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Is Virginia for Lovers? Geographic variation in adult attachment orientation

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Abstract

People often use relationships to characterize and describe places. Yet, little research examines whether people's relationships and relational style vary across geography. The current study examined geographic variation in adult attachment orientation in a sample of 127,070 adults from the 50 United States. The states that were highest in attachment anxiety tended to be in the mid-Atlantic and Northeast region of the United States. The states that were highest in attachment avoidance tended to be in the frontier region of the United States. State-level avoidance was related to state-level indicators of relationship status, social networks, and volunteering behavior. The findings are discussed in the context of the mechanisms that may give rise to regional variation in relational behavior.

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Is Virginia for Lovers? Geographic variation in adult attachment orientation

People often use relationships to characterize and describe places. Philadelphia is the city of brotherly love. Hershey, PA is the sweetest place on Earth. Virginia is for lovers. Many of these sayings and mottos express people's affection for these places. However, do people from these places differ in their degree of affection for each other and how they approach relationships with others? The current study examines geographic variation in adult attachment orientation in a large sample from all 50 United States. We also tested the hypothesis that geographic variation in attachment orientation would be related to state-level indicators of relational behavior and well-being, including marriage/divorce, living alone, and volunteer behavior.

An individual's attachment orientation is generally conceptualized as his/her position on two distinct dimensions: anxiety and avoidance (Fraley & Waller, 1998). Attachment-related anxiety reflects a preoccupation with the availability of close others and a hypervigilance to signs of rejection and abandonment (Mikulincer, Gillath, & Shaver, 2002). The avoidance dimension reflects a discomfort with intimacy and is characterized by chronic attempts to inhibit and minimize expressions of distress (Edelstein & Shaver, 2004; Fraley, Davis, & Shaver, 1998). Individuals reporting low scores on both dimensions are generally considered secure.

Geographic Variation in Attachment and Relational Behavior

Individuals from different geographic regions vary considerably with respect to their psychological characteristics (Park & Peterson, 2010; Rentfrow, Gosling, & Potter, 2008). For example, in a combined sample of over 1.5 million participants, Rentfrow and colleagues (2013)

demonstrated that distinct psychological profiles derived from Big 5 personality characteristics can describe large geographic areas within the United States. For example, Middle America can be characterized as “Friendly and Conventional” as residents of these areas tend to be sociable, considerate, dutiful, and traditional. The West Coast, Rocky Mountain area, and the Sunbelt regions can be characterized as “Relaxed and Creative” as residents from these areas tend to be wealthy, (mostly) politically liberal, and economically innovative. The Mid-Atlantic and Northeast regions can be characterized as “Temperamental and Uninhibited” as residents from these areas tend to be reserved, aloof, impulsive, irritable, and inquisitive.

Although some research has demonstrated differences in adult attachment orientation *between* countries (Chopik & Edelstein, 2014; Schmitt et al., 2004), the current study is the first to examine geographic variation in attachment *within* a particular country, namely the United States. Why would one expect geographic variation in adult attachment orientation? Many of the mechanisms hypothesized to give rise to the emergence of geographic variation focus on selective migration/mobility (e.g., people choosing to move to or remain in a certain place for some reason). People tend to migrate to areas where their neighbors share similar occupations, ideologies, and even personalities (Florida, 2008; Rentfrow et al., 2008). Similar processes might also explain why individuals with different attachment orientations might live in particular areas.

Rentfrow and colleagues (2013) suggest that states in the Atlantic and Northeastern United States report higher levels of neuroticism because emotional contagion forces may be at work, such that the negative affect of one’s friends and family might make individuals more temperamental (Fowler & Christakis, 2008). They also suggest that, because neuroticism predicts residential *immobility*, that many of the less neurotic individuals have moved to different areas within the US in previous generations (Jokela, 2014). This observation is supported by this

region's lower rate of residential mobility (Rentfrow et al., 2013). Regional variation in the frequency of genetic alleles related to social sensitivity and anxiety may also explain why the Atlantic and Northeastern states have higher anxiety (Murakami et al., 1999; Way & Lieberman, 2010), particularly because attachment anxiety has a larger heritable component compared to attachment avoidance (Brussoni, Lang, Livesley, & Macbeth, 2000; Donnellan, Burt, Levendosky, & Klump, 2008). Because neuroticism and attachment anxiety share some overlap (e.g., Nettle & Shaver, 2006), these regions might also be particularly high in attachment anxiety. Thus, we hypothesized that participants high in attachment anxiety would be more likely to reside in Atlantic and Northeastern states.

