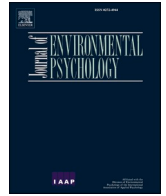




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Distant from others, but close to home: The relationship between home attachment and mental health during COVID-19

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ABSTRACT

The COVID-19 pandemic has had significant consequences for Americans' daily lives. Many people are spending more time in their homes due to work from home arrangements, stay at home orders, and closures of businesses and public gathering spaces. In this study, we explored how one's attachment to their home may help to buffer their mental health during this stressful time. Data were collected from a three-wave, longitudinal sampling (n=289) surveyed at baseline, two, and four weeks after. We found a clear relationship between an individual's attachment to home and positive mental health. Across all three waves, home attachment was negatively associated with symptoms of depression, anxiety, and stress. Furthermore, participants' home attachment at baseline was predictive of subsequent mental health two weeks after, which suggests that one's relationship to their home was particularly important during the initial onset of the national response to the outbreak. Predictors of home attachment included conscientiousness, agreeableness, and restorative ambience. Over the course of the study, kinship ambience also emerged as a predictor of home attachment. In the midst of increased mental health concerns and limited resources due to COVID-19, the home may buffer some individuals from depressive and anxiety-related symptoms by functioning as a source of refuge, security, and stability.

On January 20, 2020, the United States reported its first confirmed case of COVID-19 (Holshue et al., 2020). On March 13th, a national state of emergency was declared. Soon all major sports leagues were suspended, the borders with Canada and Mexico were closed, and Americans were instructed to avoid gatherings of 10 or more people. By the end of the month, the majority of U.S. states had issued stay-at-home orders to its residents. This sequence of events dramatically altered the population's day-to-day lives. Entire industries were forced to change the way in which they conduct business, individuals lost jobs or had to shift the ways in which they work, and opportunities to interact socially became severely limited and altered. These changes to normal life, coupled with the existential fear of a deadly and highly contagious disease, floundering economy, and an unknown future, have led many to worry about the psychological consequences of the pandemic (e.g., Kecmanovic, 2020; North, 2020). Writing about those placed in quarantine, Brooks et al. (2020) outline many potential negative psychological effects associated with being isolated in a particular location, ranging from post-traumatic stress symptoms to boredom, frustration, and anger. Corroborating this concern, a poll by the American Psychiatric Association (2020) in late March 2020 found that over a third of

Americans thought that the coronavirus was seriously affecting their mental health.

In light of the potential psychological costs associated with these pandemic-related stressors, it is important to better understand the factors that may help buffer individuals from these negative outcomes. One potential factor, which we investigate in the present paper, is people's relationship with their homes. Even under normal circumstances, the home plays a central role in the lives of occupants, influencing a variety of psychological processes related to cognition, identity, emotion, and behavior (Gosling et al., 2002; Graham et al., 2015; Meagher, 2020). However, under the stay-at-home orders issued across the nation, the amount of time spent and the number and types of behaviors most people engage in within this particular setting has substantially increased. Thus, the influence of this important person-place relationship can only be expected to have grown during this unusual period. In the present research, we explore this evolving dynamic by longitudinally assessing participants' home attachment (Altman & Low, 1992; Giuliani, 2003; Lewicka, 2010a; Scannell & Gifford, 2010) during the initial wave of this global crisis. In doing so, we investigate: (1) the factors associated with home attachment over this period of time, and

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(2) the extent to which home attachment predicts the subsequent mental health of occupants.

1. Attachment to home

Theorists across numerous academic disciplines have long acknowledged the powerful psychological significance of the home (e.g., Easthope, 2004; Graham et al., 2015; Porteous, 1976). Described as “the prototypical place” (Lewicka, 2010a, p. 211), the home is much more than a mere physical space or residence. Rather, descriptions of home are typically characterized by their relational, psychological properties, such as personal control, privacy, and warmth (Smith, 1994a, 1994b). These places help fulfill many needs in the lives of their occupants, including self-expression (Gosling et al., 2002), maintaining family and social relationships (Lohmann et al., 2003; Orathinkal & Vansteenkoven, 2006), and scaffolding habitual behavior (Edney, 1976). It is therefore not surprising that people tend to feel very strong emotional bonds to their homes. In fact, studies assessing the strength of people’s attachment to places at different geographic scales have reliably found that people report the strongest feelings of attachment to their homes (relative to the buildings, neighborhoods, or cities in which they also live; Hidalgo & Hernández, 2001; Lewicka, 2010b).

Attachment to one’s home entails all three of the psychological processes outlined in Scannell and Gifford’s (2010) tripartite model of place attachment. Individuals form affective bonds with their homes, generally viewing it as a place of emotional centering that facilitates experiences of restoration (Meagher, 2016; Staats, 2012) and emotion regulation (Gosling et al., 2002, 2008; Graham et al., 2015). Attachment to home also entails cognitive elements, particularly those associated with identity reinforcement (Proshansky et al., 1983). In fact, empirical evidence demonstrates that homes tend to reflect the characteristics (e.g., personality traits) of their occupants (Gosling et al., 2002, 2008). Finally, attachment to home also involves behavioral elements—the chief among them being proximity maintenance. Descriptive and qualitative studies reliably find that homes are conceptualized as places of refuge and safety (Dahlin-Ivanoff et al., 2007; Easthope, 2004; Mallett, 2004; Roush & Cox, 2000). As a consequence, many people desire to stay home in response to physical danger (e.g., when people choose not to evacuate; Billig, 2016; Druzhinina & Palma-Oliveira, 2004) and experience intense separation anxiety when forced to leave their homes (Anthony, 1997; Cox & Perry, 2011; Silver & Grek-Martin, 2015).

