Yet, past research has also demonstrated that exposure to nature has positive effects on cognitive functioning. In particular, Berman et al. (2008) have shown that exposure to images of nature (versus urban environments) results in better performance on a test of short-term working memory, specifically the backward digit span task (a task that has been used in several studies from this theoretical perspective, e.g., Berman et al., 2012; Kuo, 2001; Ottosson & Grahn, 2005; although not always with significant results, e.g., Bratman, Daily et al., 2015; Tennessen & Cimprich, 1995). Our second study therefore considered whether the identity-contingent effects of exposure to nature extend to the cognitive domain.

3.1. Method

3.1.1. Participants, design and procedure

109 participants (85 female; mean age = 19.71, $SD = 3.47$) took

part in the experiment as part of an introductory course. As in the previous study, all were students at the University of Exeter, and we made use of the same identity content and image type manipulations and the same condition allocation procedures. Participants were tested across separate testing sessions that took place in one of two large lecture theatres. Each lecture theatre contained a projector screen and lectern where the (male) experimenter stood and delivered the instructions. To minimize the effects of the external environment, blinds obscured the view through any windows.

In this study, participants completed two tests of short-term memory capacity based on the backward digit span (BDS) task, one before image exposure (but after the identity content manipulation) and one after exposure. The BDS typically involves individual testing in which an experimenter reads a string of numbers of increasing length to a participant, who then has to repeat back the string in reverse order. This is then repeated with number strings of increasing length. Performance in this task requires both the storage and manipulation of information in short-term working memory, and therefore is believed to tap capacities relevant to attention restoration theory (Berman et al., 2008). To adapt this verbally administered task to the group-testing format, a number of changes to the basic paradigm were made. First, rather than being read aloud, numbers in white were flashed at random locations on a black background via the projector screen at the front of the lecture theatre. The timing of the appearance of each digit was kept constant (1 s) and was programmed into the slide show. As each new number appeared, the previous number disappeared. This was done to ensure that the task required a certain level of vigilance from participants and to prevent them from passively fixating on a single point and writing down the number sequence as they watched. At the end of each number string, there was a pause and participants were instructed to write down the number sequence in backwards order from left to right. The experimenter closely monitored participant behavior to limit the possibility for cheating (e.g., by writing the sequence in forward order but from right to left). Sequences began with 3 digits and increased in length one digit at a time to the final sequence of 9 digits. Participants received a score for each sequence they correctly reproduced in reverse order, giving each participant a final possible score ranging from 0 to 7 (actual scores ranged from 1 to 7). Performance on the second BDS was the primary dependent measure. Performance on the first task served as a check that the identity content manipulation did not affect cognitive capacity and as a baseline covariate in the analysis of the second task score.

3.2. Results

Means and standard deviations for performance on the BDS tasks are presented in Table 2. Submitting BDS scores at Time 1 to a 2 (identity: urban, rural) $\times$ 2 (image: cities, nature) analysis of variance revealed no main or interactive effects of the variables, $F_{(1, 105)} < 1.31$, $ps > 0.25$. This confirms that the identity manipulation did not independently influence cognitive capacity. The analysis performed on Time 2 BDS, controlling for Time 1

performance (i.e., ANCOVA), revealed a significant effect of Time 1 BDS, $F_{(1, 104)} = 58.05$, $p < 0.001$, $\eta_p^2 = 0.36$ 90%CI [0.2373; 0.4579], and a significant Identity $\times$ Image Type interaction, $F_{(1, 104)} = 4.60$, $p = 0.034$, $\eta_p^2 = 0.04$, 90%CI [0.0016; 0.1200].⁵

Among participants with a salient urban identity, performance on the Time 2 BDS task was higher after exposure to images of cities versus images of nature, $F_{(1, 104)} = 4.59$, $p = 0.034$, $\eta_p^2 = 0.04$, 90%CI [0.0016; 0.1199]. Among participants with a salient rural identity, exposure to natural images was instead associated with higher performance than exposure to images of cities, however this comparison was not significant, $F_{(1, 104)} = 0.76$, $p = 0.38$, $\eta_p^2 = 0.007$, 90%CI [0.0000; 0.0563]. Analyzed differently, the data show that performance was highest under conditions of compatibility between a salient identity and the images to which the individual was exposed, and was lowest under conditions of incompatibility between these things. In a regression analysis predicting Time 2 BDS (controlling for Time 1), a contrast comparing the two compatible conditions with the two incompatible conditions was significant, $\beta = 0.16$, $t = 2.14$, $p = 0.034$. Two orthogonal contrasts also included in this analysis were not significant, $ts < 1$, $ps > 0.39$, suggesting no residual variance not explained by the focal contrast. On this basis at least, compatibility between images and identities seems to matter more than the specific domain in which this compatibility occurred.^{6,7}

