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Are Adult Attachment Styles Categorical or Dimensional? A Taxometric Analysis of General and Relationship-Specific Attachment Orientations

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One of the long-standing debates in the study of adult attachment is whether individual differences are best captured using categorical or continuous models. Although early research suggested that continuous models might be most appropriate, we revisit this issue here because (a) categorical models continue to be widely used in the empirical literature, (b) contemporary models of individual differences raise new questions about the structure of attachment, and (c) methods for addressing the types versus dimensions question have become more sophisticated over time. Analyses based on 2 samples indicate that individual differences appear more consistent with a dimensional rather than a categorical model. This was true with respect to general attachment representations and attachment in specific relationship contexts (e.g., attachment with parents and peers). These findings indicate that dimensional models of attachment style may be better suited for conceptualizing and measuring individual differences across multiple levels of analysis.

Keywords: adult attachment, types versus dimensions, individual differences

There are substantial individual differences in the way people approach close relationships. Some people, for example, are comfortable opening up to and depending on others. Other people, in contrast, are reluctant to do so, fearing that intimacy may undermine their sense of autonomy. Attachment researchers refer to these kinds of individual differences as *attachment styles* or *attachment orientations*. A large body of research has accumulated over the past 27 years examining the implications of attachment styles for relationship functioning, personality dynamics, and psychological well-being. For example, research has shown that people who are relatively secure in their attachment orientations are more likely to have well-functioning relationships (Holland, Fraley, & Roisman, 2012), experience fewer depressive symptoms (Rholes et al., 2011), and exhibit greater resilience in the face of distress (Mikulincer, Ein-Dor, Solomon, & Shaver, 2011).

Early research on adult attachment was based on the assumption that individual differences in attachment styles were categorical—that people belonged to one of several different attachment categories (e.g., secure, avoidant, anxious–ambivalent). In the late 1990s, however, researchers gradually began transitioning toward a dimensional framework. This shift was driven by early taxometric research, which suggested that people vary continuously (and not categorically) in security (Fraley & Waller, 1998), and the development of multi-item self-report measures that could be used to scale people with respect to latent dimensions (Brennan, Clark, & Shaver, 1998). Although many researchers now use dimensional models in their research, categorical models and methods continue to guide much of the work in the field (e.g., Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010). Indeed, to an outsider looking in, it might seem as if the decision to treat individual differences as categorical or continuous is a matter of preference rather than a decision that can be made scientifically.

The objective of the present article is to reconsider the types versus dimensions question in the study of adult attachment. There are several reasons for doing so. First, many researchers continue to conceptualize and measure attachment styles categorically, indicating that the types versus dimensions question has not been adequately resolved. Second, theoretical models of individual differences in attachment have evolved in important ways and raise new questions about the distribution of individual differences. For example, although researchers have historically examined attachment orientation as a traitlike construct (i.e., one that cuts across various relationship contexts), researchers have increasingly come to study attachment in relationship-specific domains, such as romantic and parental relationships (e.g., Fraley & Heffernan, 2013; Klohnen, Weller, Luo, & Choe, 2005; Overall, Fletcher, & Friesen, 2003; Sibley & Overall, 2008). It is possible that the answer to the types versus dimensions question depends on the level of specificity with which one assesses attachment. For example, perhaps attachment orientations are categorical in the context of specific relationships (e.g., a romantic partner) and only begin to resemble dimensions when aggregated to a more abstract level (i.e., general representations of others). Third and finally, methods for addressing the types versus dimensions question have advanced considerably in the past 15 years. That is, we have better taxometric methods now than we did in the 1990s—methods that are less subjective and more robust and have been evaluated extensively in simulation studies (e.g., Ruscio, Haslam, & Ruscio, 2006). In the present research, we used modern taxometric techniques to analyze

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data from two samples of adults who completed self-reports of attachment style across a variety of relationship domains. We hope this research will help to advance the study of individual differences in adult attachment by clarifying the kinds of theoretical models that best capture individual differences across various levels of abstraction and relational contexts.

A Brief History of Categorical and Dimensional Models of Individual Differences

When Hazan and Shaver (1987) began their seminal work on adult attachment, they adopted Ainsworth's three-group typology of attachment patterns in infancy (Ainsworth, Blehar, Waters, & Wall, 1978) as a framework for organizing individual differences in the ways adults think, feel, and behave in romantic relationships. In their initial studies, Hazan and Shaver developed brief, paragraph-long descriptions of the three proposed attachment types—avoidant, secure, and anxious–ambivalent. In this measure, respondents are asked to think back across their history of romantic relationships and indicate which of the three descriptions best captures the way they generally think, behave, and feel in romantic relationships. The three-category measure was widely adopted by researchers in social, clinical, and personality psychology, partly because of its brevity, face validity, and ease of administration.