Other research on geographic variation suggests that attachment avoidance would also vary in meaningful ways within the US. For example, Kitayama and colleagues suggest that individuals in frontier states (i.e., more recently settled states) are more independent and autonomous than individuals living in the Eastern US. These differences might have emerged because settling the frontier initially attracted people who were highly independent and less interconnected and that these traits helped people adapt to new unexplored environments. As time passed, frontier states developed institutions and practices that reified these differences and socialized future generations. As such, individuals on the frontier tend to derive happiness more from personal accomplishments, make more dispositional attributions, live in sparsely populated regions, and even name their children more esoteric names (Shinobu Kitayama, Conway, Pietromonaco, Park, & Plaut, 2010; S. Kitayama, Ishii, Imada, Takemura, & Ramaswamy, 2006; Uskul, Kitayama, & Nisbett, 2008; Varnum & Kitayama, 2011). Frontier states also have a greater percentage of people living alone, greater percentage of households without grandchildren, and a greater percentage of people who are self-employed (Vandello & Cohen,

1999). Likewise, the harsh and dangerous conditions of the early frontier may have put ecological pressures on individuals to adopt strategies geared toward short-term relationships and superficial bonds, a staple of ecological theories of the transmission of attachment behavior (Belsky, Steinberg, & Draper, 1991; Chisholm, 1993). In sum, relative to other regions, individuals in the frontier have fewer social connections and stress independence and autonomy. Similarly, avoidant individuals are often characterized as excessively self-reliant and also prefer isolated activities (Brennan, Clark, & Shaver, 1998; Ein-Dor, Mikulincer, Doron, & Shaver, 2010; Ein-Dor, Reizer, Shaver, & Dotan, 2012). Through intergenerational transmission and social contagion, the harshness of the early frontier region could lead to higher rates of avoidant attachment in the western U.S. (Belsky et al., 1991; Chopik, Edelstein, et al., 2014; Chopik, Moors, & Edelstein, 2014; Fonagy, Steele, & Steele, 1991; Fowler & Christakis, 2008). Further, the quality of close relationships is often considered a proxy for environmental threat and stress—providing a functional explanation for the development of attachment insecurity in these harsh environments (Belsky et al., 1991; Simpson & Belsky, 2008). Altogether, historical differences in settlers of the frontier, environmental conditions of the frontier, and the processes of intergenerational transmission and social contagion would suggest that individuals living in these regions may have more stand-offish, independent personalities. Thus, we hypothesized that participants high in attachment avoidance would be more likely to reside in frontier (i.e., western) states.

Variation in adult attachment orientation should also be related to regional indicators of relational behavior. For example, avoidant individuals tend to have smaller social networks (Fiori, Consedine, & Merz, 2011), suggesting that they might be more likely to live alone or live in smaller households on average. Further, avoidant individuals are less likely to engage in

committed relationships, preferring more casual, distant relationships (Schindler, Fagundes, & Murdock, 2010). Among those *in* relationships, avoidance predicts higher dissolution rates over a four-year period (Kirkpatrick & Hazan, 1994). These relationship dynamics suggest that states with a high number of avoidant individuals may also have a lower percentage of married adults. Avoidant adults also tend to volunteer and offer help to others at lower rates than non-avoidant adults (Gillath et al., 2005). As such, we expected that states with a larger number of avoidant individuals would report lower volunteering rate and fewer hours volunteering. Finally, given the associations between adult attachment and health (Pietromonaco, Uchino, & Dunkel Schetter, 2013) and well-being (Wei, Liao, Ku, & Shaffer, 2011), we hypothesized that higher state-level anxiety and avoidance would be associated with higher mortality rates and lower well-being.

Method

Participants and Procedure

Participants were 127,070 adult users ($Mdn_{age} = 25-34$ years old; 73.5% female) from an Internet site (authentichappiness.com) between September 2002 and March 2012. The current sample was part of a larger project on the comparison of age differences in attachment orientations across cultures (Chopik & Edelstein, 2014). The majority of the sample (71.7%) had at least a bachelor's degree. Information on ethnicity, sexual orientation, and respondent-level relationship status was unavailable. Participants who registered on the website provided demographic information, including their postal zip codes, which were used to identify the states in which respondents lived. All available data were used, so no stopping rule was implemented and there were no data exclusions. Additional measures on several positive psychology constructs (e.g., subjective well-being, character strengths) were available but the current authors did not have access to these data. Although our large sample of participants allowed for more

precise estimates of state-level means, ultimately our analysis was done on these fifty observations as in previous work on national differences in psychological characteristics (Rentfrow, 2010; Rentfrow et al., 2008). This limits our ability to statistically detect small effects. Thus, studies of geographic variation should be interpreted in light of the number of observations used in the focal analysis, rather than the number of observations used to yield aggregate scores for an area. We note this as a limitation of the current study and recommend replication of the following associations in different samples and at different units of analysis, which have the potential to increase the confidence of our findings.