3.3. Discussion

Using the same experimental paradigm as our first experiment, the results of this experiment again show that exposure to nature does not straightforwardly improve individual psychological functioning, this time in terms of cognitive capacities: There was no main effect of image type on subsequent performance in the backward digit span task. Instead, the effects of exposure to different images depended on the identity that was salient to participants as they contemplated those images. When the images to which participants were exposed matched their salient identity, cognitive capacity was higher than when images did not match salient identities. Again, the overall pattern is consistent with our hypothesis that salient identities are a lens through which people view and respond to different environments, and therefore play a

⁵ This interaction was equally significant without Time 1 included as a covariate: $p = 0.034$.

⁶ A parallel interactive pattern was evident on positive affect, $F_{(1, 105)} = 3.61$, $p = 0.06$, $\eta_p^2 = 0.03$, such that this was highest under conditions of congruence between image and salient identity. However, positive affect was not correlated with BDS performance ($ps > 0.20$).

⁷ After the second BDS task, participants completed a survey that included measures of self-related competence (6 items, $\alpha = 0.82$) and autonomy (7 items, $\alpha = 0.72$) taken from self determination theory's basic psychological needs scale (e.g., Gagné, 2003), and a measure of connectedness to nature (e.g., Mayer et al., 2009, also used in Weinstein et al., 2009; 5-items, $\alpha = 0.82$). There were no main or interactive effects of the manipulations on any of these measures, $ps > 0.11$. But, when connectedness to nature (an indicator of more personal identification with nature) was substituted for our social identity manipulation in the analysis of Time 2 BDS (controlling for Time 1), a significant interaction was revealed, $F_{(1, 104)} = 4.48$, $p = 0.037$. Consistent with our overall argument, participants who did not feel connected to nature ($-1SD$) showed significantly better performance after exposure to urban versus natural images, $p = 0.045$. The opposite pattern was apparent among those who were high on connectedness to nature ($+1SD$), but this difference was not significant, $p = 0.31$. Controlling for nature connectedness did not affect the results of the main analysis. Finally, this survey also assessed subjective vitality (Ryan et al., 2010, p. 7 items, $\alpha = 0.93$). Consistent with previous research, the pattern on this measure was such that exposure to natural (versus urban) images improved vitality, $F_{(1, 105)} = 4.08$, $p = 0.046$. However, this main effect was only evident among participants with a salient rural identity, $F_{(1, 105)} = 4.86$, $p = 0.03$, and was absent among those with a salient urban identity, $F < 1$. Moreover, vitality was highly correlated with positive affect ($r = 0.61$, $p < 0.001$; Footnote 6), and controlling for this eliminated the effect on vitality, $ps > 0.12$.

Table 2

Means (and standard deviations) for the backward digit span task as a function of identity salience and image type (Study 2).

	Rural identity		Urban identity	
	Nature	Cities	Nature	Cities
Time 1	3.62 (1.24)	3.72 (1.07)	3.29 (1.18)	3.73 (1.54)
Time 2	4.54 (1.61)	4.34 (1.47)	3.96 (1.07)	4.92 (1.41)
<i>n</i>	26	29	28	26

Note: Possible scores can range from 0 to 7, higher scores indicate better performance.

role in determining the effects that flow from this.

Although supplementary analyses suggested that this effect was not contingent on the specific domain of compatibility, it is nonetheless apparent that the effects in this study were stronger in the case of compatibility between urban identity and urban images than the match between rural identity and natural images. One reason for this may lie in the images used. Specifically, the urban environments depicted were dominated by examples of architecture that are not typical of the urban British environments that were likely to be more familiar to our participants. Thus, to a certain extent, they may have been more distinctive, attention-grabbing, and absorbing. However, if anything, these features should undermine the capacity of such images to restore attention according to the ART perspective.⁸ Also, these were the same images that were used in Study 1, and the images of nature used in this and the previous study were equally not typical of those found on the British Isles. In our final study, we address this issue more directly by using new sets of images that vary in their typicality for the British context while simultaneously varying the salience of identities that created matches or mismatches with these images.

4. Study 3

Studies 1 and 2 show that shifting the salience of “urbanite” versus “ruralite” identities changes the way individuals are affected by images of nature (versus images of cities). Confirming our hypothesis, exposure to nature had positive effects only when it reflected salient aspects of people’s identity. Indeed, exposure to images of cities was also found to have psychological benefits when these images reflected a salient urban identity. Thus rather than specific environments straightforwardly benefiting individual motivation and cognition, benefits appear to be contingent on the degree to which environments reflect perceivers’ identity.

