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Cultural Fit in Campus Spaces: Acculturation Orientations Shape the Perceived Restorativeness of Minority and Majority Environments

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ABSTRACT

In three field experiments (total $N = 618$), international students who varied in their acculturation orientations completed tasks in a majority or minority space on campus. Integrating theories from environmental and social psychology, we expected that fit between the individual's acculturation orientation and the social profile of the campus spaces would increase perceived and experienced psychological restoration. Consistent with this prediction, integrative mixed model analysis of the combined data across studies revealed that participants perceived the minority space as more restorative than the majority space, but only among those oriented towards their home culture (i.e., evidencing stronger fit). Effects on objective performance and mood were more mixed and less consistent with predictions. Overall, the results point to the importance of individual, social, and physical factors in shaping environmental experiences and perceptions.

1 | Introduction

University campuses across many Western countries are increasingly multicultural. However, even multicultural campuses can be segregated at the level of specific spaces. Sometimes separation is informal, such as when students from the same background cluster together in eateries or lecture theaters (e.g., Clack et al. 2005; Koen and Durrheim 2010). At other times, separation is supported by group-specific rooms or buildings on campus, such as LGBTQ+ spaces, women's rooms, and areas that cater to ethnic or religious minority students (e.g., Harper and Quaye 2007; Poynter and Tubbs 2008; Samura 2016). Because students from minoritized groups experience heightened uncertainty about their belonging on campus (e.g., Trawalter et al. 2021; Walton and Cohen 2007), and because this can erode their motivation, performance and persistence (e.g., Beasley and Fischer 2012; Cheryan et al. 2009, 2011; Schmader et al. 2001; Woodcock et al. 2012), the provision of such group-specific spaces may be especially psychologically meaningful. Indeed, research shows that just knowing a space exists for one's group can boost both belonging and academic engagement among students from underrepresented racial/ethnic backgrounds (Kirby et al. 2020).

The current research is similarly concerned with the psychological consequences of being in identity-relevant spaces on campus. We focus on international students, a group that also faces threats to belonging on campus (e.g., Lee and Rice 2007), and compare their experience of being in spaces associated with international students or associated with the dominant cultural

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group. Integrating prior research on the psychological significance of identity-relevant spaces with perspectives on cultural adaptation, we also examine how individual differences in acculturation orientation shape the (in)compatibility of campus spaces and, therefore, international students' experiences and outcomes within them.

1.1 | Environments Shape Psychological Outcomes

Understanding how environments shape psychological outcomes is a central concern for both environmental psychology and social psychology, though these sub-disciplines tend to emphasize different environmental properties. Within environmental psychology, the focus of theory and research has been on identifying which physical environments are "restorative", that is, replenishing of individual cognitive and emotional capacities. Prominent theories, such as attention restoration theory (Kaplan 1995; Kaplan and Kaplan 1989) and stress reduction theory (Ulrich et al. 1991), argue that the sensory properties of natural environments contribute to restorative experiences, whereas the properties of built or urban environments detract from these experiences.

There is much evidence for the cognitively enhancing and stress reducing effects of exposure to nature (Gaekwad et al. 2023; Stevenson et al. 2018); but nature is also not the only environment that can contribute to positive psychological outcomes. Attention restoration theory elaborates four subjective components of environments that contribute to restorative experiences: *Being away* (i.e., the feeling transported away from everyday routines while in the environment), *extent* (i.e., experiencing coherence and structure in the environment), *fascination* (i.e., perceiving interesting and beautiful elements in the environment), and *compatibility* (i.e., feeling able to be oneself and pursue important goals in the environment). Research on *perceived restorativeness*, defined according to these components, shows that (1) individuals can differ in their subjective assessments of the same physical environment, and (2) a variety of environments, including built environments like museums or places of worship, can be perceived as highly restorative for certain individuals (Herzog et al. 2010; Kaplan et al. 1993; Ouellette et al. 2005).

While research in environmental psychology identifies sources of perceived restoration that extend beyond the physical properties of environments, the origin of these perceptions has received little theoretical elaboration. Here, the work of social psychologists may be useful for providing that elaboration. Research from this field establishes that social concerns also determine the environments individuals gravitate towards and use versus avoid or leave (Esposito and Calanchini 2022; Motyl et al. 2014; Trawalter et al. 2021). Particularly, researchers drawing on social identity and self-categorization theories (Tajfel and Turner 1979; Turner and Oakes 1986) further argue that identity-based meanings can fundamentally change how even physical environmental properties are perceived. In line with this thinking, field studies show how physically intrusive environments, for example, those that are objectively noisy (Shankar et al. 2013; Shayegh et al. 2017) or crowded (Alnabulsi and Drury 2014; Morton and Power 2023; Novelli et al. 2013), can be subjectively experienced as bearable—or even uplifting—when these environments are created by ingroups rather than outgroups.

Having access to environments that symbolize group membership (Cheryan et al. 2009, 2011; Kirby et al. 2020) and that provide the potential for contact with other group members (Glasford 2021) most obviously contributes to the individual's sense of belonging, which could also be understood through attention restoration theory's concept of perceived compatibility. But identity-defined correspondence between the individual and their environment can also render spaces more pristine and less constraining than they appear according to objective criteria (e.g., Bonaiuto et al. 1996; Novelli et al. 2013) and might also provide the context for transcendent emotional experiences (Hopkins et al. 2015), thereby also contributing to the dimensions of fascination, extent and being away in attention restoration theory's terms. Indeed, the overall level of perceived restorativeness attributed to different environments has been found to correlate with identity measures (e.g., Liu et al. 2020; Ratcliffe and Korpela 2017), and studies experimentally manipulating the identity-based compatibility between individual and environment show that this elevates not just restorative perceptions (Liu et al. 2020) but also self-esteem, positive mood (e.g., Schmitt et al. 2010; Ysseldyk et al. 2016, 2021) and cognitive performance (Morton et al. 2017). Thus, in addition to the physical properties of environments that are thought to support psychological restoration, social psychological research shows that the social meaning of environments, and more specifically their connection to individual identity, also shapes how these are perceived and experienced.

1.2 | Nuances in the Space-Identity Relationship

Prior work leads to an expectation that identity-congruent spaces would be experienced as more psychologically restorative than identity-incongruent or neutral spaces. In the context of international students, this could lead to the assumption that environments associated with other international students (i.e., "minority spaces") would be more restorative than environments associated with students in general (i.e., "majority spaces"). Qualitative work supports this assumption: among individuals from migration backgrounds living in German cities, experiences of foreignness and alienation are more likely in majority-dominated spaces, whereas minority-dominated spaces were associated with belonging, identity-continuity and authenticity (Duden et al. 2024). Yet, recent theorizing suggests further nuances to questions of person-environment fit.

According to the SAFE model (*State Authenticity as Fit between one's identity and the Environment*; Schmader and Sedikides 2018), people also assess fit based on their internal goals and whether the surrounding environment impedes or facilitates them (i.e., goal fit; also see Diekman et al. 2017 for goal congruity theory). Consistent with this idea, racial minorities do not universally feel more authentic in environments that celebrate minority racial and ethnic identities (e.g., see Kirby and Kaiser 2021; Kirby et al. 2020). Instead, experienced authenticity in minority-affirming environments depends on the extent to which individuals hold their racial

identity as central to their self-concept—indicating a chronic goal of open identity expression (Ellemers et al. 2002). Similarly, although religious individuals might experience religious environments as generally restorative (e.g., Ysseldyk et al. 2016), research suggests that preferences for specific religious environments are further shaped by the nature of individual religious goals. For example, among individuals oriented to the intrinsic value of religion (emphasizing religious faith and adherence as an end in itself), religious buildings that are orderly and coherent are preferred (Meagher 2016), whereas among individuals with a more questioning orientation, spaces offering exploration are more preferred (Meagher 2018).

To understand the ways in which goal motivations might influence international students' experiences of campus spaces, we drew on acculturation theory. According to Berry's model of acculturation (see Sam and Berry 2010, for an overview), individuals who move from one culture to another are faced with questions about how they want to navigate their complex identities. In responding to these questions, individuals vary along two dimensions: (a) their desire to maintain strong connections to their culture or origin (termed "home orientation" in this article), and (b) their desire to co-exist in daily life with other ethnocultural groups in the larger society (termed "host orientation" in this article). Variation in acculturation orientations has been linked to different patterns of behavior (Berry et al. 2006), social engagement (e.g., Szabó et al. 2020) and well-being (Demes and Geeraert 2014; Taušová et al. 2019).

Since acculturation orientations capture individual motivations to engage with majority and/or minority groups, it seems plausible that these might also determine which campus spaces are experienced as places of belonging (Cheryan et al. 2009) and restoration (Morton et al. 2017). For example, the provision of "separate spaces" for the minority group on campus should appeal more strongly to individuals who are primarily motivated by cultural maintenance (i.e., those higher on home orientation). Conversely, those motivated to engage with the host culture (i.e., those higher on host orientation) should find the idea of separate spaces less appealing. In this way, individual differences in acculturation orientations might determine more precisely which spaces facilitate goal fit and therefore which spaces are perceived and experienced as restorative.