2. Predictors of home attachment

Although people by and large tend to show some degree of attachment to their home, such an emotional bond is not universal. Because attachment represents a person-place relationship, attributes of both the person and the place should be relevant in predicting the likelihood of attachment forming. In fact, decades of research have identified a number of individual factors positively associated with place attachment, including length of residence (Jorgensen & Stedman, 2006; Kelly & Hosking, 2008; Nielsen-Pincus et al., 2010; Windsong, 2010), home ownership (Brown et al., 2003; Ringel & Finkelstein, 1991), and the strength of one’s social ties (Lewicka, 2010; Mesch & Manor, 1998; Scopelliti & Tiberio, 2010).

Nevertheless, one’s home has a number of singular attributes, relative to its occupant, that suggest some unique factors and processes may be involved in increasing (or decreasing) feelings of attachment. Unlike people’s relationship with large-scale places (e.g., neighborhoods or cities), the home is a setting over which one has distinctly high levels of control. As a result, people regularly alter, adapt, and create home environments in ways that directly facilitate both affective and identity-formation processes. This process of *niche construction* (Costall, 1995; Heft, 2007; Withagen & van Wermeskerken, 2010) entails changing the physical environment in ways that scaffold both the desired and habitual behaviors of occupants. Personalization can therefore lead to a home

environment that better reflects the needs, priorities, and behavioral tendencies of the resident. This process is evidenced in research that has found that particular personality traits, such as openness and conscientiousness, are reliably associated with certain qualities of the resident’s environment (Gosling et al., 2002, 2008; Horgan et al., 2019; Nasar & Devlin, 2011; Perez-Lopez et al., 2017).

The capacity to alter the environment suggests that, through their actions, occupants may be able to more or less successfully create homes that elicit feelings of attachment. For example, Harris et al. (1996) found that attachment to the home was higher when occupants had the capacity to regulate their privacy with respect to other family members. This result suggests that dividing and designating particular spaces within the home could enhance one’s emotional bond to it by facilitating feelings of autonomy and control. Conversely, experiences within the home can also make one’s place of residence become a source of stress, dissatisfaction, or even danger (Manzo, 2005). High levels of clutter, for example, are associated with both lower levels of attachment and lower well-being (Roster, 2016). Feminist perspectives on the concept of home (e.g., Ehrenreich & English, 1978)) highlight the fact that gender stereotypes and inequalities in the division of domestic labor can ultimately create living spaces that are themselves stressful. Consistent with this expectation, Anthony (1997) found that many stressors related to the home, such as expectations about housekeeping, a lack of space, and house payments, were acknowledged as strong contributors to interpersonal conflict in the lead up to divorce. Naturally, issues related to the home can prevent the occupant from forming positive emotional bonds to the place. Instead of being a place that the occupant strongly identifies with, the residence may feel more, as one participant described it, like “his house, not our house” (p. 8).

More recently, Graham et al. (2015) have articulated another way in which individuals alter their home environments: by designing, decorating, or furnishing rooms and places in ways that elicit particular *ambiances*, viz., evoking certain emotions and feelings. In doing so, the act of personalizing one’s home functions primarily as a means of regulating one’s thoughts and feelings (Gosling et al., 2008). In an analysis exploring the various psychological functions served by one’s home, Graham et al. (2015) identified several different types of ambiances people seek to create. For example, particular places in the home may be altered in ways that evoke feelings of privacy and rejuvenation. Having access to private spaces that are away from sources of stress, such as bedrooms or studies, may help facilitate experiences of psychological restoration (Staats, 2012). In contrast, other places in the home may be designed explicitly to elicit feelings of excitement and stimulation through the use of games, technology, or music, thereby satisfying desires for sensation-seeking (Zuckerman et al., 1978). Alternatively, certain people may prioritize creating spaces that evoke feelings of family and togetherness in, for example, their living rooms and dining rooms. Critically, when design and personalization is done effectively, creating these types of ambiances will ultimately allow the home to help satisfy a variety of basic psychological needs, including feelings of autonomy, arousal, and connectedness.

Of course, one would expect that the homes of different individuals vary in terms of these ambiances. Moreover, one’s capacity to create a desired ambiance will also vary dramatically. For example, the capacity to create a restorative space will be limited by those with whom one lives, both in terms of the quantity and type of people with whom one cohabits. Additionally, not everyone has the ability to create a desirable home environment. People of lower socio-economic status have fewer resources to renovate and redesign, are more likely to be renters and therefore limited by landlord-imposed restrictions, and reside in neighborhoods that are inherently less safe, less private, and less aesthetically pleasing. Thus, homes will vary dramatically from person to person in terms of the emotions they elicit, and they therefore will also vary in terms of actually being effective at satisfying a variety of basic psychological needs.

Researchers have yet to empirically investigate whether a home’s

capacity to elicit these different types of ambiances is associated with higher levels of attachment. This gap is notable, as place attachment has primarily been conceptualized and studied in relation to people's emotions (e.g., Giuliani, 2003; Hidalgo & Hernández, 2001; Lewicka, 2008; Manzo, 2003, 2005). Addressing this question is likely particularly relevant in the present context of a global pandemic, during which access to other places are limited and stressors are high. If the home represents the key location in which one's psychological needs will or will not be met, creating spaces within it that evoke desired emotions that help to satisfy such needs may be a particularly valuable activity that will ultimately bond individuals to it. We anticipate that a home that facilitates feelings of psychological restoration would be particularly valuable during a time of intense anxiety. However, the pandemic also had additional consequences, including restrictions on travel, gatherings, and many sources of entertainment, thus also making people more susceptible to social isolation and boredom. We therefore expect that having homes that satisfy both social (i.e., kinship) and entertainment (i.e., stimulation) needs will also predict a stronger bond to the space.