One could argue, however, that Studies 1 and 2 do not reveal an effect of reflected *identities*, but rather a process whereby images that correspond to what people have just thought or written about creates harmony—harmony that involves nothing more than consonance between the literal features of stimuli rather than some more abstract identity-based congruence. For example, thinking and writing about life in a rural environment could create a certain degree of flow with the subsequent experience of viewing images of nature, in the same way that thinking and writing about urban life could create flow with viewing images of cities. To clarify further the role of identity, we conducted a third study in which we altered the identity manipulation.

Rather than varying the content of a single identity as “urban” or “rural” (and subsequently asking participants to think and write about urban or rural life, as we did in Studies 1 and 2), we varied the situational salience of two different identities that do not immediately have anything to do with nature or cities, at least not exclusively. Specifically, we manipulated the salience of national identity versus personal identity. Although this manipulation again involved contemplating the self in different ways (i.e., thinking and writing about what it means to be British versus what makes one unique as an individual), this did not explicitly require the participant to think or write about natural or urban themes. This lessens the more obvious overlap between our independent variables and increases our confidence that any resulting resonance between

salient self and image is identity-based. We also extended the design to include not just urban images, but also images of two different kinds of nature: nature that reflected British identity versus nature that did not.

We predicted that when national (i.e., British) identity is salient, people would view natural environments through the lens of that identity. As such, exposure to images that are typical of that identity (i.e., images of British nature) would produce positive effects on cognition and aspiration. However, exposure to images that do not reflect that identity (e.g., images of Australian nature) should not support intrinsic aspirations and cognitive performance. Indeed, exposure to such atypical, *but equally natural*, environments might undermine performance and intrinsic aspiration. Conversely, when personal identity is salient, image type should have no effect on performance or aspiration, because neither environment specifically reflects the self. Similarly, when people view generic urban images (i.e., images that contain no cues to national or personal identity), identity salience should have no bearing on performance because these environments are equally (un)representative of nationality and individuality.

In sum, we predicted that both cognitive performance and patterns of individual aspiration would vary as an interactive function of image type and identity salience. Specifically, when national (versus personal) identity is salient, exposure to images of own nation-typical nature was expected to enhance intrinsic aspirations and cognitive performance over exposure to images of own-nation atypical nature, whereas responses to urban images were not expected to differ according to identity salience.

4.1. Method

4.1.1. Participants and design

135 psychology students took part in the experiment as part of an introductory course. Data from 13 non-British participants was discarded, leaving 122 British participants (93 female; mean age = 20.00, $SD = 4.65$). The experiment involved a 2×3 design in which identity salience and image type were orthogonally manipulated. Participants attended testing sessions in which they viewed slides of urban images ($n = 44$), images of typical British nature ($n = 37$), or images of Australian nature (and therefore atypical nature for British participants; $n = 41$). Within these sessions, participants were randomly assigned to personal identity ($n = 62$) versus national identity ($n = 60$) salience conditions via instructions within their questionnaire pack.

4.1.2. Procedure

The procedure of the experiment was similar to Studies 1 and 2. Participants first completed an identity manipulation embedded within randomly distributed questionnaire packs. They were then exposed to slides depicting different environments accompanied by an imagery script and rated their immersion in each environment. Finally, they completed two dependent measures: a new test of cognitive capacity (described below) followed by a questionnaire assessing intrinsic ($\alpha = 0.77$) versus extrinsic ($\alpha = 0.87$) aspirations (as per Study 1).

To manipulate identity salience, in the national identity condition participants were asked to think about what it means to be a member of their national group and to list the things that come to mind when they think about this group. They were then asked to list three things that they and other people from their national group do relatively well. In the personal identity condition, they were instead asked to think about what makes them who they are as an individual and the traits or qualities that make them unique and different from other people (following Haslam et al., 1999). They were then asked to list three things that they do relatively

⁸ Also arguing against this explanation, participants indicated finding it harder to imagine themselves in the urban rather than the natural environments that were depicted, $F_{(1, 105)} = 12.79$, $p = 0.001$. As previously noted, however, immersion was not related to cognitive capacity ($r_s < -0.06$, $p_s > 0.55$) and controlling for immersion did not alter the pattern of effects.

well. To reinforce these manipulations, after listing their three things participants in the national identity condition completed a four-item measure of national identification (e.g., “I am pleased to be a member of my national group”; Doosje, Ellemers, & Spears, 1995), whereas participants in the personal identity condition completed four items from the self-concept clarity scale (e.g., “In general, I have a clear sense of who I am and what I am”; Campbell et al., 1996).