1.3 | The Present Research

Integrating theories across environmental, social, and cross-cultural psychology, we expected that the social meaning of campus spaces would influence their restorative potential. Although prior work could suggest that international students, as cultural minorities, would perceive and experience minority spaces as more restorative than majority spaces (following Duden et al. 2024; Kirby et al. 2020), we expected the restorative value of minority (*vs.* majority) spaces to depend on individual differences in acculturation orientations. International students oriented towards their home culture (and away from the host culture) were expected to perceive and experience minority spaces as more restorative than majority spaces. Conversely, international students oriented towards the host culture (and away from the home culture) were expected to perceive and experience majority spaces as more restorative than minority spaces. Thus, acculturation orientations were expected to create a more precise level of fit between individual goals and their environment (Hypothesis 1). To capture fit, we assessed the perceived restorative value of the environment as the primary outcome of interest. This measure captures the subjective properties of environments that are theorized to underscore restorative experiences (Hartig et al. 1997), connecting this study to findings from environmental psychology documenting restorative experiences within real spaces. The perceived restorativeness scale also incorporates a sense of fit and belonging (termed "compatibility"), which further connects to space-related findings in social psychology.

Theoretically, at least, being in environments that are perceived as restorative should also reveal restored psychological capacities, such as improved performance (following attention restoration theory), and improved emotional well-being following exposure to a stressor (e.g., a performance test; following stress reduction theory). A second goal of this study was therefore to examine whether and how subjectively restorative experiences relate to these additional outcomes. To index performance, we gave our participants English and Math tests while they were in the environment, and we also asked them about the subjective difficulty of these tests. To index emotional outcomes, we measured mood in the environment, both before and after the tests. A higher degree of fit between self and environment was expected to be reflected in better test performance (Hypothesis 2a), experiencing the tests as less difficult (Hypothesis 2b), and better mood (Hypothesis 2c) compared to situations entailing lower self-environment fit. Our hypothesized model is summarized in Figure 1.

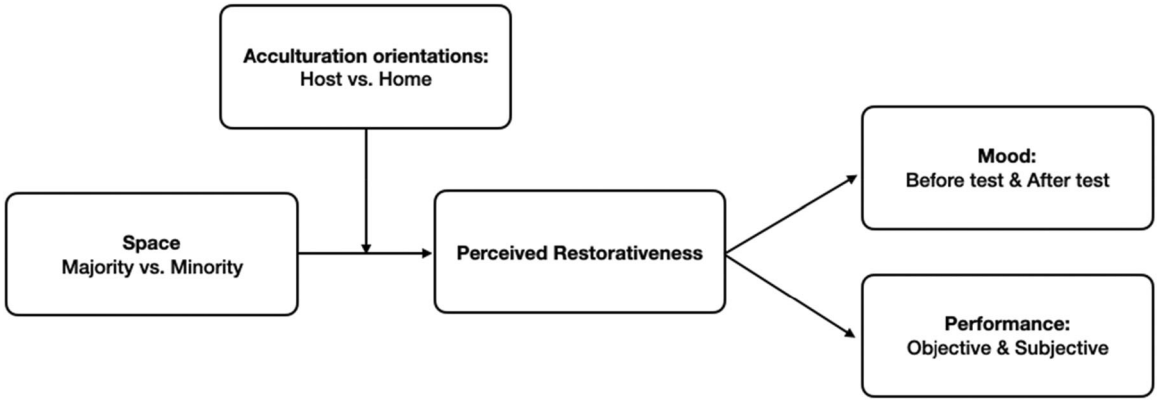

FIGURE 1 | Hypothesized model of person-space fit and restoration.

A final goal of our research was to move away from what has become the typical methodology in social and environmental psychology: lab (or online) experimentation. To boost ecological validity, we conducted a series of field experiments in real campus spaces that were well-matched in their physical qualities but varied in the degree to which they were associated with (and inhabited by) minority or majority groups. The minority space was a building that provides dedicated services and support to international students and that is frequented predominantly by international students rather than majority nationals. The majority space was the main building for general student support services and therefore predominantly occupied by majority students. Although socially distinct, these two buildings are part of the same era of campus development and, as such, share many architectural features (i.e., they are both modern buildings, with large windows and light, incorporating smooth natural shapes and wood elements into their design; refer to Supporting Materials for images).

2 | Methods

To test the hypothesized model, we conducted 3 studies across a 3-year period. Of the sequence, only Study 3 was pre-registered: https://aspredicted.org/2mi2d.pdf. Pooled data used in these analyses are available on OSF: https://osf.io/gfb4p/?view_only=42a87099b7f2431d80ef6555304ac82a. Given our focus on international students on campus, data collection was constrained by academic semesters. As a result, individual studies involved small samples and were inevitably underpowered (see Supporting File for power calculations). To simplify the presentation of results and to capitalize on the improved power of the total sample, we pooled the data and analyzed them as a mixed model, with participants nested within studies. Internal meta-analysis of multi-study papers has become a common means to address power and draw more robust conclusions (Goh et al. 2016), especially in social psychology. Given our access to the raw data and the identical set of measures and manipulations across studies, pooling the data allowed for a more nuanced analysis than meta-analysis of extracted effect sizes (see Curran and Hussong 2009, for the advantages of mixed models for data synthesis). Nonetheless, we also analyzed the data via meta-analysis and present the results of this in the online supplement. The conclusions of this are broadly similar to the analyses reported below.

Although the core of all studies was identical, later studies in the sequence included additions and refinements to probe the phenomenon in more detail and test additional hypotheses (e.g., concerning the effects of ambient noise as an environmental stressor, see pre-registration). The online supplement describes additional independent and dependent variables included in later studies of the sequence. The presentation below focuses on the common procedures and measures that test the main hypotheses outlined above.

2.1 | Design

All studies involved one manipulated between-subjects independent variable (campus space: majority space vs. minority space) and two measured moderator variables (host orientation & home orientation). Dependent variables were perceived restorativeness of the space, test performance, subjective test difficulty, and mood before and after the test. Moderator variables were assessed via an online survey before the main experiment. The main experiment, when the manipulation and all dependent measures were administered, was in person on campus around a week later. For each of the studies, we recruited international students who were currently studying at the university as research participants.

2.2 | Participants

Advertisements for each of the studies were cascaded through various international student networks at the university, as well as on the research participation website for psychology students. Pooling across the three experiments, 618 international students (50% Chinese) completed both parts of the study (i.e., the online survey and the in-person test) in exchange for £5 payment or course credit. See Table 1 for participant demographic details for each study.

2.3 | Procedure and Measures

Data collection was conducted over the academic semesters: January to March 2017 (Study 1); October to November 2017, and January to March 2018 (Study 2); October to November 2018, and January to March 2019 (Study 3). Ethical approval for

TABLE 1 | Summary of participant demographics.

	Study 1 ($n = 114$)	Study 2 ($n = 260$)	Study 3 ($n = 244$)
Age in years			
Mean	21.36	22.44	22.36
SD	3.8	3.57	4.54
Gender:			
Male	38	88	78
Female	76	172	165
Other	—	—	1
Ethnic background			
Black	3	4	4
Chinese	52	133	124
Hispanic	2	2	3
Indian	9	29	12
Japanese	5	5	4
Multiracial	2	5	8
White	27	48	56
Other	14	34	33
Level of Program			
Undergraduate	81	127	132
Postgraduate	33	133	112

each study was granted by the departmental ethics committee and was obtained before data collection.

2.4 | Part 1: Online Survey

The first part was an online survey containing a measure of *acculturation orientations* (Ramos et al. 2016). This measure asks respondents the degree to which they disagree or agree with 8 statements about their motivation to engage with British culture and community (host orientation; e.g., "I like British culture and I will do my best to be part of it"), and 9 statements on their motivation to engage with their own culture and community (home orientation; e.g., "I would like to have more friends from my own nationality"). Participants responded on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items were averaged to create indices of host ($\alpha = 0.66$ to 0.69)[1] and home ($\alpha = 0.71$ to 0.73) orientation. In the online survey, participants also provided standard demographic details.

2.5 | Part 2: In-Person Testing

Between 7 and 10 days after Part 1, participants met an experimenter (Asian man or Asian woman) individually at a single neutral spot at the center of campus, equidistant to each of the experimental spaces. Each participant was randomly assigned via a coin toss to take the test in one of two spaces on campus: one a "majority space" (catering to all students, but therefore dominated by majority group members) or a "minority space" (a building dedicated to support services for international students and therefore dominated by cultural minorities). Besides key differences in who was targeted by the space, the two buildings were broadly comparable in terms of age, design, and their offerings (e.g., both contained eateries, large windows, and similar architectural styles; refer to the Supporting File for images). Once seated in the building, participants were first asked to name the building and to take a moment to observe their surroundings.

2.5.1 | Perceived Restorativeness

After observing their surroundings, participants first filled in the *Perceived Restorativeness Scale* (14 items; adapted from Hartig et al. 1997). This scale measures individual appraisals of the four key dimensions of restorative experiences: (1) being away (e.g., "Being in this space gives me a break from my day to day routine"); (2) fascination (e.g., "My attention is drawn to many interesting things in this space"); (3) coherence (e.g., "There is a great deal of distraction in this space" [reverse scored]); and (4) compatibility (e.g., "I have a sense that I belong here"). Participants gave their responses to each of these items on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Across studies, Cronbach alphas of the subscales ranged from 0.60 to 0.80. Ultimately, because theory suggests that it is the combination of all features that creates restorative experiences, we collapsed across subscales to create a single, reliable index ($\alpha = 0.73$ to 0.84).

2.5.2 | Positive and Negative Emotions

Next, participants completed the 12-item *Scale of Positive and Negative Experience* (SPANE; Diener et al. 2010) and two further items from the Emotional Well-Being Scale (Diener and Biswas-Diener 2008). Together, these 14 items assessed participants' experiences of 7 positive emotions (e.g., "contented", "happy") and 7 negative emotions (e.g., "afraid", "angry") in that moment. Participants gave their responses on a 5-point scale, ranging from 1 (not at all) to 5 (very much). Factor analysis within each study revealed interpretable 2-factor solutions that explained between 55% and 63% of variance in individual items. Positive and negative items loaded separately on these factors and, when combined, produced reliable indices of positive and negative mood ($\alpha s > 0.80$). As such, we averaged positive and negative items separately to create two indices of emotion. These same items were repeated after the test, also producing interpretable and reliable two factor solutions ($\alpha s > 0.84$) with items again averaged to create two indices.

