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Research Report

When are natural and urban environments restorative? The impact of environmental compatibility on self-control restoration

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Abstract

This research investigates the role of environmental cues found in consumer contexts on the restoration of self-control resources. In doing so, we challenge the often-repeated claim that natural environments benefit consumer well-being more than urban environments by focusing on environmental compatibility: the match between environmental characteristics and an individual's motivational orientation. Across three studies, we find that individuals high in neuroticism experience greater self-control restoration when exposed to environmental cues associated with more anxiety while the reverse is true for individual who are low in neuroticism. Importantly, these results occur regardless of whether the environmental cues are inherent in urban consumer contexts, like a bookstore, or natural consumer contexts, like a safari vacation experience. We find preliminary process evidence that consumers low in neuroticism require fewer attentional resources when processing environmentally compatible cues, leading to self-control restoration.

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When you're alone and life is making you lonely
You can always go downtown
When you've got worries, all the noise and the hurry
Seems to help, I know, downtown (Hatch, 1964)

Petula Clark achieved fame with this song about the restorative benefits of neon signs and bright lights found in urban settings. However, these lyrics run counter to a large and growing stream of research in environmental psychology that finds exposure to environments with more natural elements increases subjective well-being (Ryan et al., 2010), reduces mental fatigue (Kuo & Sullivan, 2001), and restores directed

attention (Berman, Jonides, & Kaplan, 2008). These findings have led to additional research implying that designers and architects should incorporate natural elements into urban planning (e.g., Gidlöf-Gunnarsson & Öhrström, 2007), and that marketers should look to nature when designing advertisements (Hartmann & Apaolaza-Ibanez, 2010) and optimal restorative vacation experiences (Lehto, 2013).

Despite the evolving scientific consensus on the benefits of natural settings, some evidence suggests that urban environments may also be restorative (e.g., Rosenbaum & Massiah, 2011). In most cases, these urban environments are characterized as calm, thus potentially providing many of the benefits of nature (Berto, 2014). In contrast, we propose that some individuals might restore their cognitive resources in more typical urban environments, which are perceived as less calm and potentially more dangerous than natural environments (Herzog & Chernick, 2000). If so, such individuals would need to be relatively comfortable processing

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environmental cues that are active, sometimes unpredictable, and potentially produce feelings of anxiety (e.g., traffic).

We identify neuroticism as an individual difference trait that may affect a person's compatibility with the level of anxiety-associated cues present in an environment. Neuroticism is a stable motivational orientation that is linked to negative affect, anxiety, and psychological distress (Larsen & Ketelaar, 1991; Suls, Green, & Hillis, 1998). Individuals who are relatively high in neuroticism are more vigilant to cues of threat (Matthews, Derryberry, & Siegle, 2000). At the same time, individuals high in neuroticism process complex and dynamic cues (e.g., ones that are abrasive or that move quickly and erratically) with less attentional effort (i.e., fewer fixations and shorter dwelling times; Rauthmann, Seubert, Sachse, & Furtner, 2012). These findings suggest that individuals high in neuroticism may be relatively comfortable processing anxiety-associated environmental cues.

Kaplan (1995) proposed that compatibility between an environment and an individual is a necessary component to restore a common resource that may be used in executive functioning and self-regulation tasks (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Kaplan & Berman, 2010). According to attention restoration theory, environments are restorative when individuals interacting with them require less directed attention resources, which are finite and depend on inhibition to operate (Kaplan, 1995). Thus, it is possible that environmental compatibility, or the extent to which salient cues in the environment are compatible with an individual's motivational orientation, affects the amount of attentional resources necessary to interact within an environment. Specifically, environments laden with more (less) anxiety-associated cues may be more compatible and require less attentional resources, for individuals who are high (low) in neuroticism. Thus, we predict that exposure to calm (anxiety-related) environmental cues will restore self-control resources for individuals low (high) in neuroticism due to environmental compatibility.

Overview of the present studies

In three studies, we tested the interaction effect of trait neuroticism and type of environmental prime on the restoration of self-control resources. Study 1 adopts the typical scenario in the environmental psychology literature in which participants are exposed to natural environments that tend to be more stable, calm, and less complex in comparison to urban environments (Herzog & Chernick, 2000). Study 1 demonstrates that exposure to lexical primes associated with prototypical urban environments (i.e., more anxiety-associated) restores self-control resources for individuals high in neuroticism while the reverse is true for individuals low in neuroticism. Study 2 demonstrates support for our conceptual framework by replicating Study 1 findings even when atypical environments are primed (i.e., more anxiety-associated natural environments vs. less anxiety-associated urban environments). Study 3 applies these findings in a consumption-related scenario while demonstrating preliminary process evidence that perceived levels of attention mediate the relationship between neuroticism and environmental cues

on self-control restoration. For each study, the sample size was chosen to maximize number of participants given constraints on time and subject pool availability. The data for each study were not examined until all enrolled participants completed the study.

Study 1

Method

Participants and research design

Two hundred and three university students enrolled in a lab study for partial course credit and were randomly assigned to an environmental prime condition (urban vs. natural vs. neutral). The data from 13 participants were removed for not following directions during the depletion task, one for guessing the true nature of the experiment, and 15 were removed for insufficient exposure to the environmental primes (i.e., incorrectly solved 50% or more of the environmental anagrams during the priming task). This left a final sample of 174 participants (61% male; mean age = 21.92 years, SD = 2.25).

Procedure

Participants began by completing an active thought suppression self-control depletion task (i.e., white bear task; Wegner, Schneider, Carter, & White, 1987) in order to later determine the restorative effect of the environmental primes and a 12-item neuroticism scale of the short form of the revised Eysenck Personality Questionnaire ($\alpha = .81$; EPQR-S; Eysenck, Eysenck, & Barrett, 1985). Participants were then exposed to lexical primes, which were pre-tested to confirm that the natural primes were perceived as more natural and associated with less anxiety cues in comparison to the neutral and urban primes. Participants solved six solvable anagrams as a practice block, consisting of four anagrams associated with an environmental prime condition and two neutral anagrams (six neutral anagrams in the neutral condition). Next, participants completed two potential emotional state process measures (none contributed to the results and are not discussed further). Participants then completed an additional anagram task consisting of one solvable environmental prime anagram, one solvable neutral anagram (two neutral anagrams in the neutral condition), and one unsolvable anagram to serve as the dependent measure of self-control. Finally, participants answered demographic questions and then took part in a funneled debriefing.

Results

The amount of time spent on the unsolvable anagram task served as the dependent measure of self-control. Results from a general linear model (GLM) with environmental prime (0 = natural; 1 = urban; and 2 = neutral) and neuroticism (mean-centered) as the independent variables, and the two-way interaction indicated the predicted interaction effect ($F(2, 168) = 6.2, p < .01, \eta^2 = .07$) and a significant main effect of environmental prime ($F(2, 168) = 4.50, p < .05, \eta^2 = .05$).

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