To manipulate image type, we created three sets of four images that depicted generic British urban scenes (including a residential street, traffic, and generic buildings), typical British nature (including moorland, green hills, a forest with bluebells and a stream), and typical Australian nature (including views of bushland, a eucalyptus forest, and a waterhole). The latter set did not include images of environments that might have been seen as dangerous (e.g., deserts) rather than simply atypical for British perceivers.⁹

To assess cognitive capacity, we used a different task than the previous study that was more amenable to mass testing. This test was devised for the current experiment, but was intended to tap similar capacities to the previously used BDS — namely the storage and manipulation of information from short-term working memory. The task itself was an adaptation of the children's party game in which objects are presented on a tray, the participants are given time to memorize the objects, the tray is covered and some objects are taken away and, finally, the tray is uncovered and participants have to identify the missing objects. We reasoned that performance on this task requires holding information in short-term memory (i.e., memorizing previously presented objects) and then comparing that information to the objects subsequently presented as the individual searches for the missing objects. These features seem relevant to the cognitive processes ART have argued to reveal nature restoration effects (i.e., working memory, executive control, concentration).

In our version of this task, participants were presented with a slide (on a large projector screen in a lecture theatre) depicting 30 ordinary objects (e.g., scissors, pen, teabag, mug, paperclip, key, orange) and given 30 s to familiarize themselves with these objects. The slide was then taken away. Participants were told that the slide would be returned with 5 objects missing and that they had to identify as many missing objects as they could within 15 s. The presentation took the form of a timed powerpoint slide show. The task was repeated three times and in each trial a different set of objects was removed. In addition to the relatively short exposure period, to further ensure that concentration was required for the task the placement of objects varied across trials (i.e. we tried to minimize the extent to which participants could simply fixate on a specific quadrant of the screen and scan for changes to that section). Participants received a score from 0 to 5 for each trial indicating how many objects they correctly identified.

After the cognitive capacity task, participants completed a questionnaire that assessed intrinsic versus extrinsic aspirations

and gathered demographic data.¹⁰ On completion of the experiment, participants were fully debriefed.

4.2. Results

Preliminary checks revealed unexpected differences between the image conditions based on participant age, $F_{(2, 115)} = 3.69$, $p = 0.03$. Participants in the atypical nature condition were slightly older than those in the typical nature, $p = 0.05$, and urban conditions, $p = 0.09$. Age was also correlated with the relative endorsement of intrinsic over extrinsic aspirations, $r = 0.21$, $p = 0.02$, and weakly with performance on the third (but not first or second) memory trial, $r = -0.18$, $p = 0.052$. In light of this anomaly, we controlled for age in all analyses reported below.

4.2.1. Cognitive effects

We first explored performance on the memory task via a 2 (identity: national, personal) $\times$ 3 (image type: urban, typical nature, atypical nature) $\times$ 3 (trial: 1, 2, 3) mixed analysis of variance with repeated measures on the third factor and age included as a covariate. In addition to a significant improvement across trials, $F_{(2, 228)} = 10.51$, $p < 0.001$, $\eta_p^2 = 0.08$, 90%CI [0.0318; 0.1414], and a significant interaction between age (the covariate) and trial, $F_{(2, 228)} = 6.44$, $p = 0.002$, $\eta_p^2 = 0.05$, 90%CI [0.0125; 0.1025], there were also significant interactions involving trial and image type, $F_{(4, 228)} = 2.53$, $p = 0.04$, $\eta_p^2 = 0.04$, 90%CI [0.0009; 0.0781], and trial, image type, and identity, $F_{(4, 228)} = 2.67$, $p = 0.033$, $\eta_p^2 = 0.045$, 90%CI [0.0019; 0.0812].¹¹ Further interrogation of this three-way interaction revealed that it was due to an Image Type $\times$ Identity interaction that was equally present across the first two trials, $F_{(2, 114)} = 4.69$, $p = 0.011$, $\eta_p^2 = 0.076$, 90%CI [0.0102; 0.1533], but that had disappeared by the third trial, $F_{(2, 114)} = 0.67$, $p = 0.51$, $\eta_p^2 = 0.01$, 90%CI [0.0000; 0.0506]. On the final trial, there were also no main effects of the manipulations, $F_s < 2.14$, $p_s > 0.12$.