2.5.3 | Academic Performance

Next, participants completed a measure of academic performance based on 7 numerical reasoning (i.e., Math) questions and 7 verbal reasoning (i.e., English) questions. Although attention restoration theory usually draws on more specific cognitive tasks to test its predictions (e.g., the reverse digit span task; Berman et al. 2008), in keeping with the goal to boost ecological validity we draw on the kinds of tests that students might actually encounter in an educational setting (something that may have relevance when interpreting our findings; we return to this in the Discussion). The tests we administered were taken from job test preparation websites in the UK (Job Test Prep 2016). There were no time constraints for the tests, and participants could use their smartphones or the internet to check vocabulary. All questions were in English with 5 multiple-choice answers, including 4 possible answers and one 'cannot say' option. A pilot study ($n = 13$, age ranged 18 to 25, all international status) confirmed that these 14 academic questions yielded variability in terms of scoring (6 to 13 correct) and could be completed within a reasonable time (average completion time was approximately 21 min).

To further probe experiences of the test, after each block, participants responded to 3 items concerning the subjective difficulty of the test (e.g., "How hard did you find the test?"; "How well do you think you did on this section of the test?"). Responses were given on appropriately worded 5-point scales (e.g., from 1 = extremely easy to 5 = very difficult). These items were averaged to form a measure of perceived difficulty ($\alpha = 0.57$ to 0.69) of each of the Math and English tests ($\alpha = 0.78$ to 0.84).

3 | Results

3.1 | Preliminary Analyses

Preliminary analyses of the data from each individual study suggested no serious issues with assumptions of normality and

homogeneity of variance, or with multicollinearity. In studies 2 and 3, the experimenter counted the number of people in the immediate area during the testing session and coded their apparent ethnicity (i.e., "white" *vs.* "nonwhite"). Consistent with the designation of spaces as "majority" and "minority", there was a significant difference in the percentage of majority group members across spaces, $B = -0.66$, $SE = 0.01$, 95% CIs [−0.69, −0.63], $t(502) = -50.02$, $p < 0.001$. Approximately 81% of individuals in the majority space, and approximately 15% in the minority space, were categorized as white by the experimenter.

3.2 | Analytic Procedure

Scales representing the moderator (acculturation orientations) and dependent variables (perceived restorativeness, English and Math test performance, subjective test difficulty, mood) were calculated in the same way across all studies and then pooled into a single data file containing all participants, nested in their respective study. In each data set, the two acculturation orientations (i.e., host & home orientation) were weakly negatively correlated and therefore empirically distinct: $r_{\text{Study 1}} = -0.108$, $p = 0.253$; $r_{\text{Study 2}} = -0.237$, $p < 0.001$; $r_{\text{Study 3}} = -0.111$, $p = 0.084$. Accordingly, when pooling the data, we retained these as separate measures and tested their main and interactive effects in the same model (as is recommended practice: Demes and Geeraert 2014).

To analyze the data, we conducted a series of mixed (i.e., multilevel) models in JAMOVI (The JAMOVI Project 2021). These models included random intercepts for the study. Campus space (majority *vs.* minority) was entered as a fixed factor (dummy coded: majority space = 0, minority space = 1), home and host orientations (both centered) were entered as continuous predictors (i.e., as covariates), and the model was specified to test all main effects, two- and three-way interactions among these variables. Parameters were assessed via restricted maximum likelihood estimation, and degrees of freedom were calculated using Satterthwaite's approximation. The intraclass correlation coefficients (ICC) were generally very low (≤ 0.01) suggesting that the majority of variance occurred at the individual level rather than the study level. Although this would question the need for multi-level modeling, we retained the multi-level structure to be consistent with how the individual data was collected (i.e., as individual participants within 3 separate studies collected across 3 academic years) and to provide more accurate parameter estimates. Results are reported in Tables 2–6.

3.3 | Primary Analyses

3.3.1 | Perceived Restorativeness (H1)

The analysis of perceived restorativeness (Table 2) revealed a significant main effect of space across the studies: The minority space was perceived as more restorative than the majority space. There was also a main effect of host orientation, indicating that those more oriented towards the host culture generally perceived both spaces as more restorative than those less oriented towards the host culture. In addition, there was a significant interaction between space and home orientation such that the restorative value of the minority (*vs.* majority) space was evident among those high, $B = 0.28$, $SE = 0.09$, 95% CIs [0.11, 0.46], $t = 3.20$, $p = 0.001$, and moderate in home orientation, $B = 0.14$, $SE = 0.06$, 95% CIs [0.02, 0.26], $t = 2.23$, $p = 0.026$, but not among those low in home orientation, $B = -0.00$, $SE = 0.09$, 95% CIs [−0.18, 0.17], $t = -0.04$, $p = 0.969$ (see Figure 2). Together, these patterns provide some support for Hypothesis 1: The minority space was perceived as more restorative than the majority space, especially among those whose acculturation orientation matched this space (i.e., higher home orientation). Yet we did not find a complementary pattern whereby the majority space was perceived as more restorative among those oriented to the host culture. Instead, those higher in host orientation perceived both majority and minority spaces as more restorative than those lower in host orientation. As such, Hypothesis 1 was partially supported.

TABLE 2 | Parameter estimates from mixed models on perceived restorativeness.

			95% CI				
	Est	***SE***	**Lower**	**Upper**	***df***	***t***	***p***
(Intercept)	4.23	0.06	4.10	4.36	3.75	65.58	< 0.001
Minority space	**0.14**	**0.06**	**0.02**	**0.26**	**608.50**	**2.23**	**0.026**
Home orientation	0.04	0.06	−0.07	0.15	608.51	0.73	0.464
Host orientation	**0.18**	**0.06**	**0.06**	**0.30**	**608.31**	**2.97**	**0.003**
Space × Home	**0.19**	**0.08**	**0.02**	**0.35**	**609.76**	**2.24**	**0.025**
Space × Host	0.01	0.08	−0.16	0.17	608.53	0.08	0.935
Home × Host	−0.10	0.08	−0.25	0.05	608.38	−1.30	0.193
Space × Home × Host	0.13	0.10	−0.08	0.33	609.15	1.21	0.225
ICC	0.01						
R2 marginal	0.06						
R2 conditional	0.07						

Note: Bold values indicate statistically significant at $p < 0.05$.

TABLE 3 | Parameter estimates from mixed models on Math and English test performance.

	Math							English						
			95% CI							95% CI				
	Est	*SE*	Lower	Upper	*df*	*t*	*p*	*Est*	*SE*	Lower	Upper	*df*	*t*	*p*
(Intercept)	4.82	0.11	4.62	5.03	3.10	45.48	< 0.001	4.24	0.09	4.06	4.41	610.00	47.84	< 0.001
Minority space	0.06	0.12	−0.18	0.31	608.01	0.52	0.603	−0.04	0.13	−0.29	0.20	610.00	−0.35	0.728
Home orientation	0.04	0.11	−0.18	0.26	607.98	0.32	0.747	−0.18	0.11	−0.40	0.04	610.00	−1.57	0.117
Host orientation	−0.01	0.12	−0.24	0.23	607.49	−0.05	0.959	0.21	0.12	−0.03	0.45	610.00	1.69	0.092
Space × Home	0.06	0.16	−0.26	0.38	609.97	0.38	0.707	0.18	0.17	−0.15	0.50	610.00	1.06	0.289
Space × Host	0.26	0.17	−0.07	0.58	607.98	1.54	0.124	−0.05	0.17	−0.38	0.28	610.00	−0.30	0.761
Home × Host	−0.06	0.15	−0.35	0.23	607.65	−0.41	0.684	−0.14	0.15	−0.43	0.16	610.00	−0.91	0.366
Space × Home × Host	−0.09	0.21	−0.50	0.31	609.46	−0.45	0.654	−0.11	0.21	−0.52	0.30	610.00	−0.52	0.602
ICC	0.00							0.02						
R2 marginal	0.01							0.02						
R2 conditional	0.02							0.07						

TABLE 4 | Parameter estimates from mixed models on perceived test difficulty.

	Math							English						
			95% CI							95% CI				
	Est	*SE*	Lower	Upper	*df*	*t*	*p*	*Est*	*SE*	Lower	Upper	*df*	*t*	*p*
(Intercept)	3.24	0.07	3.10	3.37	4.60	45.93	< 0.001	2.76	0.09	2.59	2.93	3.44	31.83	< 0.001
Minority space	0.04	0.08	−0.11	0.19	608.71	0.56	0.574	0.09	0.08	−0.07	0.24	608.42	1.08	0.281
Home orientation	0.00	0.07	−0.13	0.14	608.71	0.07	0.943	−0.04	0.07	−0.18	0.11	608.43	−0.49	0.626
Host orientation	0.02	0.07	−0.13	0.16	608.46	0.24	0.812	**−0.32**	**0.08**	**−0.47**	**−0.16**	**608.25**	**−4.05**	**< 0.001**
Space × Home	−0.06	0.10	−0.25	0.14	609.97	−0.56	0.575	**0.28**	**0.11**	**0.08**	**0.49**	**609.61**	**2.68**	**0.008**
Space × Host	−0.10	0.10	−0.31	0.10	608.72	−1.02	0.308	**0.23**	**0.11**	**0.02**	**0.44**	**608.45**	**2.11**	**0.035**
Home × Host	−0.03	0.09	−0.21	0.15	608.54	−0.36	0.721	−0.03	0.10	−0.21	0.16	608.31	−0.28	0.780
Space × Home × Host	0.04	0.13	−0.20	0.29	609.46	0.35	0.724	0.02	0.13	−0.24	0.28	609.00	0.16	0.875
ICC	0.01							0.01						
R2 marginal	0.00							0.05						
R2 conditional	0.01							0.06						

Note: Bold values indicate statistically significant at $p < 0.05$.