3. Consequences of home attachment

The concept of attachment, with its roots in developmental psychology (Ainsworth et al., 1978; Bowlby, 1969, 1973, 1988), was first used to account for the apparent innate motivation found in young children to form strong emotional bonds with particular individuals (attachment figures) to whom they would seek out during times of stress. In this way, the attachment system is conceptualized as functioning primarily as a means of emotion regulation—children with secure caregiver attachments have access to a *safe haven* when distressed and a *secure base* in which to feel safe. As a consequence, the assessment of a child's attachment style is based primarily on observing the child's degree of emotional distress under different social conditions (Ainsworth et al., 1978).

If place attachment functions in a similar way, it is reasonable to expect that there should also be emotional consequences to having high (or low) home attachment. Certainly, individuals report that being in the places to which they are attached provides psychological benefits, such as improved mood, feelings of restoration, and a greater sense of belonging (Korpela, 2003; Korpela & Hartig, 1996; Scannell & Gifford, 2017b). The home in particular tends to be associated with positive memories, a sense of belonging, and physical and psychological comfort, relative to other important places (Scannell & Gifford, 2017b). Moreover, existing research has demonstrated a reliable, positive association between measures of subjective well-being and place attachment, both at large geographic scales (e.g., Afshar et al., 2017; Rollero & De Piccoli, 2010) and at the level of the home (Evans et al., 2002; Junot et al., 2018; Roster et al., 2016; Wiles et al., 2017).

Nevertheless, there remain limitations regarding our understanding of how home attachment relates to psychological health. First, the well-established relationship between place attachment and well-being is based largely on cross-sectional studies. As a consequence, one cannot know from these correlational findings whether well-being is a consequence of attachment, or whether those high in well-being are more likely to create places to which they are attached. Although some initial laboratory-based experimental evidence suggests a causal role for place attachment (Scannell & Gifford, 2017a), evaluating the evolving dynamic between these two variables over time in an ecologically valid context would provide further clarification regarding their relationship.

Second, although measures of general well-being provide a broad assessment of an individual's psychological health, researchers have yet to assess the relationship between place attachment and specific mental health outcomes or symptoms. The current COVID-19 pandemic in particular represents a period with a large number of external stressors, and individuals at risk of mental health disorders (e.g., depression, anxiety) are particularly vulnerable. Mental illness, particularly depression, is among the leading causes of disability in the United States

(Murray et al., 2012). Thus, it is important to identify novel opportunities for improving mental health. Whether the home, functioning as a safe haven and secure base, can successfully buffer individuals from the very real psychological costs associated with mental health disorders is an important question to address. This is especially important during a time when people are spending more time in their homes and cannot easily access traditional mental health treatments and buffers, such as in-person psychotherapy, exercise, and social support.

4. The present study

The goal of the present study was to investigate attachment to home during the initial wave of the global COVID-19 pandemic. This period, during which hours spent at home were substantially higher and the mental health of the general population was particularly at risk, represents a unique and important span of time in which to evaluate both people's relationships with their homes and the potential psychological consequences of those relationships. Moreover, if people's attachment to their home is in fact able to buffer them from negative mental health symptoms, it is clearly valuable to determine what factors are most predictive of this resident-home relationship.

Employing a longitudinal analysis, the current research investigates a pair of questions related to participants' home attachment during the existential threat of a global pandemic:

- (1) What home ambiances are predictive of attachment during this prolonged period of social distancing? In particular, we seek to evaluate whether particular ambiances associated with psychological need satisfaction (e.g., restoration, kinship, stimulation) predict greater attachment, while controlling for participant-level sociodemographic and dispositional variables.
- (2) To what extent does home attachment predict the mental health of residents during this time? Specifically, our longitudinal analysis allows us to evaluate whether initial home attachment is associated with *changes* in mental health symptoms, controlling for the individual's initial mental health.

5. Method

5.1. Participants

Three-hundred U.S. adults aged 19 to 72 (56% male; $M_{\text{age}} = 37.36$, $SD = 11.62$) were recruited for a study entitled "Personality, Home, and Health" through Amazon's Mechanical Turk. This sample size was chosen to allow for the detection of anticipated small to medium fixed effects ($f^2 = 0.05$), based on previous studies assessing home attachment and subjective well-being (e.g., Junot et al., 2018; Roster et al., 2016). Eleven participants were dropped from the dataset for failing attention-checks, leaving a total sample of 289 people. The sample was predominantly Caucasian (82%), but also included participants identifying as Hispanic (5%), Asian/Pacific Islander (5%), Black or African American (4%), and mixed race (4%). In terms of home characteristics, 82% of participants reported residing with at least one other person ($M = 2.01$, $SD = 1.49$): 57% with a spouse or partner, 35% with a child or children, 17% with some other relative, and 8% with a roommate(s).

Participants were contacted two weeks after this initial data collection (Wave II) and then again at four weeks (Wave III) to take part in a follow-up questionnaire. Out of the original sample, 255 unique participants successfully completed at least one of the subsequent questionnaires: 231 in Wave II (80%) and 210 in Wave III (73%). At each wave of the study, all participants provided informed consent online and were compensated \$1.