The pattern averaged across the first two trials is depicted in Fig. 1. As can be seen, the significant two-way interaction is due to a main effect of image type when national identity was salient, $F_{(2, 114)} = 5.12$, $p = 0.007$, $\eta_p^2 = 0.08$, 90%CI [0.0133; 0.1614], but not when personal identity was salient, $F_{(2, 114)} = 0.65$, $p = 0.52$, $\eta_p^2 = 0.01$, 90%CI [0.0000; 0.0497]. When national identity was salient, exposure to images of own-nation typical nature was associated with non-significantly higher performance on the memory task relative to exposure to own-nation typical urban images, $p = 0.14$, whereas exposure to own-nation atypical nature was associated with significantly reduced performance relative to the typical nature condition, $p = 0.002$, and marginally reduced performance relative to the urban image condition, $p = 0.06$.

Looked at differently, this interaction reflects varying effects of identity salience within each image condition. While there was no effect of identity in the urban condition, $F_{(1, 114)} = 0.025$, $p = 0.87$, $\eta_p^2 = 0.00$, 90%CI [0.0000; 0.0092], in response to own-nation typical nature there was a significant effect of identity, $F_{(1, 114)} = 6.17$, $p = 0.014$, $\eta_p^2 = 0.05$, 90%CI [0.0056; 0.1290], such that performance was higher when national rather than personal identity was salient; and this effect was reversed, albeit marginally, in response to own-nation atypical nature, $F_{(1, 114)} = 3.36$, $p = 0.07$, $\eta_p^2 = 0.03$, 90%CI [0.0000; 0.0948]. The total pattern of effects on this variable

⁹ In this study, preliminary analyses revealed a noteworthy effect of image type on immersion averaged across the 4 images, $F_{(2, 115)} = 10.80$, $p < 0.001$, $\eta_p^2 = 0.16$: participants found it harder to imagine themselves in the images depicted in the atypical nature set ($M = 5.16$, $SD = 1.07$) than in the urban ($M = 5.84$, $SD = 0.93$) and typical nature slides ($M = 6.12$, $SD = 0.72$). The atypical nature condition differed significantly from the other two, $p_s < 0.005$, with no difference between the urban and typical nature conditions, $p = 0.55$. This pattern reflects the intention of the manipulation, in which participants were exposed to environments that varied in their typicality for British participants, with one set being atypical (i.e., images of Australian nature). As in all studies, however, controlling for reported immersion did not alter the pattern of results reported below.

¹⁰ In this study, after the aspiration index we again measured situational self-esteem as a potential outcome of interest, however there were no significant effects on this variable, $F_s < 1.56$, $p_s > 0.22$.

¹¹ Without age included as a covariate, the three-way interaction was still apparent, $p = 0.051$. The significant two-way interaction across the first two memory trials remained significant, $p = 0.019$. Likewise, the simple effect of condition remained significant in the national identity, $p = 0.02$, but not personal identity condition, $p = 0.45$, as did the simple effect of identity salience in response to typical nature, $p = 0.02$, although the reversal in response to atypical nature was further reduced, $p = 0.12$.

Fig. 1. Estimated means (with standard error bars) for the effect of identity salience and image type on memory performance averaged across trials 1 and 2 (Study 3).

suggests that exposure to nature does not straightforwardly improve cognitive performance. Instead: (a) exposure to nature can also undermine performance; (b) the effect of exposure to nature is contingent on the degree to which this reflects salient identity; and (c) cognitive performance effects appear to fade quickly, at least within the current paradigm (likely due to practice).

4.2.2. Motivational effects

Intrinsic and extrinsic aspirations were weakly positively correlated, $r = 0.15$, $p = 0.09$. To analyze the aspiration indices, we conducted a 2 (identity: national, personal) $\times$ 3 (image type: urban, typical nature, atypical nature) $\times$ 2 (aspiration: intrinsic, extrinsic) mixed analysis of variance with repeated measures on the third factor and age included as a covariate. This revealed a significant effect of aspiration, $F_{(1, 114)} = 8.67$, $p = 0.004$, $\eta_p^2 = 0.07$, 90%CI [0.0135; 0.1551], indicating that participants were generally more motivated by intrinsic than extrinsic aspirations, as well as a significant interaction between age (the covariate) and aspiration, $F_{(1, 114)} = 5.87$, $p = 0.017$, $\eta_p^2 = 0.05$, 90%CI [0.0047; 0.1257], reflecting the relationship between the covariate and aspirations already described above. The main effect of aspiration was further qualified by a significant three-way interaction involving all factors, $F_{(2, 114)} = 3.52$, $p = 0.033$, $\eta_p^2 = 0.06$, 90%CI [0.0026; 0.1292].¹²