TABLE 5 | Parameter estimates from mixed models on reported mood before tests.

	Positive mood							Negative mood						
			95% CI							95% CI				
	Est	*SE*	Lower	Upper	*df*	*t*	*p*	*Est*	*SE*	Lower	Upper	*df*	*t*	*p*
(Intercept)	3.36	0.04	3.27	3.45	610.00	75.29	< 0.001	1.49	0.04	1.42	1.57	3.44	37.64	< 0.001
Minority space	0.03	0.06	−0.10	0.15	610.00	0.44	0.660	−0.02	0.05	−0.11	0.07	608.21	−0.50	0.615
Home orientation	−0.01	0.06	−0.12	0.10	610.00	−0.17	0.867	−0.01	0.04	−0.09	0.08	608.18	−0.14	0.887
Host orientation	**0.27**	**0.06**	**0.15**	**0.40**	**610.00**	**4.40**	**< 0.001**	**−0.11**	**0.05**	**−0.20**	**−0.03**	**607.74**	**−2.52**	**0.012**
Space × Home	0.15	0.08	−0.02	0.31	610.00	1.74	0.083	0.09	0.06	−0.03	0.21	609.97	1.45	0.148
Space × Host	−0.05	0.09	−0.22	0.11	610.00	−0.63	0.528	−0.00	0.06	−0.13	0.12	608.18	−0.06	0.950
Home × Host	0.04	0.08	−0.11	0.19	610.00	0.52	0.605	−0.10	0.06	−0.21	0.01	607.88	−1.83	0.067
Space × Home × Host	−0.15	0.11	−0.35	0.06	610.00	−1.39	0.164	0.07	0.08	−0.08	0.22	609.51	0.90	0.369
ICC	0.00							0.00						
R2 marginal	0.06							0.04						
R2 conditional	0.06							0.04						

Note: Bold values indicate statistically significant at $p < 0.05$.

TABLE 6 | Parameter estimates from mixed models on reported mood after tests.

	Positive mood							Negative mood						
			95% CI							95% CI				
	Est	*SE*	Lower	Upper	*df*	*t*	*p*	*Est*	*SE*	Lower	Upper	*df*	*t*	*p*
(Intercept)	3.15	0.05	3.05	3.26	4.94	59.32	< 0.001	1.47	0.03	1.40	1.54	610.00	42.65	< 0.001
Minority space	−0.01	0.07	−0.14	0.13	608.74	−0.07	0.942	0.03	0.05	−0.06	0.13	610.00	0.70	0.484
Home orientation	0.03	0.06	−0.09	0.16	608.63	0.50	0.620	−0.06	0.04	−0.14	0.03	610.00	−1.25	0.211
Host orientation	**0.26**	**0.07**	**0.13**	**0.40**	**608.03**	**3.77**	**< 0.001**	−0.04	0.05	−0.14	0.05	610.00	−0.90	0.367
Space × Home	0.04	0.09	−0.15	0.22	608.34	0.41	0.683	**0.21**	**0.06**	**0.08**	**0.33**	**610.00**	**3.22**	**0.001**
Space × Host	−0.09	0.10	−0.28	0.10	608.57	−0.97	0.334	0.01	0.07	−0.12	0.14	610.00	0.11	0.909
Home × Host	0.15	0.09	−0.02	0.31	608.21	1.71	0.088	**−0.13**	**0.06**	**−0.25**	**−0.02**	**610.00**	**−2.29**	**0.022**
Space × Home × Host	**−0.37**	**0.12**	**−0.60**	**−0.14**	**610.00**	**−3.13**	**0.002**	0.11	0.08	−0.05	0.27	610.00	1.39	0.164
ICC	0.00							0.00						
R2 marginal	0.05							0.03						
R2 conditional	0.05							0.03						

Note: Effects on positive and negative mood after the test held when controlling for mood before the test. Bold values indicate statistically significant at $p < 0.05$.

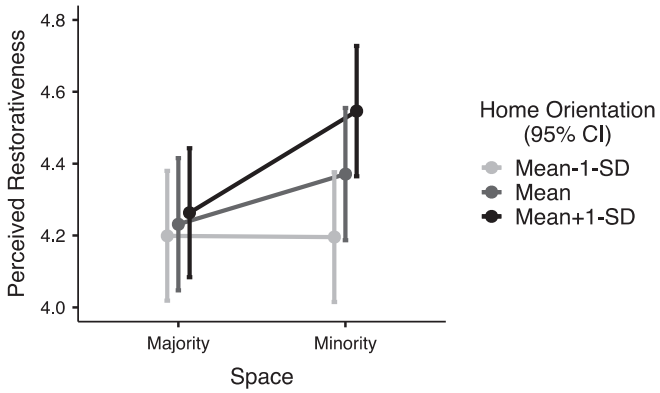

FIGURE 2 | Home Orientation × Space interaction on Perceived Restorativeness (error bars indicate 95% CIs).

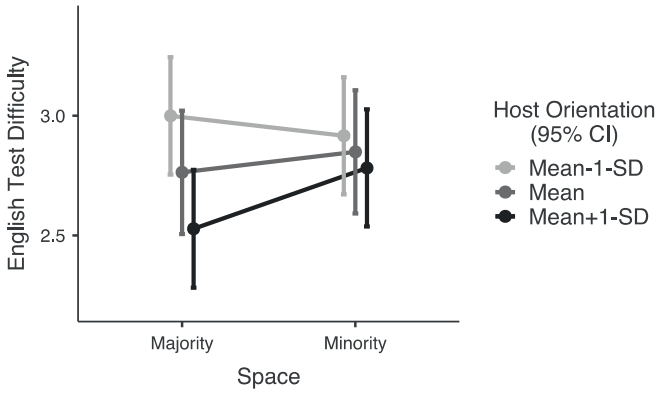

FIGURE 3 | Host Orientation × Space interaction on English Test Difficulty (error bars indicate 95% CIs).

3.3.2 | Performance (H2a-b)

The analysis on performance outcomes (Table 3) did not find any evidence for Hypothesis 2a: participants did not do better on either Math or English tests when they took these in environments that matched their minority status or their specific acculturation orientation. Indeed, there were no effects of any variable alone or in combination on test performance scores.

There were, however, significant effects on the subjective difficulty of the English test (Table 4). Those higher in host orientation generally found this test less difficult. This effect of host orientation was further qualified by the space in which participants took their test (i.e., a significant interaction). There was also a significant interaction between space and home orientation.

The Space × Host orientation interaction (Figure 3) indicated that those higher in host orientation experienced the test as less difficult when it was taken in the majority rather than the minority space, $B = 0.24$, $SE = 0.11$, 95% CIs [0.03, 0.48], $t = 2.25$, $p = 0.025$. Perceived difficulty among those moderate, $B = 0.09$, $SE = 0.08$, 95% CIs [−0.07, 0.24], $t = 1.08$, $p = 0.281$, and low in host orientation, $B = -0.08$, $SE = 0.11$, 95% CIs [−0.30, 0.14], $t = -0.074$, $p = 0.459$, was not related to the space in which the test was taken. This pattern is consistent with Hypothesis 2b.

The Space × Home orientation interaction (Figure 4) indicated that those higher in home orientation experienced the test as *more* difficult when it was taken in the minority rather than the majority space, $B = 0.30$, $SE = 0.11$, 95% CIs [0.08, 0.52], $t = 2.70$, $p = 0.007$. Perceived difficulty among those moderate, $B = 0.09$, $SE = 0.08$, 95% CIs [−0.07, 0.24], $t = 1.08$, $p = 0.281$, and low in home orientation, $B = -0.13$, $SE = 0.11$, 95% CIs [−0.36, 0.09], $t = -1.14$, $p = 0.253$, was not related to the space in which the test was taken. This pattern is the opposite of what would have been expected under Hypothesis 2b. Overall support for Hypothesis 2b is thus mixed.

3.3.3 | Mood (H2c)

Before taking the test (Table 5), individuals higher on host orientation showed more positive and less negative mood, irrespective of the space they were in. Home orientation was uncorrelated with mood before taking the test. After taking the test (Table 6), those higher on home orientation continued to display more positive (but not less negative) mood. However, the pattern on posttest positive mood was now qualified by a 3-way interaction involving space, host orientation and home orientation. There was also a significant interaction between space and home orientation on posttest negative mood.

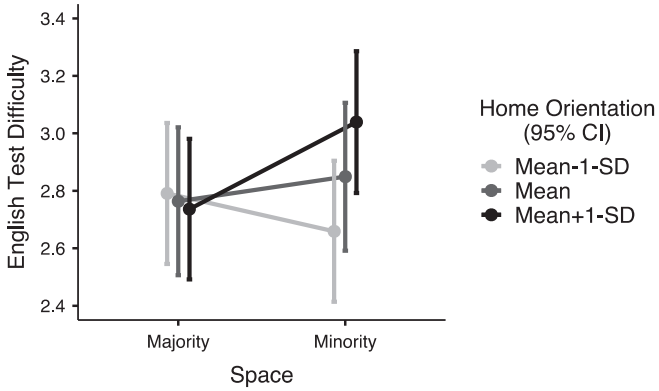

FIGURE 4 | Home Orientation × Space interaction on English Test Difficulty (error bars indicate 95% CIs).