Adult Attachment

A measure of attachment anxiety and avoidance (ECR-R; Fraley, Waller, & Brennan, 2000) was completed by all participants. The 18-item ECR-R avoidance subscale ($\alpha = .93$) reflects an individual's discomfort with closeness and intimacy and the 18-item ECR-R anxiety subscale ($\alpha = .95$) reflects an individual's concern about abandonment. Sample items include “I don't feel comfortable opening up to romantic partners” (avoidance), and “I often worry that my partner doesn't really love me” (anxiety). Participants rate the extent to which they agree with each statement, using a 7-point Likert scale, ranging from 1 (*disagree strongly*) to 7 (*agree strongly*). Anxiety and avoidance are significantly correlated at both the individual ($r = .49, p < .001$) and the state level ($r = .58, p < .001$).

State-level Variables

Longitude and Latitude. The central longitude and latitude of each state was indexed from the Earth Explorer application available from the US Geological Survey website (US Geological Survey, 2014).

Relational Indicators. The percentage of individuals never married, percentage of

households that contain a married couple, the percentage of divorced adults, average household size, and percentage of individuals living alone were obtained from the US Census Bureau's 2010 estimate of social characteristics (U.S. Bureau of the Census, 2010). The percentage of the adult population volunteering in each state and the average number of hours spent volunteering per state resident per year were taken from the Corporation for National and Community Service (CNCS)'s 2007 assessment of "Volunteering in America." The CNCS is a government agency that encourages service activities and is primarily known for funding AmeriCorps (Corporation for National and Community Service, 2007).

Well-being. State-level well-being was drawn from the 2013 Gallup-Healthways Well-Being Index and is a composite of six domains—life evaluation (a combined metric of the evaluation of one's present life situation and one's anticipated life situation five years from now), emotional health (a composite of respondents' emotions during daily experiences), work environment factors gauging respondents' feelings and perceptions about their work environment), physical health (a composite of question related to body mass index, disease burden, sick days, physical pain, daily energy, history of disease, and daily health experiences), healthy behaviors (life style habits), and access to basic necessities (respondents' access to food, shelter, healthcare, and a safe and satisfying place to live). Composites from each of these domains were combined to yield an overall well-being index for each state. Full documentation on the Gallup-Healthways Well-Being Index is provided by the Gallup Organization, is provided in the references, and can also be requested from the authors (Gallup, 2014).

Mortality. State-level mortality was operationalized as the deaths per capita (i.e., per 100,000 people) in a state and were drawn from 2014 estimates from the Center for Disease Control and Prevention's National Vital Statistics Reports (Kochanek, Murphy, Xu, & Tejada-

Vera, 2016).

Covariates. The number and type of control variables in studies of the geographic variation of psychological characteristics vary considerably (Brethel-Haurwitz & Marsh, 2014; Park & Peterson, 2010; Rentfrow et al., 2008). In the current study, we controlled for each state's male-to-female sex ratio, median age, proportion of White, non-Hispanic residents, and median income (Brethel-Haurwitz & Marsh, 2014). This information was taken from the U.S. Census (U.S. Bureau of the Census, 2011, 2012). Covariates from the 2002 estimates from the U.S. Census correlated highly with the 2010 estimates used in the current study (all $r_s > .76$) and the results reported below do not change substantively when they are used instead.

Results

Individual mean scores for anxiety and avoidance were computed for the residents within each state. Means, standard deviations, sample sizes, and rankings for state-level anxiety and avoidance are presented in Table 1. The states with the highest anxiety scores were North Dakota, West Virginia, and New York; the states with the lowest anxiety scores were Mississippi, Alaska, and Vermont. The states with the highest avoidance scores were North Dakota, Nevada, and Kentucky; the states with the lowest avoidance scores were Wisconsin, Utah, and Hawaii.

Do attachment anxiety and avoidance vary geographically?