As in Study 1, this interaction reflects the fact that while participants always endorsed intrinsic more than extrinsic aspirations, the relative endorsement of these varied as a function of identity salience and image type. To simplify the decomposition of this interaction, we created a difference score to represent relative endorsement by subtracting extrinsic aspirations from intrinsic

Fig. 2. Estimated means (with standard error bars) for the effect of identity salience and image type on the relative importance of intrinsic over extrinsic aspirations (Study 3).

aspirations.¹³ Logically, the interaction between image type and identity was equally significant when using the difference score as a dependent measure, $F_{(2, 114)} = 3.52$, $p = 0.033$, $\eta_p^2 = 0.06$, 90%CI [0.0026; 0.1292]. The interaction was due to different effects of identity salience in each of the image conditions (see Fig. 2). While participants did not differ in their aspirations according to identity in the urban image condition, $F_{(1, 114)} = 0.57$, $p = 0.45$, $\eta_p^2 = 0.005$, 90%CI [0.0000; 0.0471], in response to images of own-nation typical nature participants reported stronger intrinsic over extrinsic aspirations when national identity rather than personal identity was salient, $F_{(1, 114)} = 3.91$, $p = 0.050$, $\eta_p^2 = 0.033$, 90%CI [0.0000; 0.1021]. In response to images of atypical nature, this effect of identity reversed, although the comparison of identity conditions was only marginally significant, $F_{(1, 114)} = 2.91$, $p = 0.09$, $\eta_p^2 = 0.03$, 90%CI [0.0000; 0.0886]. Again, the overall pattern of effects on this variable suggests that exposure to nature does not straightforwardly increase intrinsic over extrinsic aspirations. Instead, the motivational effects of exposure to nature depend on whose nature is depicted and whether this reflects the perceiver's own salient identity.

4.3. Discussion

The findings of this study again confirmed our hypothesis. Using different manipulations of identity and a different set of stimuli we found that exposure to nature had benefits for cognition and aspiration only when nature reflected a salient identity. In this study we also found some evidence that exposure to natural images that *do not* reflect identity can undermine cognitive performance and reduce the relative importance of intrinsic over extrinsic aspirations. Thus motivation and cognition were not improved by exposure to nature *per se*, but were improved only to the extent that the forms of nature to which people were exposed reflected salient aspects of their self, either by being typical of a salient national identity or by being exotic, different, and thereby exemplifying individuality.

In this study we used a different set of urban images that were more reflective of the urban environments our British participants were likely to be familiar with. Although more familiar, these images did not embody national identity in any specific way—for example, by including iconic buildings or monuments. As such, the urban scenes were equally reflective of national identity and individuality (i.e., personal identity). Bearing this in mind, it is noteworthy that participants performed equally well in this condition regardless of which identity was activated. In the natural

¹² Without age included as a covariate, the main effect of aspiration type increased substantially, $F_{(1, 114)} = 589.13$, $p < 0.001$, and the significance of the three-way interaction was reduced, $p = 0.064$. However, the simple effect of identity salience on responses to typical nature remained significant, $p = 0.043$, although the reversal in response to atypical nature was further reduced, $p = 0.20$.

¹³ In this study, neither of the univariate interactions that comprise the three-way interaction were significant: intrinsic aspirations, $F_{(1, 114)} = 1.57$, $p = 0.21$, and extrinsic aspirations, $F_{(1, 114)} = 1.68$, $p = 0.19$. Retaining both indices in a mixed ANOVA, the pattern in the three-way interaction reflects the fact the tendency to endorse intrinsic rather than extrinsic goals was equivalent in the urban image condition, irrespective of whether national or personal identity was salient, $F_s = 112.30$ & 92.36 , η_p^2 s = 0.50 & 0.45, respectively. In the alternative conditions, this tendency was pronounced when national identity (rather than personal identity) was salient while viewing typical nature, $F = 108.90$, $\eta_p^2 = 0.49$ ($F = 66.80$, $\eta_p^2 = 0.37$) and when personal identity (rather than national identity) was salient while viewing atypical nature, $F = 143.10$, $\eta_p^2 = 0.56$ ($F = 80.03$, $\eta_p^2 = 0.41$). This pattern is captured by the difference score.

image conditions, which more clearly reflected national identity (or negated this), responses also diverged more clearly as a function of identity salience.

5. General discussion

The three studies reported in this paper support the claim that identities are relevant to understanding the restorative potential of different environments. In none of the studies reported here did we observe a straightforward main effect of exposure to natural images on positive psychological outcomes. Instead, participants reported stronger intrinsic over extrinsic aspirations (Studies 1 & 3), and performed better on tasks that require short-term working memory (Studies 2 & 3), following exposure to images of environments that reflected their salient self-definition, regardless of whether these images contained natural or urban scenes.