5.2. Measures

The study received ethics approval by Hope College's Human

Subjects Review Board. At each wave of this study, participants completed a series of scales assessing: (a) their impressions of home and (b) their mental and physical health. The primary predictor of interest, attachment to home, was assessed with 12 items adapted from Scannell and Gifford's (2013, 2017a) place attachment scale ($\alpha = 0.87$). This measure includes items tapping into the cognitive (e.g., "My home reflects the type of person I am"), affective (e.g., "I feel happiest when I'm in my home"), and behavioral (e.g., "My home is the best place for doing the things that I enjoy most") components of the construct. Participants were also asked to evaluate the ambience of their home by rating the extent to which it, in its current condition, evokes particular emotions or feelings. Drawing on the categories developed by Graham et al. (2015), participants provided judgments of their home on four ambiances using a 5-point scale ("not at all" to "extremely"): *restoration* ($\alpha = 0.69$; "tranquility," "rejuvenation," "privacy"), *kinship* ($\alpha = 0.83$; "togetherness," "community," "friendship"), *stimulation* ($\alpha = 0.82$; "fun," "excitement," "entertaining"), and *productivity* ($\alpha = 0.49$; "productivity," "quiet," "creativity"). Because of the low reliability for productivity items, we excluded this variable in our analysis.

Participants' mental health was assessed in three ways; for each, participants were asked to think about their experiences over the past seven days. First, depressive symptoms were assessed using the 10-item Center for Epidemiologic Studies Depression Scale Revised (CESD-R-10; Eaton et al., 2004), with total scores ranging from 0 to 30 ($\alpha = 0.77$). Second, symptoms of anxiety were measured using the 7-item Generalized Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006), which ranges from 0 to 21 ($\alpha = 0.94$). The CESD-R-10 and the GAD-7 are commonly used scales that provide measures of symptoms of depression and anxiety, respectively, as well as cutoff scores indicating likely diagnosis. Third, self-reported stress was measured with the 10-item Perceived Stress Scale (PSS; Cohen et al., 1983), which ranges from 0 to 30 ($\alpha = 0.84$).

To evaluate their feelings and behaviors specifically associated with COVID-19, participants were also asked how concerned they were with the coronavirus, and to what extent the coronavirus had changed their normal, day-to-day life, each on a 5-point scale ("not at all" to "extremely"). Participants who indicated that they lived with at least one other person were also asked how the amount of time they have spent with those people compared to the previous month, using a 5-point bipolar scale ("much less time" to "much more time"). Finally, participants were asked to estimate the number of hours in a typical weekday during the past week that they spent: (a) at home awake, (b) at home sleeping, and (c) outside the home.

In addition to these measures taken at each wave of the study, in Wave I participants also completed the ten-item personality inventory (Gosling et al., 2003), assessing each of the Big Five Personality factors, and were asked to estimate the number of hours in a typical weekday during the months of January/February that they spent at home awake, at home sleeping, and outside the home.

6. Results

6.1. The trajectory of attitudes, behaviors, and symptoms over time

Descriptive statistics for measured constructs collected across the three waves are shown in Table 1. As anticipated, in light of national and state-level travel restrictions, participants at the initial wave reported spending more hours at home awake, $t(286) = 15.09, p < .001$, and fewer hours away from home, $t(286) = 15.64, p < .001$, than during the previous months of January and February. T-tests were used to compare participants who did and did not participate in at least one followup wave on key constructs. Comparisons are shown in Table 2. Due to differences on key variables including aspects of home ambience and mental health, all hypothesis testing was conducted on the full sample as well as the subset of participants who participated in at least one followup. Because no differences were found between models run in each

Table 1
Descriptive statistics across three waves of data collection.

	January/ February Estimate (Wave I)	Wave I: Week of 3/ 23 (N = 289)	Wave II: Week of 4/6 (N = 236)	Wave III: Week of 4/ 20 (N = 221)
Age	–	37.41 (11.56)	37.65 (11.46)	37.59 (11.51)
Gender	–	54% male	55% male	50% male
Hours home awake	10.04 (4.11)	13.62 (3.92)	14.35 (3.43)	14.10 (3.39)
Hours home sleeping	7.65 (1.56)	7.88 (2.09)	7.55 (1.62)	7.68 (1.56)
Hours outside home	6.32 (4.10)	2.50 (3.46)	2.10 (3.31)	2.22 (3.25)
Coronavirus concern	–	3.67 (1.11)	3.71 (1.15)	3.50 (1.19)
Change in day- to-day life	–	3.60 (1.22)	3.65 (1.15)	3.62 (1.11)
More time spent with cohabitants	–	3.83 (1.09)	3.92 (1.13)	3.98 (0.97)
Attachment to home	–	5.40 (1.10)	5.36 (1.07)	5.51 (1.01)
Ambience	–	–	–	–
Restoration	–	3.66 (0.96)	3.66 (0.94)	3.71 (1.00)
Kinship	–	3.11 (1.14)	3.12 (1.16)	3.10 (1.13)
Stimulation	–	3.17 (1.01)	3.06 (1.02)	3.10 (0.94)
Depressive symptoms	–	9.26 (6.65)	8.33 (6.82)	8.10 (6.80)
General anxiety symptoms	–	6.20 (6.02)	5.25 (5.73)	4.61 (5.14)
Perceived stress	–	14.79 (8.51)	13.37 (8.55)	13.13 (8.11)

Table 2
Comparison of key variables that showed differences between participants with and without data from at least one followup wave.

	Participants without followup data	Participants with at least one followup	t-test
# Residents living in the home	2.62 (1.41)	1.98 (1.44)	2.45, $p = .007$
Conscientiousness	5.09 (1.23)	5.73 (1.24)	$-2.82, p = .005$
Hours away from home, Wave 1	3.47 (3.78)	2.37 (3.40)	1.75, $p = .041$
Kinship	3.70 (1.04)	3.04 (1.13)	3.21, $p < .001$
Stimulation	3.79 (0.99)	3.08 (0.98)	3.95, $p < .001$
Depressive symptoms	11.74 (7.04)	8.93 (6.54)	2.33, $p = .01$
General anxiety symptoms	8.68 (6.35)	5.87 (5.91)	2.58, $p = .005$

sample, only models tested using the full sample are reported below.