We hypothesized that Eastern US states would be higher in anxiety and that Western US states would be higher in avoidance. No hypotheses about differences between Northern and Southern states were made. To test these hypotheses, we regressed anxiety and avoidance simultaneously onto the centralized longitude (east/west) and latitude (north/south) coordinates of each state.¹ As predicted, anxiety was negatively related to longitude, $b = -85.54$, $\beta = -.41$, $t =$

-2.25, $p = .03$, $\Delta R^2 = .10$, 95% CI[-162.05,-9.03]. As seen in Figure 1a, the most anxious states tended to be in the mid-Atlantic and Northeast region of the United States. In fact, five of the top ten most anxious states fell in one of these two regions. Only one state in the ten least anxious states (Vermont) fell in these regions.

Also as predicted, avoidance was positively related to longitude, $b = 85.684$, $\beta = .36$, $t = 1.97$, $p = .06$, $\Delta R^2 = .08$, 95% CI[-1.94,173.31], albeit this association was marginally significant. As seen in Figure 1b, the most avoidant states tended to be in the mountainous states on the frontier of the US. Like anxiety, five of the top ten most avoidant states fell in the western US. Only one state in the ten least avoidant states (Utah) fell in the western US. Latitude was unrelated to anxiety ($p = .31$) and avoidance ($p = .44$).

Are state-level anxiety and avoidance related to state-level relational indicators?

We hypothesized that state-level avoidance would be associated with a smaller percentage of the population being married, a smaller household size, and less volunteering. We also hypothesized that avoidance would be associated with a higher percentage of divorced residents and a higher percentage of residents living alone. No specific predictions were made about the relationship between anxiety and relational indicators at the state level. To test these hypotheses, we regressed anxiety and avoidance on each of the relational indicators while controlling for each state's male-to-female sex ratio, median age, proportion of White, non-Hispanic residents, and median income (Brethel-Haurwitz & Marsh, 2014). As seen in Table 2, some of these hypotheses were supported. Higher state-level avoidance was associated with a lower percentage of married households, a smaller household size, a lower percentage of individuals volunteering, and fewer hours of volunteering on average. Avoidance was also associated with a higher percentage of residents living alone. Avoidance was not significantly

related to the percentage of the population never married or divorced, contrary to our hypotheses. Somewhat surprisingly, anxiety was significantly related to the percentage of married households and marginally (negatively) related to the percentage of the population reporting that they have never been married. States higher in anxiety tended to have a larger percentage of married households compared to states lower in anxiety. Contrary to our hypotheses, anxiety and avoidance were not related to mortality or well-being at the state-level. In sum, states higher in avoidance tended to have fewer married households, smaller households, less volunteerism, and more residents living alone.

Discussion

The geographic variation in adult attachment found in the current study aligns well with previous research on regional variation in psychological characteristics (Shinobu Kitayama et al., 2010; Rentfrow et al., 2013). States in the mid-Atlantic and Northeast tend to be home to people high in neuroticism—a correlate of attachment anxiety. Frontier states also tend to be home to individuals who are extremely self-reliant and independent—traits found in highly avoidant people as well. Associations between state-level avoidance and state-level relational indicators were very similar to research found on the individual level (Gillath et al., 2005; Kirkpatrick & Hazan, 1994).

Mechanisms that Contribute to Geographic Variation in Attachment

We previously reviewed how selective migration (e.g., choosing to remain in or leave a certain place), genetic variation, and the harshness of local ecologies could explain why anxious individuals reside on the east coast and avoidant people reside on the frontier. However, extant research on other mechanisms that give rise to geographic mobility can also lend insight into why these geographic patterns emerged. For example, the physical environment may exert an

influence on people's approaches to close relationships. In a recent study, Oishi and colleagues (2015) demonstrated that introverts prefer mountainous regions when they wanted to be alone, tended to live in mountainous states, and were happier in secluded areas. Not surprisingly, many states on the frontier are among the most mountainous states. The mountains and secluded regions of the frontier may cater to avoidant individuals' dislike of social interactions or serve as a broader indicator of the predictability and safety of an environment (Brennan et al., 1998; Simpson & Belsky, 2008). A region's temperature and weather may also affect how people interact with one another (Anderson, 2001; Keller et al., 2005; Park & Peterson, 2010; Van de Vliert & Yang, 2014). For example, a model of the development of individualism and collectivism posits that harshness of weather (whether extreme heat or cold) often serves as a proxy for environmental threat and the availability of resources. These conditions of living, in addition to considerations like parasite burden, leave individuals to adopt more stand-offish orientations toward others, particularly outgroup members (Gelfand et al., 2011; Richter & Kruglanski, 2004; Schaller & Murray, 2008; Van de Vliert & Yang, 2014). As such, examining how variation in temperature covaries with attachment orientation at more discrete units of analyses is a useful avenue for future research. Despite this, there are likely additional predictors of variation in attachment orientation, whether they are considered uniquely or in combination other variables like weather. For example, there is also evidence that the effects of extreme climate on personality may be attenuated in geographic regions that have greater monetary resources and infrastructure, as individuals in these regions are able to cope with the harshness of such environments more easily (Georgas, van de Vijver, & Berry, 2004; Levine & Norenzayan, 1999; Van de Vliert & Yang, 2014).