With respect to posttest positive mood (see Figure 5), individuals higher in home orientation displayed more positive mood after taking the test in the minority space compared to the majority space when host orientation was also low, $B = 0.30$, $SE = 0.14$, 95% CIs [0.04, 0.57], $t = 2.23$, $p = 0.026$. When both host and home orientation were high, positive mood was instead slightly higher after taking the test in the majority rather than minority space, though this difference was not significant, $B = 0.26$, $SE = 0.15$, 95% CIs [−0.54, 0.03], $t = -1.74$, $p = 0.082$. There were no effects of space at any other combination of host and home orientation, $ts < |1.14|$, $ps > 0.255$. Though somewhat complex, the pattern on positive mood is consistent with the hypothesis since the spaces most clearly matching the individual's acculturation profile are the ones in which positive mood is highest: the combination of high home and high host orientation is an integration profile fitting to the majority environment, whereas high home orientation in combination with low host orientation is a separation profile fitting to the minority environment.

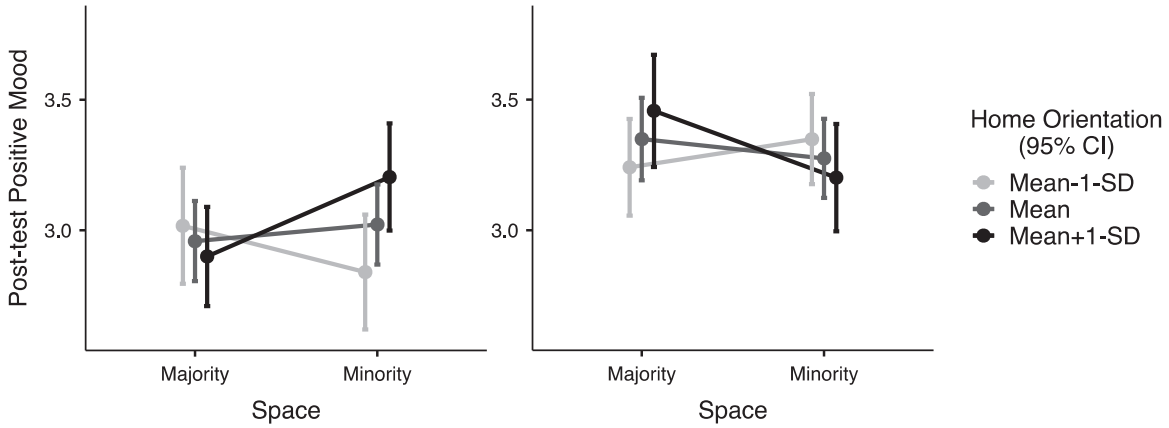

FIGURE 5 | Host Orientation × Home Orientation × Space interaction on posttest Positive Mood (error bars indicate 95% CIs).

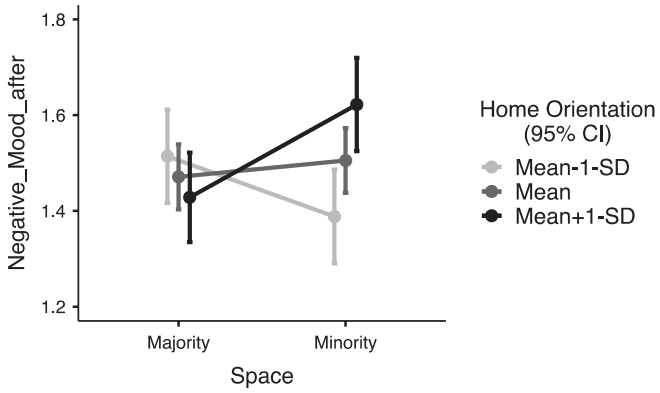

FIGURE 6 | Home Orientation × Space interaction on posttest Negative Mood (error bars indicate 95% CIs).

With respect to posttest negative mood (see Figure 6), individuals higher on home orientation displayed more negative mood after taking the test in the minority space than the majority space, $B = 0.19$, $SE = 0.07$, 95% CIs [0.06, 0.33], $t = 2.82$, $p = 0.005$, whereas those low on home orientation showed the opposite pattern, though this was not significant, $B = -0.13$, $SE = 0.07$, 95% CIs [−0.26, 0.01], $t = -1.78$, $p = 0.075$. These patterns are the opposite of what would be expected under the hypothesis and suggest that self-space compatibility might have been associated with heightened emotion, rather than heightened positivity per se, at least among those oriented towards their home culture. The overall pattern suggests some support for Hypothesis 2c, but this support is complicated by the observed pattern on posttest negative mood.

3.4 | Exploratory Analyses

3.4.1 | Narrowing to Asian Students

International students are a diverse group and our participants spanned a range of cultural backgrounds, ethnicities, and nationalities. The cultural gap between home and host cultures should have relevance for the meaning of separate versus integrated spaces, and the diversity of our sample could be obscuring this. Concretely, some of our international students were from European backgrounds and therefore culturally similar to British students. However, by far the largest number of participants reported Asian ethnic backgrounds ($n = 415$). In addition, Asian students are the largest international group on the campus, being studied, and as implied by the pictures in the Supporting File, the international student building is largely used by Asian students. Given these differences, we tested whether the above effects held when the sample was restricted to include only respondents reporting Asian ethnicities. In these analyses, all of the previously observed effects remained significant (see Supporting File).

3.4.2 | Differences Across Spaces

Although we chose campus spaces to maximize differences in social meaning while limiting differences in physical state and appearance, inevitably, physical conditions varied between environments and across testing sessions in ways that could have affected restorative experiences. Speaking to this, studies 2 and 3 included measures of crowding (number of people in the immediate vicinity) and ambient noise (as measured by a decibel meter) during the testing session, both of which differed significantly across locations, $ts(502) = 9.13$ & 14.61, $ps < 0.001$. The majority space was both more crowded and noisier than the minority space. More crowding and higher average noise levels were negatively correlated with perceived restorativeness, $rs = -0.18$ & -0.22, $ps < 0.001$; noise, but not crowding, was further correlated with positive mood before the test, $r = -0.11$, $p = 0.016$, but not after, $r = -0.06$, $p = 0.155$. All other correlations between environmental parameters and outcome variables were nonsignificant, $ps > 0.142$. Given the disruptive effect of environmental conditions on perceived restorativeness, we re-examined effects on this outcome on the combined data from studies 2 and 3 only ($n = 504$). Including these factors as covariates in the previous mixed model revealed an independent effect of noise, $B = -0.03$, $SE = 0.01$, $t(493.88) = -3.28$, $p = 0.001$, but not crowding, $B = -0.01$, $SE = 0.01$, $t(235.96) = -1.56$, $p = 0.12$, on perceived restorativeness. Inclusion of these variables also erased the previously observed main effect of minority versus majority space, $B = -0.04$, $SE = 0.08$, $t(493.85) = -0.42$, $p = 0.672$, but not the significant Home orientation × Space interaction, $B = 0.22$, $SE = 0.09$, $t(492.98) = 2.43$, $p = 0.015$. The Home orientation × Space interaction also persisted when ambient noise or crowding were allowed to interact with the

other parameters, $B = 0.34$, $SE = 0.12$, $t(487.49) = 2.87$, $p = 0.004$ and $B = 0.27$, $SE = 0.11$, $t(481.65) = 2.46$, $p = 0.014$, respectively. Thus, while environmental conditions do contribute to restorative experiences, the role of acculturation orientations in further shaping perceived restorativeness appears independent of this.

3.4.3 | Relationships Among Outcomes

Finally, one assumption of our model—and theories from environmental psychology more generally—is that perceived restorativeness reflects the actual restorative potential of the environment. Our findings, however, show different effects on the subjective measure of perceived restorativeness versus plausible outcomes of restoration (e.g., objective & subjective performance, mood). To probe this further, we examined the correlations between perceived restorativeness and each of these additional outcomes. Perceived restorativeness was unrelated to performance outcomes (neither test scores nor perceived difficulty, rs $\leq |.05|$), but it was associated with positive mood (both before and after the test; rs $= 0.43$ & 0.31, ps < 0.001) and with negative mood before the test, $r = -0.10$, $p = 0.003$, but not after, $r = -0.03$, $p = 0.530$. Those who perceived a space as restorative also reported more positive mood and (generally) less negative mood while they were in the space.

4 | General Discussion

In the current research, we tested the prediction that fit between international students' identity-related goals and the social properties of campus environments would enhance restorative experiences. Our prediction was informed by a variety of literature spanning environmental psychology (e.g., showing that environmental parameters can affect psychological outcomes), social psychology (e.g., showing that identity-based spaces are psychologically meaningful), and acculturation research (e.g., showing that individual variation in identity goals guides how international students engage with their sojourn experience). Unusually for research in both contemporary environmental psychology and social psychology, we tested this prediction in response to real-world spaces (not imagined places or images) on a university campus that differed in their social meaning.

The combined results of three field experiments (total $N = 618$) suggest qualified support for the primary hypothesis. In line with Hypothesis 1, among international students, the perceived restorativeness of a minority campus space was higher than a majority campus space, but this was only the case among those oriented towards maintaining their home culture (i.e., there was a significant Home orientation × Space interaction). For those oriented towards the host culture, rather than the majority space being appraised more positively, as was expected under the hypothesis, both majority and minority spaces were perceived as restorative (i.e., there was a main effect of host orientation on perceived restorativeness).