Growth curve analyses were used to observe changes in key variables over the three waves of the study. The time course of each key variable was modeled with a random slope and fixed intercept using maximum likelihood estimation. There was a significant effect of time on depression symptom scores indicating that depression scores decreased over the waves of the study ($b = -0.30, p = .03$; AIC = 4269). Similarly, anxiety scores decreased over the waves of the study ($b = -0.56, p < .001$; AIC = 4129), as did perceived stress scores ($b = -0.61, p = .001$; AIC = 4586). Identifying these changes in mental health outcomes justifies further analyses of what predicts these changes. Concern about the

coronavirus decreased over the waves of the study ($b = -0.10, p = .003$; AIC = 1940). Other key variables did not exhibit systematic change.

6.2. Factors predicting home attachment

In order to investigate what person-based and ambience-based factors were most strongly associated with feelings of home attachment, we employed a series of three hierarchical multilevel models. In each, time was estimated as a random effect with an autoregressive covariance structure. Details of each model are presented in Table 3. In Model 1, fixed effects were estimated for person-based factors related to covariates including demographics (i.e., age, gender, and number of cohabitants) and the Big Five Personality traits. Relative to a null model, these fixed effects explained approximately 16% of the variance in home attachment, $pseudo-R^2 = 0.157$. Statistically significant effects were observed for age, agreeableness, and conscientiousness. In Model 2, the participants' evaluation of their home in terms of the three ambiances were added to the model. These factors explained an additional 12% of the variance, $\Delta pseudo-R^2 = 0.115$. Attachment to home was positively and significantly associated with all three of the tested ambiances.

To evaluate whether the relationship between home attachment and these factors changed over the course of the data collection period, Model 3 was tested with the addition of time by variable interaction effects for each variable in the model. The only variable found to interact with time was the home's kinship ambience (See Table 3). As can be seen in the simple slopes shown in Fig. 1, the relationship between home attachment and kinship ambience grew over the course of the study, $b_{Time1} = 0.03, t(419) = 0.66, p = .506, b_{Time2} = 0.09, t(419) = 2.14, p = .033, \text{ and } b_{Time3} = 0.16, t(419) = 3.36, p = .001$.

6.3. The influence of home attachment on mental health

Home attachment was negatively associated with symptoms of poor mental health at all three waves of the study. A preliminary analysis of zero-order correlations demonstrated statistically significant correlations between home attachment and depressive symptoms, anxiety symptoms, and stress, which are shown in Table 4.

To further analyze the relationship between home attachment and mental health symptoms over time, we estimated a set of three cross-lagged panel models (Greenberg & Kessler, 1981). In each, the R package lavaan (Rosseel, 2012) was employed to evaluate both the

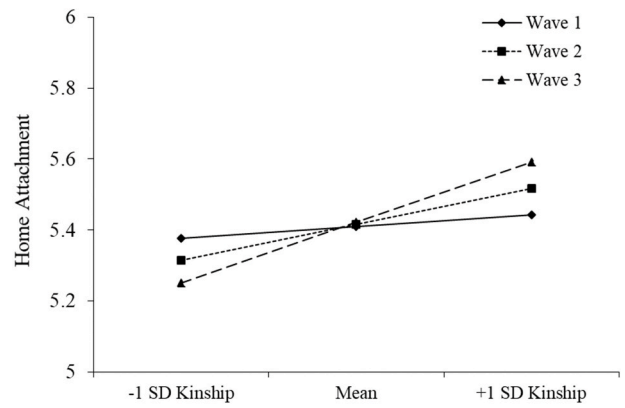


Fig. 1. Simple slopes demonstrating the interaction between study wave and reported kinship ambience, predicting participants' attachment to home.

Table 4
Zero-order correlations of home attachment and mental health.

	Time 1	Time 2	Time 3
Depressive symptoms	-.270, $p < .001$	-.321, $p < .001$	-.310, $p < .001$
Anxiety symptoms	-.180, $p = .002$	-.222, $p = .001$	-.202, $p = .003$
Perceived stress	-.288, $p < .001$	-.344, $p < .001$	-.339, $p < .001$

synchronous and asynchronous association between home attachment and mental health (i.e., depressive symptoms, anxiety symptoms, and stress) using structural equation modeling. The advantage of this design is that it estimates both the consistency of each variable's measurement (i.e., the inertial effect of a variable at time one on the same variable at time two), as well as potential reciprocal effects between variables (i.e., the influence of a variable at time one on another variable at time two, and vice versa). Because not all participants completed all three waves of data collection, full information maximum likelihood estimation was used to correct for missing data.

The three tested models are shown in Fig. 2. In all three models, there is evidence of an initial buffering influence of home attachment on subsequent mental health symptoms. Controlling for both inertial effects and their contemporaneous relationship, home attachment at time one

Table 3
Hierarchical multilevel models predicting home attachment.