5.1. Implications

Prior work in this area often assumes that restorative potential is inherent to natural environments. The physical features of nature have been argued to automatically direct people's attention in special ways that permit cognitive restoration (Kaplan, 1995), and immersion in nature has been assumed to automatically stimulate intrinsic motivations and goals (Weinstein et al., 2009). By showing that the effects of exposure to different environments are contingent on the identities through which these are viewed, our studies do not question the veracity of previous findings. Instead, we provide an alternative framework through which such effects can be explained and further explored. Specifically, our data suggest that relationships between perceivers' sense of self and the specific environments to which they are exposed can also determine restorative experiences. Thus we offer an identity-based analysis of the effects of exposure to different environments.

The specific identity-based analysis we offer, grounded in the social identity approach, has previously been supported by evidence that people's evaluations of others, information, ideas, and events varies as a function of how these things reflect and contribute to their own sense of identity. The present studies join a number of recent works that have extended these insights to the experience of physical environments, for example by showing that social identities determine the psychological consequences of being in specific spaces (e.g., Cheryan et al., 2009; Knight & Haslam, 2010a; b; Schmitt et al., 2010; Ysseldyk, Haslam, & Morton, 2016) and help to explain when and why objectively unpleasant environments are experienced as subjectively uplifting sources of meaning and inspiration (Alnabulsi & Drury, 2014; Novelli et al., 2013; Pandey et al., 2014; Shankar et al., 2013).

By opening up the field to identity-based explanations, we believe that our research has a range of implications. Theoretically, and especially in light of the variable and at times weak effects of exposure to nature on individual functioning (Bowler et al., 2010), it seems appropriate to more systematically identify factors that increase or attenuate the restorative potential of environments. Although some research has adopted an interactive perspective like ours, the moderators investigated remain relatively unspecified from a theoretical perspective. For example, although self-reported immersion (Ryan et al., 2010; Weinstein et al., 2009) and individual differences in the perceived beauty of nature (Zhang et al., 2014) have been shown to moderate effects of exposure to natural images, past theory does not specify the origins of individual differences in immersion and perceived

beauty and their specific psychological underpinnings. Indeed, others have critiqued the use of measured individual difference variables, and the ability to draw causal conclusions based on these, in this kind of research (Kaiser, Otto, & Schuler, 2015). Current frameworks also do not seem well-placed to explain restorative effects that follow exposure to distinctly urban environments (e.g., Studies 1 & 2). Adopting more broadly social lens might help to explain some other subtle patterns that are evident in previous research – for example, why the density of urban street trees is associated with better individual health and well-being, but the density of other trees within one's environment (e.g., in private gardens and public parks) is not (Kardan et al., 2015). From our perspective it is plausible that urban street trees communicate investment in, and make public respect for, a valued social identity, namely one's local community, thereby potentially locating this effect in social processes as much as natural ones.

An identity-based analysis could also have implications for applied work. For example, it is common for those who plan and manage spaces—be these urban environments, offices, or residential areas—to consider what will make that space better for its inhabitants. The answers provided to such questions typically focus on the physical parameters of the space—for example, noise, lighting, windows, physical dimensions, plants and water features. While all these things are important and may contribute to people's positive or negative experiences of different environments, social parameters can also make space functional or dysfunctional (Knight & Haslam, 2010a, b). For example, spaces that allow people to articulate, express, and realize their identities, and which facilitate connections to others with whom they identify, have been found to contribute to individual health and happiness (see also C. Haslam et al., 2014; C. Haslam, Jetten, Haslam, & Knight, 2011). This again suggests that an understanding of social processes should be more central to discussions of how to design functional and restorative places.

None of the above observations question the potential for nature to be such a place. An impressive, and ever-growing, body of research attests to the value of contact with nature for individual functioning. Nature is a place where people relax and engage in physical activity. Nature is also a space in which people express their identities and experience connections with important others (e.g., Coley, Sullivan, & Kuo, 1997; Maas, van Dillen, Verheij, & Groenewegen, 2009). Thus, there are likely to be many social, psychological and physical health benefits that result from interacting with nature. Our aim is contribute an additional theoretical perspective that helps us understand *when* nature has these effects, and when alternative non-natural environments might be experienced as equally restorative.

5.2. Limitations and directions for future research

It is important to note that our studies examined the effects of brief exposure to images of natural environments. It is plausible that extended contact with nature (e.g., through proximity to nature in everyday life, White, Alcock, Wheeler, & Depledge, 2013; or more immersive manipulations, Mayer et al., 2009) might reveal benefits that are not so contingent on identities. Nonetheless, it should also be noted that a significant proportion of the literature has made use of paradigms similar to ours in order to make claims about the restorative effects of nature.