The observed patterns on performance and mood outcomes were more complex and, overall, less consistent with hypotheses. We did observe more positive mood after taking tests in environments that matched the individual's acculturation profile: individuals with an integration profile (high on both host and home orientation) were more positive after taking the test in a majority space, whereas those with a separation profile (high home but low host orientation) felt better after taking the test in a minority environment. This pattern on positive mood is congruent with Hypothesis 2c. But the pattern on negative mood complicates this picture, with home-oriented individuals also experiencing more negative mood in the minority environment. Seen in combination, the total pattern across mood is difficult to confidently interpret in relation to the hypothesis.

Also difficult to interpret is the pattern on perceived test difficulty (Hypothesis 2b). Here, individuals oriented towards the host culture experienced the English (but not Math) test as less difficult when it was taken in the majority rather than minority environment, a pattern consistent with expectations. However, individuals oriented towards the home culture experienced the same test as more difficult when it was taken in the minority than majority environment—the opposite of expectations. Intuitively, one would expect psychological restoration, and the enhanced cognitive capacity this typically entails (Berman et al. 2008; Kaplan 1995), to result in subjective ease rather than difficulty. It could be that self-consistent environments do not straightforwardly enhance performance but instead boost engagement. Heightened engagement might be associated with emotional arousal (both positive and negative) and enhanced effort, which, depending on baseline abilities, might be reflected in perceptions of difficulty or ease. It is also possible that the boosted cognitive resources conferred by being in restorative environments result in more accurate appraisals of performance rather than simply ease. Finally, it is possible that specific ability-related stereotypes attached to the environments impinged on either ability or perceptions of this, along the lines of the stereotype threat literature (e.g., see Inzlicht and Schmader 2012). These possibilities are all post-hoc and speculative, and in the absence of baseline ability measures or any effects on actual performance (Hypothesis 2a), are difficult to resolve. Overall, performance-related hypotheses were therefore not supported by the current data.

4.1 | Implications

Research in environmental psychology has focused on identifying the physical properties of environments that support restorative experiences and enhanced psychological outcomes. Although a variety of environments can be perceived as restorative to the individual (e.g., Herzog et al. 2010; Kaplan et al. 1993; Ouellette et al. 2005), within environmental psychology a primary distinction is drawn between natural and built/urban environments (e.g., Hartig 2021). Our studies also show that physical environmental properties matter for individual experiences: environments that were noisier (and to a lesser extent more crowded) were generally perceived as less restorative. Yet, research drawing on social psychological theories of identity (e.g., Tajfel and Turner 1979; Turner and Oakes 1986) has also shown that environments are appraised and experienced more positively when they are "owned" by the individual's social ingroup (e.g., Knight and Haslam 2010; Morton et al. 2017; Ysseldyk et al. 2016). At least at the level of

explicit environmental appraisals (i.e., perceived restorativeness) our studies provide further evidence of this phenomenon. In the context of the broader literature from environmental psychology, these patterns point to the often-overlooked importance of the social, not just physical, parameters in structuring environmental experiences (see also Bornioli et al. 2023).

The present research extends prior work in both environmental and social psychology by acknowledging the importance of individual differences in defining person-environment fit. Although past work shows that ethnic minorities on university campuses (e.g., Kirby et al. 2020) and women in male-dominated fields (Cheryan et al. 2009, 2011) benefit from the provision of spaces that signal inclusion of their group, not all minorities orient towards their group membership in the same way, and not all minorities hold the same identity-based goals. Particularly with respect to international students on campus, acculturation research points to the importance of variation in the degree to which individuals orient their identity towards the host (i.e., majority) culture versus their culture of origin. Our research shows that these individual differences play a role in further shaping minority individuals' perceptions of space. Although both home and host orientations were related to environmental perceptions and experiences within the space, home orientation seemed to play a stronger role in differentiating our international students' subjective responses to minority versus majority spaces. This might indicate that the social character of spaces has special significance to individuals motivated to preserve their cultural identity on a campus otherwise dominated by majority group members. Nonetheless, and despite the mixed patterns across dependent variables, the results do show that individual differences of this kind create divergence between individuals who otherwise belong to the same category (e.g., "international students", or even "Asian students" as our Supporting analyses show).

By taking an environmental perspective and engaging in the real world outside the lab, we also see this kind of work as challenging the understanding of context in social psychological research. Within social psychology, it is typical to treat context as something primarily symbolic, and contextual manipulations—even in research on environments—often involve hypothetical scenarios, textual reminders, or momentary engagement with imagined worlds (e.g., Glasford 2021; Kirby et al. 2020; Morton et al. 2017). But individuals experience contexts through the real, material, and physical environments they inhabit. Real environments are inherently messy, and this is one reason why social psychologists typically retreat into the controllable lab (Proshansky 1976). But testing theoretical predictions in the messiness of the real world also allows us to identify which expectations hold versus fade into the background of the noise. We see the mixed pattern of findings from this study partly in line with the challenges of conducting real-world experimental research.

4.2 | Limitations and Directions for Future Research

We also see the mixed pattern of results as reflecting our choices of measures. We expected that perceived restoration would also be revealed in actual restoration, for example, via improved performance and enhanced mood, but we did not find this. At least two of our design choices likely contributed to this lack of findings. First, participants were not specifically depleted before they encountered the relevant environment. This could have provided more space to observe restorative effects (though meta-analytic syntheses do not support this assumption: Stevenson et al. 2018), but was impractical given our ecologically valid approach in which measures were taken in situ and environmental exposure was real rather than administered virtually or via a screen. Said differently, we could not cleanly deplete participants immediately before immersing them in a relevant environment. Second, we prioritized tests that students might actually encounter—specifically, we used numerical and verbal reasoning tasks that are often part of employers' graduate recruitment tests. Although relevant to the study population, these tests were perhaps too broad to capture the cognitive outcomes specified by attention restoration theory. Researchers in this area typically use more precise tests of cognitive capacity, working memory, or attention, such as the backward digit span task (e.g., Berman et al. 2008; Ottosson and Grahn 2005) or sustained attention to response task (SART; Berto 2005). More precise measures might have been better suited to detect any consequences of restorative experiences for actual performance. That said, some reviews of the literature have suggested that cognitive effects of environmental exposure are less reliable than effects on self-reported restoration measures (e.g., Bowler et al. 2010). Our overall pattern of findings is consistent with this picture: effects were clearest on perceived restorativeness of the environment, more complex on self-reported emotion, and not observed on actual performance indicators. However, before concluding that environmental factors only matter for self-reported experiences and do not have further consequences for international students' outcomes on campus, it would be important to put the hypothesis to a fairer test, for example by using tests of cognitive capacity that more cleanly reflect attention restoration theory and that have most consistently revealed results in line with this theory (Stevenson et al. 2018).

Our design was also constrained, again for practical reasons, by the use of only two campus spaces, one majority and one minority. To fully explore the role of social meanings in shaping environmental experiences, and to permit generalizability, multiple examples of each space should ideally be used. We hope that this set of studies provides a basis for more detailed future explorations. Building on the multi-sensory nature of real-world environments, it would also be important—and interesting—for future research to further investigate potential interplay between physical and social environmental parameters. As evident in our pre-registration, later studies in the sequence intended to explore whether the social meaning of spaces not only shaped restorative perceptions, but also altered the experience of physical environmental intrusions, such as noise and crowding. Past research across a variety of settings has shown that identity factors can attenuate the negative consequences of environmental intrusions like noise and crowding (e.g., Alnabulsi and Drury 2014; Morton and Power 2023; Novelli et al. 2013; Shankar et al. 2013; Shayegh et al. 2017; Ysseldyk et al. 2021). Our analyses show that physical environmental parameters varied across the locations

used in this study, and across individual testing sessions, in ways that affected restorative experiences. Although we did not observe any higher-order interactions, for example, in which being in identity-consistent environments attenuated the negative impact of physical environmental intrusions, we also did not have the power to test such complex patterns. Future research should explore more systematically the interplay between social and physical environmental features and what these together mean for restorative experiences.

Although we pooled data across three experiments to maximize the power to test relationships of interest, each of our individual studies remained relatively small, and the overall power was still not optimal. In addition to this constraint, acculturation preferences among international students are likely to have been confounded with other relevant parameters, such as English language competence, which would be relevant for performance on the tests we administered. Reflective of this, host (and to a lesser extent home) orientation was weakly correlated with better (*vs.* worse) English test performance. We did not measure participants' English language competency before the experimental session and therefore could not control for this aspect, which might have given better resolution on the performance implications of environmental properties. Finally, although the choice of spaces in this study was guided by a desire to maximally differentiate social meaning while maintaining a degree of broad physical (i.e., architectural) similarity, there are many more spaces on campus that relate to the identities of international and other students. It would be very interesting to delve into the micro- and perhaps moment-to-moment experiences of campus spaces as students move through their daily lives. Future research of this kind could build on the evidence we have provided to conduct these more complete tests of restorative experiences on university campuses.

5 | Conclusion

Individual differences in acculturation orientation were found to shape international students' perceptions of campus spaces. Consistent with prior research on the benefits of being in identity-congruent spaces, we find that fit between an individual student's culturally-defined sense of self and the spaces they are in can provide a basis for restorative perceptions of the environment. In particular, international students oriented towards maintaining minority culture evaluated learning spaces associated with minority students as having more restorative potential than learning spaces dominated by the majority. Despite perceptions of the restorative value of identity-consistent spaces, we did not find consistent evidence that this translated into better academic performance or emotional recovery when taking tests. Further research should establish whether or not the effects of being in identity-consistent spaces extend beyond perceived restoration to other individually consequential outcomes. Nonetheless, the findings reported here highlight how the social properties of space in combination with identity-relevant individual differences shape psychological outcomes and encourage further research to elaborate the connections among individual, social, and physical aspects of environmental experience. Practically speaking, these findings attest to the role group-specific spaces can play in supporting positive experiences among the diverse students that inhabit today's multicultural campuses.