	Model 1			Model 2			Model 3		
	b	β	t-test, 95% CI	b	β	t-test, 95% CI	b	β	t-test, 95% CI
Age	.01	.14	2.47*, [.002,.022]	.01	.09	1.87***, [-.0004,.016]	.01	.09	1.90, n.s., [.009,.018]
Gender	.03	.02	0.51 n.s., [-.085,.145]	.06	.04	1.15 n.s., [-.041,.157]	.10	.04	1.78, n.s., [-.011,.208]
# Residents	-.03	-.03	-0.82 n.s., [-.091,.037]	-.07	-.09	-2.29*, [-.126,-.010]	-.05	-.08	-1.46, n.s., [-.117,.017]
Conscientiousness	.20	.25	4.02***, [.104,.303]	.17	.21	3.98***, [.087,.258]	.19	.21	3.99***, [.097,.285]
Agreeableness	.15	.21	3.38***, [.064,.243]	.12	.15	2.98**, [.039,.193]	.11	.15	2.51*, [.024,.193]
Extraversion	-.03	-.05	-0.92 n.s., [-.101,.037]	-.05	-.08	-1.54 n.s., [-.107,.013]	-.06	-.07	-1.70, n.s., [-.124,.009]
Openness	-.02	-.03	-0.48 n.s., [-.102,.062]	-.05	-.08	-1.41 n.s., [-.121,.020]	-.07	-.08	-1.69, n.s., [-.145,.011]
Neuroticism	.04	.07	0.89 n.s., [-.047,.123]	.06	.10	1.56 n.s., [-.015,.130]	.04	.10	1.02, n.s., [-.039,.122]
Kinship				.09	.11	2.90**, [.030,.158]	.03	.10	0.78, n.s., [-.051,.118]
Stimulation				.14	.13	3.81***, [.066,.207]	.16	.13	3.36***, [.066,.251]
Restoration				.28	.26	8.52***, [.215,.345]	.29	.27	6.69***, [.203,.373]
Age X time							-.001	-.01	-.53, n.s., [-.005,.003]
Gender X time							-.05	-.04	-1.90, n.s., [-.095,.002]
# Residents X time							-.02	-.02	-0.92, n.s., [-.055,.020]
Conscientiousness X time							-.02	-.02	-0.98, n.s., [-.061,.020]
Agreeableness X time							.01	.01	0.38, n.s., [-.029,.044]
Extraversion X time							.01	.02	0.93, n.s., [-.015,.042]
Openness X time							.01	.02	0.84, n.s., [-.019,.047]
Neuroticism X time							.02	.02	0.99, n.s., [-.017,.052]
Kinship X time							.06	.06	2.10*, [.004,.122]
Stimulation X time							-.02	-.02	-.60, n.s., [-.094,.050]
Restoration X time							-.01	<.001	-.22, n.s., [-.063,.051]

Note. *** $p < .001$, ** $p < .01$, * $p < .05$.

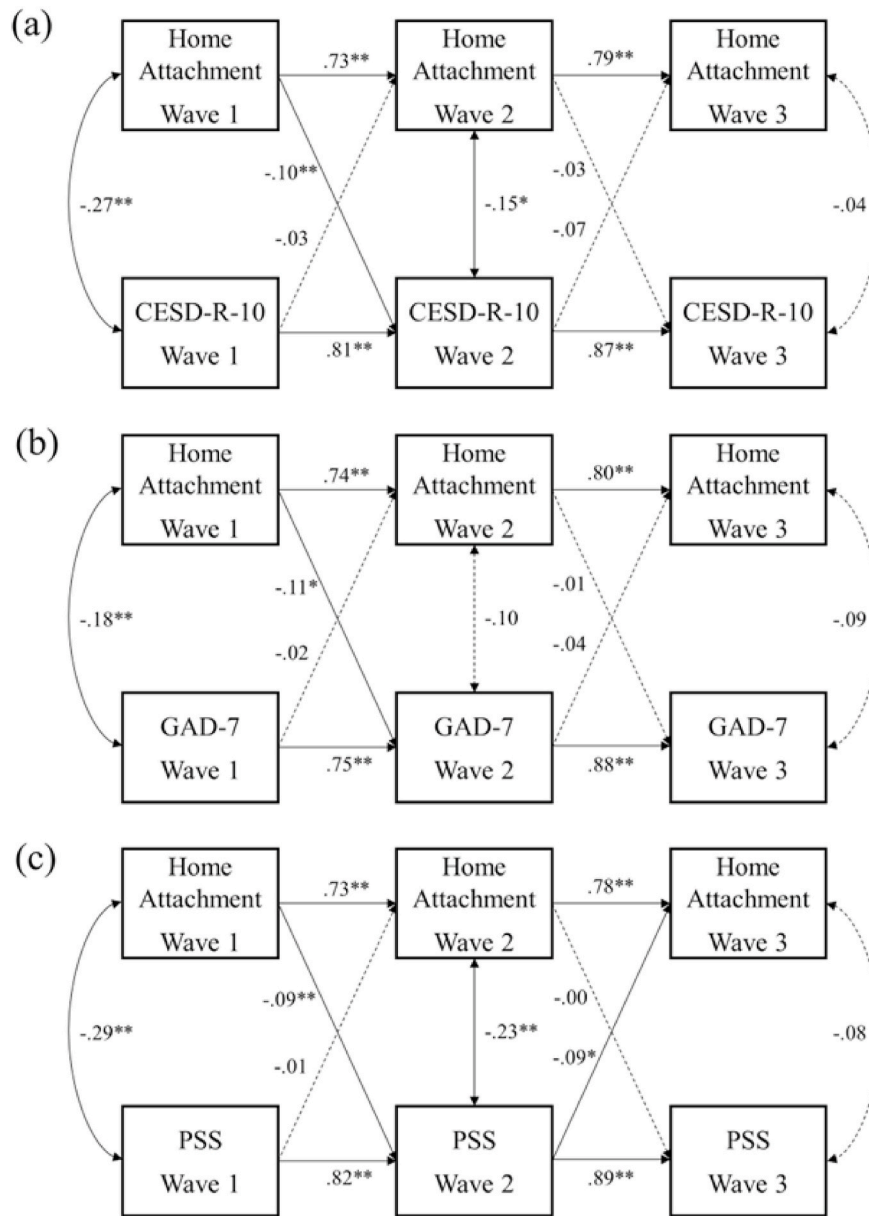


Fig. 2. Standardized coefficients for cross-lagged panel analyses, investigating the relationship between home attachment and (a) CESD-R-10, (b) GAD-7, and (c) PSS. ** $p < .01$, * $p < .05$.