Also, like much previous research in this domain, we have relied on somewhat artificial comparisons between “natural” and “urban” environments. In reality, environments exist along a spectrum,

with very few being exclusively one with no elements of the other. In this more complicated reality, the contrast between urban and natural environments also varies along many dimensions (e.g., crowding, noise, attractiveness). To show conclusively that natural environments (rather than simply quiet places, or beautiful places) are restorative, it would seem to be important for future research to find ways of making more balanced comparisons and, potentially, to move beyond the strict urban–nature dichotomy (e.g., see [Joye & van den Berg, 2011](#)).

This point is equally relevant to our operationalization of identities. In Studies 1 and 2, we contrasted rural and urban identities. Just as environments are more complex than this dichotomy, so too are people's identities. In reality, people may readily incorporate urban and rural elements into their overall self, and therefore may be responsive to multiple environments that address different self-aspects. The studies reported here drew on student samples, who, due to their relative youth, may have been more amenable to our attempts to influence their self-definition. How more stable aspects of identity guide interactions with the natural world, and the consequences of these, remains an open question, and an interesting direction for future research.

Our theoretical perspective acknowledges both enduring and situational aspects of identity. Accordingly, we would make similar predictions about the role of more stable identity aspects in guiding responses to different environments. Indeed, there was some evidence in our own data that individual differences in nature-based self-definition (i.e., connectedness to nature) guided cognitive responses to natural and urban images in a similar way to our identity manipulation (see Footnote 7). Other studies that have explored identity-based responses to other environmental features have made use of enduring categorical identities, for example, those based on religion ([Schmitt et al., 2010](#); [Shankar et al., 2013](#); [Ysseldyk et al., 2016](#)) and gender ([Cheryan et al., 2009](#)). Thus, in the absence of additional data, we assume that both situationally-salient and enduring identities can shape experiences of physical environments, natural or otherwise. If future research does pursue this idea in more detail, in addition to making use of established measures that capture individual differences in identification with nature (e.g., connectedness to nature, [Mayer et al., 2009](#); environmental identity, [Clayton, 2003](#)), we would suggest that it might be both useful and interesting to develop measures that reliably tap individual differences in urban identity. Although urban identities have been discussed in classic theoretical work (e.g., [Proshansky, 1978](#)), there is a relative paucity of measures relating to this, especially in comparison to measures of nature-based identification.

Another limitation of these studies is that although we can confidently say that salient identities modify the effects of being exposed to particular environments, the specific process through which this occurs has not been demonstrated. Several possibilities exist. For example, seeing one's self physically embodied by one's environment, might be an empowering experience and a source of transformative emotions like awe ([Zhang & Keltner, 2015](#)). Alternatively, people might do and feel better in spaces in which they expect similar others to be present, and to benefit from inclusion and support from them (e.g., [Cheryan et al., 2009](#); [Schmitt et al., 2010](#)). In the present research, we have not been able to demonstrate mediating processes and it would clearly be useful for future research to do so. Finally, while we have addressed two areas in which previous research points to the restorative effects of nature—*aspiration* and *cognition*—there is also research which points to the physiological ([Ulrich et al., 1991](#)) and neurological ([Lederbogen et al., 2011](#)) benefits of exposure to natural stimuli. It would be interesting to whether and how

identities shape outcomes shape responses on these kinds of measures.

5.3. Conclusion

Our data suggest that both natural and urban environments have the capacity to be sources of psychological restoration or distraction. When people see their identity reflected back to them in the environments they are exposed to, this seems to be an experience that contributes to individual cognition and the pursuit of intrinsic rather than extrinsic aspirations. Conversely, being exposed to environments that do not reflect salient identities seems distracting and undermining, no matter how pristine these might otherwise be. Attending to the identity-based connections between individual perceivers and their environment helps to predict which of these outcomes is most likely. In so doing, this research further illustrates the role of identity in structuring individual experience of the world, both physical and social.

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Appendix A

Example urban images used in Studies 1 & 2

Appendix B

Imagery script

Imagine your self in this place [pause]. Really try to imagine you are standing somewhere in the environment presented here. Look around, notice all aspects of your environment [pause]. Notice the colors Notice the textures ... Notice any shapes that are present in this environment ... Pay attention to how you feel in this place [pause]. Really let yourself take in all aspects of the environment in front of you. Once you've taken a moment to visualize yourself in this place, please answer the question for [this picture].

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