Acknowledgments

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Conflicts of Interest

The authors declare no conflicts of interest.

Endnotes

[1] We acknowledge that this level of reliability falls below the conventional standard of $\alpha \geq 0.70$. We have no explanation for this.

References

Alnabulsi, H., and J. Drury. 2014. "Social Identification Moderates the Effect of Crowd Density on Safety at the Hajj." *Proceedings of the National Academy of Sciences* 111, no. 25: 9091–9096. https://doi.org/10.1073/pnas.1404953111.

Beasley, M. A., and M. J. Fischer. 2012. "Why They Leave: The Impact of Stereotype Threat on the Attrition of Women and Minorities From Science, Math and Engineering Majors." *Social Psychology of Education* 15, no. 4: 427–448.

Berman, M. G., J. Jonides, and S. Kaplan. 2008. "The Cognitive Benefits of Interacting With Nature." *Psychological Science* 19, no. 12: 1207–1212. https://doi.org/10.1111/j.1467-9280.2008.02225.x.

Berry, J. W., J. S. Phinney, D. L. Sam, and P. Vedder. 2006. "Immigrant Youth: Acculturation, Identity, and Adaptation." *Applied Psychology* 55, no. 3: 303–332. https://doi.org/10.1111/j.1464-0597.2006.00256.x.

Berto, R. 2005. "Exposure to Restorative Environments Helps Restore Attentional Capacity." *Journal of Environmental Psychology* 25, no. 3: 249–259. https://doi.org/10.1016/j.jenvp.2005.07.001.

Bonaiuto, M., G. M. Breakwell, and I. Cano. 1996. "Identity Processes and Environmental Threat: The Effects of Nationalism and Local Identity Upon Perception of Beach Pollution." *Journal of Community & Applied Social Psychology* 6: 157–175. https://doi.org/10.1002/(SICI)1099-1298(199608)6:3<157::AID-CASP367>3.0.CO;2-W.

Bornioli, A., A. Birenboim, E. Druez, et al. 2023. "Environmental Appraisals in Outgroup Cultural Landscapes: The Role of Muslim Elements in Urban Settings." *Cities* 143: 104579.

Bowler, D. E., L. M. Buyung-Ali, T. M. Knight, and A. S. Pullin. 2010. "A Systematic Review of Evidence for the Added Benefits to Health of Exposure to Natural Environments." *BMC Public Health* 10, no. 1: 456.

Cheryan, S., A. N. Meltzoff, and S. Kim. 2011. "Classrooms Matter: The Design of Virtual Classrooms Influences Gender Disparities in Computer Science Classes." *Computers & Education* 57, no. 2: 1825–1835. https://doi.org/10.1016/j.compedu.2011.02.004.

Cheryan, S., V. C. Plaut, P. G. Davies, and C. M. Steele. 2009. "Ambient Belonging: How Stereotypical Cues Impact Gender Participation in Computer Science." *Journal of Personality and Social Psychology* 97: 1045–1060. https://doi.org/10.1037/a0016239.

Clack, B., J. Dixon, and C. Tredoux. 2005. "Eating Together Apart: Patterns of Segregation in a Multi-Ethnic Cafeteria." *Journal of*

Community & Applied Social Psychology 15, no. 1: 1–16. https://doi.org/10.1002/casp.787.

Curran, P. J., and A. M. Hussong. 2009. "Integrative Data Analysis: The Simultaneous Analysis of Multiple Data Sets." *Psychological Methods* 14, no. 2: 81–100.

Demes, K. A., and N. Geeraert. 2014. "Measures Matter: Scales for Adaptation, Cultural Distance, and Acculturation Orientation Revisited." *Journal of Cross-Cultural Psychology* 45, no. 1: 91–109. https://doi.org/10.1177/0022022113487590.

Diekman, A. B., M. Steinberg, E. R. Brown, A. L. Belanger, and E. K. Clark. 2017. "A Goal Congruity Model of Role Entry, Engagement, and Exit: Understanding Communal Goal Processes in STEM Gender Gaps." *Personality and Social Psychology Review* 21, no. 2: 142–175. https://doi.org/10.1177/1088868316642141.

Diener, E., and R. Biswas-Diener. 2008. *Happiness: Unlocking the Mysteries of Psychological Wealth*. USA: Blackwell Publishing. https://doi.org/10.1207/s15327752jpa4901_13.

Diener, E., D. Wirtz, W. Tov, et al. 2010. "New Well-Being Measures: Short Scales to Assess Flourishing and Positive and Negative Feelings." *Social Indicators Research* 97: 143–156. https://doi.org/10.1007/s11205-009-9493-y.

Duden, G. S., J. Reiter, C. Bauer, C. Haslinger, M. Mroz, and A. Rohmann. 2024. "'Knowing My Way Around' – The Role of Urban Spaces for Migrant Identity Content and Sense of Belonging in Germany." *Identity* 25, no. 1: 75–96. https://doi.org/10.1080/15283488.2024.2330909.

Ellemers, N., R. Spears, and B. Doosje. 2002. "Self and Social Identity." *Annual Review of Psychology* 53, no. 1: 161–186. https://doi.org/10.1146/annurev.psych.53.100901.135228.

Esposito, E., and J. Calanchini. 2022. "Examining Selective Migration as Attitudinal Fit Versus Gay Migration." *Journal of Experimental Social Psychology* 101: 104307. https://doi.org/10.1016/j.jesp.2022.104307.

Gaekwad, J. S., A. Sal Moslehian, and P. B. Roös. 2023. "A Meta-Analysis of Physiological Stress Responses to Natural Environments: Biophilia and Stress Recovery Theory Perspectives." *Journal of Environmental Psychology* 90: 102085.

Glasford, D. E. 2021. "Composition of Place, Minority Vs. Majority Group-Status, & Contextualized Experience: The Role of Level of Group Representation, Perceiving Place in Group-Based Terms, and Sense of Belonging in Shaping Collective Behavior." *PLoS ONE* 16, no. 9: 0253571. https://doi.org/10.1371/journal.pone.0253571.

Goh, J. X., J. A. Hall, and R. Rosenthal. 2016. "Mini Meta-Analysis of Your Own Studies: Some Arguments on Why and a Primer on How." *Social and Personality Psychology Compass* 10, no. 10: 535–549. https://doi.org/10.1111/spc3.12267.

Harper, S. R., and S. J. Quaye. 2007. "Student Organizations as Venues for Black Identity Expression and Development Among African American Male Student Leaders." *Journal of College Student Development* 48, no. 2: 127–144. https://doi.org/10.1353/csd.2007.0012.

Hartig, T. 2021. "Restoration in Nature: Beyond the Conventional Narrative." *Nature and Psychology: Biological, Cognitive, Developmental, and Social Pathways to Well-being* 14, no. 4: 89–151.

Hartig, T., K. Korpela, G. W. Evans, and T. Gärling. 1997. "A Measure of Restorative Quality in Environments." *Scandinavian Housing and Planning Research* 14, no. 4: 175–194. https://doi.org/10.1080/02815739708730435.

Herzog, T. R., P. Ouellette, J. R. Rolens, and A. M. Koenigs. 2010. "Houses of Worship as Restorative Environments." *Environment and Behavior* 42, no. 4: 395–419. https://doi.org/10.1177/0013916508328610.

Hopkins, N., S. D. Reicher, S. S. Khan, S. Tewari, N. Srinivasan, and C. Stevenson. 2015. "Explaining Effervescence: Investigating the Relationship Between Shared Social Identity and Positive Experience in Crowds." *Cognition and Emotion* 30, no. 1: 20–32. https://doi.org/10.1080/02699931.2015.1015969.

Inzlicht, M., and T. Schmader. 2012. *Stereotype Threat: Theory, Process and Application*. Oxford University Press.

Job Test Prep. 2016. *Setting Standards in Psychometric Test Preparation*. Retrieved from https://www.jobtestprep.co.uk/. Accessed on 18 December 2016.

Kaplan, R., and S. Kaplan. 1989. *The Experience of Nature: A Psychological Perspective*. UK: Cambridge University Press.

Kaplan, S. 1995. "The Restorative Benefits of Nature: Toward an Integrative Framework." *Journal of Environmental Psychology* 15, no. 3: 169–182. https://doi.org/10.1016/0272-4944(95)90001-2.

Kaplan, S., L. V. Bardwell, and D. B. Slakter. 1993. "The Museum as a Restorative Environment." *Environment and Behavior* 25, no. 6: 725–742. https://doi.org/10.1177/0013916593256004.

Kirby, T. A., and C. R. Kaiser. 2021. "Person-Message Fit: Racial Identification Moderates the Benefits of Multicultural and Colorblind Diversity Approaches." *Personality and Social Psychology Bulletin* 47, no. 6: 873–890. https://doi.org/10.1177/0146167220948707.

Kirby, T. A., M. Silva Rego, and C. R. Kaiser. 2020. "Colorblind and Multicultural Diversity Strategies Create Identity Management Pressure." *European Journal of Social Psychology* 50, no. 6: 1–14. https://doi.org/10.1002/ejsp.2689.

Kirby, T. A., J. A. Tabak, M. Ilac, and S. Cheryan. 2020. "The Symbolic Value of Ethnic Spaces." *Social Psychological and Personality Science* 11, no. 7: 867–878. https://doi.org/10.1177/1948550620913371.