had a statistically significant negative influence on time two depression, $\beta = -.10, p = .004, 95\% \text{ CI}[-.18, -.03]$, anxiety, $\beta = -.11, p = .010, 95\% \text{ CI}[-.19, -.03]$, and stress, $\beta = -.09, p = .009, 95\% \text{ CI}[-.16, -.02]$. However, these effects were not statistically significant from time two to time three. Interestingly, a reciprocal dynamic was observed between home attachment and perceived stress. Although time one home attachment was predictive of time two stress, stress at time two was a statistically significant predictor of home attachment at time three, $\beta = -.09, p = .037, 95\% \text{ CI}[-.18, -.01]$.

7. Discussion

The present study found a clear relationship between an individual's attachment to their home and positive mental health. Across all three waves of this study, home attachment was negatively associated with symptoms of depression, anxiety, and stress. This finding is particularly notable in light of its context. At a time when individuals are limited in terms of their access to work, recreational, educational, and public

settings, one's home will necessarily take on a uniquely important role in daily life and subsequent mental well-being. Previous research has demonstrated that people tend to believe that their homes are emotionally restorative (Dahlin-Ivanoff et al., 2007; Easthope, 2004; Mallett, 2004; Roush & Cox, 2000; Smith, 1994a, 1994b). The present findings suggest that these beliefs can, in fact, be accurate, provided that residents have created a home environment to which they are strongly attached. For some individuals, having the ability to directly create, design, and arrange their homes in ways that reflect their identity, facilitates positive emotional experiences, and affords desired behaviors can be an important part of maintaining positive mental health. However, it is also clear from this study that there is a great deal of variability in attachment to home, and for many people the home is not a place that elicits positive emotional experiences. Being restricted to this type of environment, on the other hand, will no doubt exacerbate the challenges of coping with the stressors of this pandemic.

Our dynamic analysis allowed us to investigate how the connection between attachment and mental health changed over the month of data

collection. Although there is some initial experimental evidence indicating that visualization of attached places can buffer threats to self-esteem and belonging (Scannell & Gifford, 2017a), the ongoing directional influence between place attachment and psychological well-being has not been widely studied, particularly in an ecologically valid context. The current study found that participants' home attachment at time one was predictive of subsequent mental health at time two, thus providing supportive evidence that home attachment can contribute to positive mental health outcomes. It is notable that this association was found while controlling for mental health at time one; thus, home attachment predicted short-term changes in mental health, which are generally quite difficult to predict in non-clinical samples. However, by time three, their relationship was explained entirely by their association at the previous time-points. This finding suggests that one's relationship to home was particularly important during the initial onset of the national response to the outbreak (i.e., when travel restrictions were first being set and people were making adjustments to a new day-to-day routine). By time three, any changes in mental health were the result of additional, non-measured constructs.

Interestingly, the connection between stress and home attachment was found to be bi-directional. That is, although initial home attachment was predictive of subsequent stress, stress was itself predictive of subsequent home attachment. This finding highlights the transactional and relational properties of the resident-home relationship, in which the physical setting comes to both reflect and reinforce the attributes of its occupants (Meagher, 2020). Over the course of the month of data collection, participants will have inevitably altered their homes in a variety of ways, both explicitly (e.g., rearranging furniture, decorating) and implicitly (e.g., failing to clean). These patterns of activity will ultimately impact subsequent attitudes and behaviors (Roster et al., 2016). For example, effective self-regulation often involves engaging in *prospective self-control* by creating an environment that affords desired behaviors and inhibits undesirable behaviors (Fujita, 2011; Trope & Fishbach, 2005). Ultimately, in the midst of this pandemic, experiencing high levels of stress seems to have dampened the positive emotional bonds many people had towards their home.

In addition to studying the relationship between home attachment and mental health, we also investigated what factors were predictive of higher home attachment. As articulated by previous theorists (Lewicka, 2010a; Scannell & Gifford, 2010), place attachment emerges from the dynamics of a person-place relationship. Thus, we sought to investigate the effect of relational qualities (i.e., ambiances), while controlling for the qualities of the person (i.e., personality). Of the control variables we tested, two personality factors were found to be positively associated with home attachment. The first, conscientiousness, captures the extent to which an individual is high in self-discipline, self-control, and organization. Its association with home attachment in the current analysis is consistent with the results of a pair of previous studies. Gosling et al. (2002) found that individuals high in conscientiousness are more likely to have living spaces and offices that are clean, free of clutter, and in good condition. At the same time, highly cluttered and disorderly home environments are associated with lower attachment and well-being (Roster et al., 2016). Thus, it seems likely that highly conscientious people create and maintain homes that facilitate the production of positive affective, cognitive, and behavioral bonds toward the place.

The second personality factor associated with home attachment was agreeableness, capturing an individuals' warmth and kindness. Interestingly, previous research has found little difference between the environments owned by those high and low on this trait (Gosling et al., 2002), suggesting that differences in home attachment are unlikely to be rooted in the physical place itself. Rather, the interpersonal nature of this trait suggests that their positive connection to home was likely based on the social relationships present in this place. In fact, high agreeableness is associated with a number of positive interpersonal behaviors, including helping (Graziano et al., 2007), effective emotion regulation (Tobin et al., 2000), and constructive conflict resolution

(Jensen-Campbell & Graziano, 2001). As a consequence, agreeableness is a strong predictor of relationship satisfaction (Dyrenforth et al., 2010), a fact likely reflected in their interpersonal processes with cohabitants.