Ideological fit and social influence are other possible explanations for why geographic

differences emerge. For example, Jokela and colleagues (2015) found that individuals living in less diverse areas were more agreeable and friendly. Further, living among politically dissimilar others reduces feelings of belongingness—increasing desire to move away from an area (Chopik & Motyl, 2016; Motyl, 2014; Motyl, Iyer, Oishi, Trawalter, & Nosek, 2014). Individuals also tend to live among those who share similar occupations, levels of education, hobbies, and even personalities (Florida, 2008; Rentfrow et al., 2008). Likewise, the social behavior and emotions of other people can also spread through social networks and thus a broader geographic area (Cacioppo, Fowler, & Christakis, 2009; Fowler & Christakis, 2008; Rosenquist, Fowler, & Christakis, 2011; Rosenquist, Murabito, Fowler, & Christakis, 2010). Future research can examine the other factors that contribute to geographic variation in attachment orientation and relationship behavior.

It is also important to examine the effect of residency on changes in psychological characteristics. How long does a person have to live in a particular place before they start to resemble other people from that area? Or, is there a critical period early in life where a region's influences are most potent? Unfortunately, we only collected information on participants' *current* state of residence and not on the state in which they were born or spent the majority of their life. Future research can examine the conditions under which cultural differences in attachment emerge and how socialization pressures exert their influence on individuals over time (Oishi, 2010).

Limitations and Future Directions

Despite the current study's many strengths, it also had some limitations. Most notably, we did not use a representative sample of U.S. adults. However, previous studies have shown that Internet-based samples can provide useful and valid data for psychological research,

particularly with respect to geography (Chopik & Edelstein, 2014; Rentfrow et al., 2013).

Moreover, such samples are often more diverse than traditional samples with respect to age, ethnicity, relationship status, and income (Gosling, Vazire, Srivastava, & John, 2004). Future research can examine this question in samples that are nationally representative with respect to age, gender, and other demographic characteristics.

When examining variables that can be conceptualized at different levels of analysis (e.g., individual- vs. state-level), it is prudent to interpret the findings at the level at which the data were analyzed. Researchers often run the risk of committing the *ecological fallacy*, in which inferences about individuals are inappropriately made on the basis of aggregated data (Robinson, 1950). Similarly, researchers might also assume that individual-level findings must necessarily replicate and generalize at the aggregate level (e.g., the individualistic fallacy; Inglehart & Welzel, 2003). In the current study, we were primarily interested in how attachment varied across the U.S. and how state-level variables were related to one another at the aggregate level (Rentfrow, 2010; Rentfrow et al., 2008). Individual-level findings merely guided our predictions about how constructs at the state-level would be associated with each other. However, there are likely many ways in which associations between attachment and relational behavior differ across levels of analysis. In the future, researchers can collect data on attachment and relational behavior at the individual-level from respondents from different states to examine whether individual-level and aggregate-level findings converge (King, 1997; Ostroff, 1993). In the current study, we only had attachment orientation data at the individual level and did not have measures of relationship status, household composition, volunteer behavior, health, and well-being at the individual level. Future research can also examine these questions at varying units of analysis (e.g., counties, countries), which will help reduce some of these concerns while

replicating these patterns in different contexts with larger sample sizes. Another approach to examining geographic effects on interpersonal behavior would be to randomly assign individuals to experimental conditions to see which features of an environment predict intentions for mobility and responses to social influences (Motyl et al., 2014; Oishi et al., 2015).

Conclusion

Despite these limitations, the current study provides valuable information for how states—and the people living in them—vary with respect to attachment orientation. Geographic variation in anxiety and avoidance were consistent with previous research and theory (Shinobu Kitayama et al., 2010; Rentfrow et al., 2013). Based on the results of the current study, Mississippi and Wisconsin may ultimately be the best states for lovers, as they were lowest in anxiety and avoidance, respectively. However, we do not recommend changing all of the affectionate mottos used to describe places or finally moving out of North Dakota. To a certain degree, positive relationships are found everywhere and transcend time and place. After all, home is where the heart is.

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¹Hawaii and Alaska were excluded from these analyses as they represented extreme outliers for longitude and latitude and were not part of the continental United States.