Knight, C., and S. A. Haslam. 2010. "The Relative Merits of Lean, Enriched, and Empowered Offices: An Experimental Examination of the Impact of Workspace Management Strategies on Well-Being and Productivity." *Journal of Experimental Psychology: Applied* 16, no. 2: 158–172. https://doi.org/10.1037/a0019292.

Koen, J., and K. Durrheim. 2010. "A Naturalistic Observational Study of Informal Segregation: Seating Patterns in Lectures." *Environment and Behavior* 42, no. 4: 448–468. https://doi.org/10.1177/0013916509336981.

Lee, J. J., and C. Rice. 2007. "Welcome to America? International Student Perceptions of Discrimination." *Higher Education* 53, no. 3: 381–409. https://doi.org/10.1007/s10734-005-4508-3.

Liu, Q., Y. Wu, Y. Xiao, et al. 2020. "More Meaningful, More Restorative? Linking Local Landscape Characteristics and Place Attachment to Restorative Perceptions of Urban Park Visitors." *Landscape and Urban Planning* 197: 103763.

Meagher, B. R. 2016. "Perceiving Sacred Space: Religious Orientation Moderates Impressions of Religious Settings." *Environment and Behavior* 48, no. 8: 1030–1048. https://doi.org/10.1177/0013916515581626.

Meagher, B. R. 2018. "Deciphering the Religious Orientation of a Sacred Space: Disparate Impressions of Worship Settings by Congregants and External Observers." *Journal of Environmental Psychology* 55: 70–80. https://doi.org/10.1016/j.jenvp.2017.12.007.

Morton, T. A., A. M. van der Bles, and S. A. Haslam. 2017. "Seeing Our Self Reflected in the World Around Us: The Role of Identity in Making (Natural) Environments Restorative." *Journal of Environmental Psychology* 49: 65–77. https://doi.org/10.1016/j.jenvp.2016.11.002.

Morton, T. A., and S. A. Power. 2023. "Is It Safe for Us to Be Together Again? Identity, Trust, and Perceived Risk at Mass Events During the COVID-19 Pandemic." *Social Psychological and Personality Science* 15, no. 4: 19485506231179769.

Motyl, M., R. Iyer, S. Oishi, S. Trawalter, and B. A. Nosek. 2014. "How Ideological Migration Geographically Segregates Groups." *Journal of Experimental Social Psychology* 51: 1–14. https://doi.org/10.1016/j.jesp.2013.10.010.

Novelli, D., J. Drury, S. Reicher, and C. Stott. 2013. "Crowdedness Mediates the Effect of Social Identification on Positive Emotion in a Crowd: A Survey of Two Crowd Events." *PLoS ONE* 8, no. 11: e78983. https://doi.org/10.1371/journal.pone.0078983.

Ottosson, J., and P. Grahn. 2005. "A Comparison of Leisure Time Spent in a Garden With Leisure Time Spent Indoors: on Measures of Restoration in Residents in Geriatric Care." *Landscape Research* 30, no. 1: 23–55. https://doi.org/10.1080/0142639042000324758.

Ouellette, P., R. Kaplan, and S. Kaplan. 2005. "The Monastery as a Restorative Environment." *Journal of Environmental Psychology* 25, no. 2: 175–188. https://doi.org/10.1016/j.jenvp.2005.06.001.

Poynter, K. J., and N. J. Tubbs. 2008. "Safe Zones: Creating LGBT Safe Space Ally Programs." *Journal of LGBT Youth* 5, no. 1: 121–132. https://doi.org/10.1300/J524v05n01_10.

Proshansky, H. M. 1976. "Comment on Environmental and Social Psychology." *Personality and Social Psychology Bulletin* 2, no. 4: 359–363. https://doi.org/10.1177/014616727600200406.

Ramos, M. R., C. Cassidy, S. Reicher, and S. A. Haslam. 2016. "A Longitudinal Study of the Effects of Discrimination on the Acculturation Strategies of International Students." *Journal of Cross-Cultural Psychology* 47: 401–420. https://doi.org/10.1177/0022022116628672.

Ratcliffe, E., and K. M. Korpela. 2017. "Time- and Self-Related Memories Predict Restorative Perceptions of Favorite Places via Place Identity." *Environment and Behavior* 50, no. 6: 690–720. https://doi.org/10.1177/0013916517712002.

Sam, D. L., and J. W. Berry. 2010. "Acculturation: When Individuals and Groups of Different Cultural Backgrounds Meet." *Perspectives on Psychological Science* 5, no. 4: 472–481. https://doi.org/10.1177/1745691610373075.

Samura, M. 2016. "Remaking Selves, Repositioning Selves, or Remaking Space: An Examination of Asian American College Students' Processes of Belonging." *Journal of College Student Development* 57, no. 2: 135–150. https://doi.org/10.1353/csd.2016.0016.

Schmader, T., B. Major, and R. H. Gramzow. 2001. "Coping With Ethnic Stereotypes in the Academic Domain: Perceived Injustice and Psychological Disengagement." *Journal of Social Issues* 57, no. 1: 93–111.

Schmader, T., and C. Sedikides. 2018. "State Authenticity as Fit to Environment: The Implications of Social Identity for Fit, Authenticity, and Self-Segregation." *Personality and Social Psychology Review* 22, no. 3: 228–259. https://doi.org/10.1177/1088868317734080.

Schmitt, M. T., K. Davies, M. Hung, and S. C. Wright. 2010. "Identity Moderates the Effects of Christmas Displays on Mood, Self-Esteem, and Inclusion." *Journal of Experimental Social Psychology* 46, no. 6: 1017–1022. https://doi.org/10.1016/j.jesp.2010.05.026.

Shankar, S., C. Stevenson, K. Pandey, S. Tewari, N. P. Hopkins, and S. D. Reicher. 2013. "A Calming Cacophony: Social Identity Can Shape the Experience of Loud Noise." *Journal of Environmental Psychology* 36: 87–95. https://doi.org/10.1016/j.jenvp.2013.07.004.

Shayegh, J., J. Drury, and C. Stevenson. 2017. "Listen to the Band! How Sound Can Realize Group Identity and Enact Intergroup Domination." *British Journal of Social Psychology* 56, no. 1: 181–196. https://doi.org/10.1111/bjso.12175.

Stevenson, M. P., T. Schilhab, and P. Bentsen. 2018. "Attention Restoration Theory Ii: A Systematic Review to Clarify Attention Processes Affected by Exposure to Natural Environments." *Journal of Toxicology and Environmental Health, Part B* 21, no. 4: 227–268.

Szabó, Á., Z. Z. Papp, and L. A. Nguyen Luu. 2020. "Social Contact Configurations of International Students at School and Outside of School: Implications for Acculturation Orientations and Psychological Adjustment." *International Journal of Intercultural Relations* 77: 69–82. https://doi.org/10.1016/j.ijintrel.2020.05.001.

Tajfel, H., and J. C. Turner. 1979. "An Integrative Theory of Inter-group Conflict." In *The Social Psychology of Inter-group Relations*, edited by W. G. Austin and S. Worchel, 33–47. Monterey, CA: Brooks/Cole.

Taušová, J., M. Bender, R. Dimitrova, and F. van de Vijver. 2019. "The Role of Perceived Cultural Distance, Personal Growth Initiative, Language Proficiencies, and Tridimensional Acculturation Orientations for Psychological Adjustment Among International Students." *International Journal of Intercultural Relations* 69: 11–23. https://doi.org/10.1016/j.ijintrel.2018.11.004.

The JAMOVI Project. 2021. "Jamovi V. 1.6." *Computer Software* 46, no. 6: 1017–1022.

Trawalter, S., K. Hoffman, and L. Palmer. 2021. "Out of Place: Socioeconomic Status, Use of Public Space, and Belonging in Higher Education." *Journal of Personality and Social Psychology* 120, no. 1: 131–144. https://doi.org/10.1037/pspi0000248.

Turner, J. C., and P. J. Oakes. 1986. "The Significance of the Social Identity Concept for Social Psychology With Reference to Individualism, Interactionism and Social Influence." *British Journal of Social Psychology* 25, no. 3: 237–252. https://doi.org/10.1111/j.2044-8309.1986.tb00732.x.

Ulrich, R. S., R. F. Simons, B. D. Losito, E. Fiorito, M. A. Miles, and M. Zelson. 1991. "Stress Recovery During Exposure to Natural and Urban Environments." *Journal of Environmental Psychology* 11, no. 3: 201–230.

Walton, G. M., and G. L. Cohen. 2007. "A Question of Belonging: Race, Social Fit, and Achievement." *Journal of Personality and Social Psychology* 92, no. 1: 82–96. https://doi.org/10.1037/0022-3514.92.1.82.

Woodcock, A., P. R. Hernandez, M. Estrada, and P. W. Schultz. 2012. "The Consequences of Chronic Stereotype Threat: Domain Disidentification and Abandonment." *Journal of Personality and Social Psychology* 103, no. 4: 635–646.

Ysseldyk, R., S. A. Haslam, and T. A. Morton. 2016. "Stairway to Heaven? (Ir)Religious Identity Moderates the Effects of Immersion in Religious Spaces on Self-Esteem and Self-Perceived Physical Health." *Journal of Environmental Psychology* 47: 14–21. https://doi.org/10.1016/j.jenvp.2016.04.016.

Ysseldyk, R., T. Karamally, A. Kelly, T. A. Morton, and S. A. Haslam. 2021. "They'Re (Not) Playing Our Song: (Ir) Religious Identity Moderates the Effects of Listening to Religious Music on Memory, Self-Esteem, and Mood." *Journal of Applied Social Psychology* 51, no. 8: 838–849. https://doi.org/10.1111/jasp.12804.