Of particular interest for the present study, participants were also asked to evaluate their homes in terms of *ambience*, i.e., the extent to which it evokes particular types of feelings (Graham et al., 2015). Of those evaluated, the ambience most strongly associated with home attachment was restoration. It is notable that the qualities constituting restoration (e.g., tranquility, rejuvenation, privacy) are also those most consistent with traditional understandings of attachment figures as safe havens and secure bases in response to stress. Indeed, restorative settings are generally conceptualized, at least in part, as being away from sources of stress (Kaplan, 1995; Kaplan & Berman, 2010; Korpela et al., 2001). Thus, the capacity for the home to help individuals regulate their emotions is clearly an important criteria for how closely attached participants feel toward the setting. Nevertheless, relative to the expansive literature exploring the rejuvenative properties of natural environments, the potential restorative properties of the home has not been widely studied (but see Meagher, 2016).

Although the factors predictive of home attachment remained largely stable over the course of the study, there was one exception to this pattern. Kinship ambience had very little relationship with home attachment initially, but this association emerged and increased rapidly in subsequent waves. Researchers have long recognized that place attachment entails both physical and social components (Hidalgo & Hernández, 2001; Lewicka, 2010a), and participants are equally likely to identify both types of features when describing favorite locations (Eisenhauer et al., 2000). However, over the course of weeks of social isolation, during which the capacity to interact with friends, family, and colleagues has, for many, reduced dramatically, it is not surprising that the capacity for a home to facilitate social relationships will gradually increase in importance. Conversely, the dysfunctional social dynamics present in many homes likely became even more exacerbated over this period of time. Increased rates of family and intimate partner violence is of particular concern, with household members much more vulnerable, more accessible to abusers, and with more limited options for external support than under normal circumstances (Usher et al., 2020; van Gelder et al., 2020). For an individual trapped in an environment like this, it is certainly not surprising that they would long to escape, rather than form an attachment to it. This finding highlights the fact that the criteria people use to evaluate their home will fluctuate, based on the extent to which different types of psychological needs are or are not being met.

7.1. Limitations

Several potential limitations regarding this analysis are worth noting. First, this study provides a longitudinal assessment of participants' home attachment during the initial wave of a global pandemic. It is unknown whether the pattern of results we found here are specific to this unique context, or whether they can be generalized to more normative periods of time. The lasting repercussions of this pandemic are not yet known, but it is likely to have a substantial influence on how people use both public and private spaces in at least the near future. Thus, follow-up research will be needed to continue to track people's attitudes toward and behaviors within different types of places as they adapt and cope.

Second, the current sample, despite being fairly diverse in terms of age, is nevertheless non-representative. Racial minorities have been disproportionately affected by COVID-19 (Garg et al., 2020), but White participants were overrepresented in our sample relative to the national population. As a consequence, it is quite possible that the pattern of results found here may be limited in their generalizability to the broader population. Moreover, we do not have data regarding additional, potentially relevant demographic factors related to home attachment and potential exposure to the virus (e.g., occupation, socioeconomic

status [SES]). Individuals with lower SES are likely to be at both greater risk to the virus, as well as living in homes of lower environmental quality. Even so, the relationship between socioeconomic status and home attachment has generally been inconsistent, but most commonly negative (e.g., Fried, 2000; Wilson-Doenges, 2000).

Third, there was some dropout of our sample after Wave 1. Out of the original sample, 88% completed at least one of the subsequent waves; 80% in Wave II and 73% in Wave III. Moreover, there were some differences in key study variables between participants who did and did not complete at least one followup wave. However, all models were run with estimation methods to account for missing data. Furthermore, findings were not substantially different in models tested in a subsample of participants who had at least one followup.

7.2. Implications & conclusions

The COVID-19 pandemic is an unprecedented lived experience for the majority of people on the planet. The fear of a highly contagious disease, economic uncertainty, and a substantial loss of social contact cumulatively place millions at risk for both physical and psychological illness. Across the world, vast sums of money have been spent by governments to address both the physical and economic consequences of this virus, but far less attention and fewer resources have been put toward addressing the potential psychological costs. However, evidence suggests that mental health concerns are experiencing historical increases in relation to the COVID-19 pandemic. According to a Kaiser Family Foundation poll, 45% of Americans report that the coronavirus crisis is negatively impacting their mental health (Kirzinger et al., 2020). Furthermore, emergency mental health hotlines and teletherapy providers are also reporting increases in service use (Wan, 2020).

In the midst of these increased mental health concerns and limited resources, many individuals have been left to cope as best they can. It is in this context, when many people have lost access to many of their typical sources of psychological support (e.g., social, entertainment), that certain places may be able to serve an important compensatory role in satisfying a variety of psychological needs (Keefer et al., 2012). As the current study demonstrates, one resource that can indeed buffer individuals from depressive and anxiety-related symptoms is the home, which can function as a beneficial source of refuge, security, and stability during these stressful times. That a home does so is not, of course, universal. Instead, feelings of attachment are the product of what emotions the space does or does not elicit in the resident. These results indicate that home designs that can facilitate moments of restoration and kinship are particularly valuable during these challenging times. Thus, finding ways to apply basic research identifying predictors of restorative experiences (e.g., Coburn et al., 2020, 2019; Smith et al., 2020) and feelings of belonging (e.g., Brown et al., 2019; Easterbrook & Vignoles, 2015) represents a potentially critical goal not only for designers, but also clinicians, counselors, and those working in public health.

Author roles

Benjamin Meagher: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Roles/Writing – original draft; Writing – review & editing. Alyssa Cheadle: Data curation; Formal analysis; Investigation; Methodology; Roles/Writing – original draft; Writing – review & editing

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