In 1990, Bartholomew published an important paper that challenged researchers to reconsider the three-category model of individual differences in adult attachment (Bartholomew, 1990; see also Bartholomew & Horowitz, 1991; Griffin & Bartholomew, 1994b). Drawing on Bowlby's (1973) writings, Bartholomew argued that people hold separate representational models of themselves (model of self) and their social world (model of others). Bartholomew reasoned that when these two kinds of representational models are crossed with valence (i.e., the models' positivity or negativity), it is possible to derive four, rather than three, major attachment patterns. These attachment styles have been referred to as secure, fearful, dismissing, and preoccupied (see the top panel of Figure 1). Bartholomew and Horowitz also developed a self-report measure, the Relationships Questionnaire (RQ), that provided four paragraphs that described each of the attachment types and instructed participants to select the paragraph that best characterizes their approach to close relationships.

Although both Hazan and Shaver's (1987) three- and Bartholomew's (1990; Bartholomew & Horowitz, 1991; Griffin & Bartholomew, 1994b) four-category forced-choice measures became widely used, a few investigators quickly recognized the limitations of these instruments (e.g., Collins & Read, 1990; Simpson, 1990) and began to break the paragraphs down into individual items that could be rated separately. Some researchers used these ratings to scale people along various dimensions (e.g., Collins & Read, 1990), whereas others used the ratings as a way to assign people to categories with greater fidelity (e.g., Feeney & Kirkpatrick, 1996). Although the gradual move to rating scales was an important step toward refining the measurement of adult attachment, it sidestepped a crucial theoretical question: Do people vary continuously or categorically with respect to attachment styles?

This question, sometimes referred to as the *types versus dimensions* question, is a critical one for the study of adult attachment. If people actually vary continuously in attachment organization, but researchers assign people to categories, then potentially important information about the way people differ from one another is lost (e.g., Cohen, 1983). This loss of information can have deleterious effects on the study of continuity and change; mapping the developmental antecedents and consequences of attachment experiences; and bridging the gap between attachment research in social, personality, clinical, and developmental psychology.

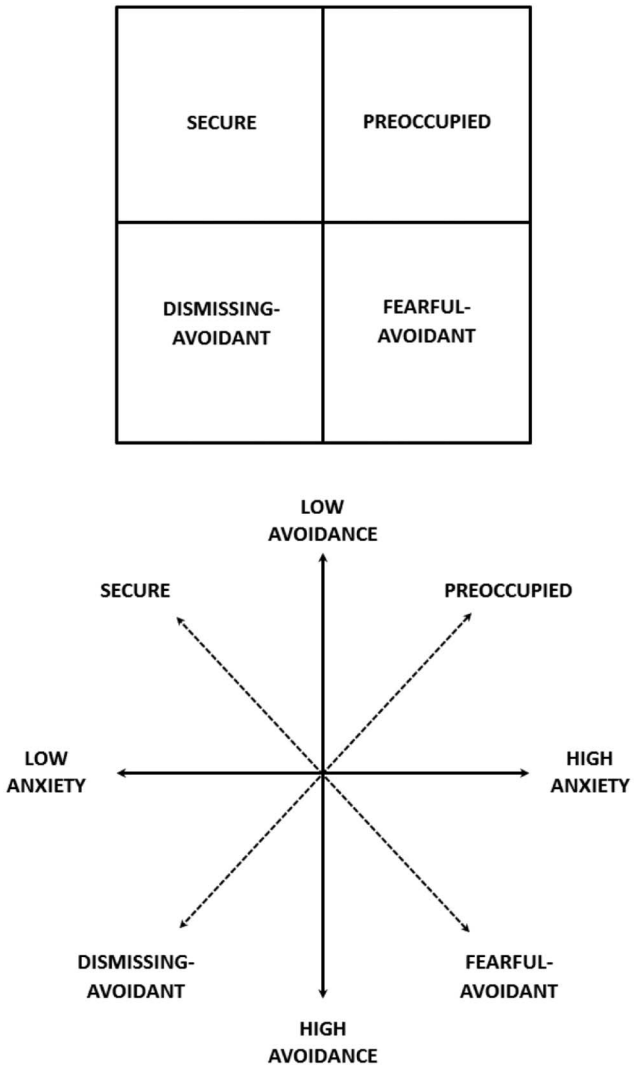

Figure 1. The four-category model of attachment (top) and the two-dimensional model of attachment (bottom).

How can one determine whether variation in an unobservable construct, such as attachment orientation, is continuous or categorical? Historically, researchers have relied on clustering techniques, such as latent class analysis or cluster analysis, to identify groupings in data (e.g., Collins & Read, 1990; Feeney, Noller, & Hanrahan, 1994). One of the limitations of clustering techniques, however, is that they reveal groupings in data regardless of whether those groupings are driven by true types as opposed to latent dimensions (see Fraley & Waller, 1998). Fortunately, Meehl and his colleagues (e.g., Meehl & Yonce, 1996; Waller & Meehl, 1998) developed a suite of techniques that allow one to uncover the latent structure of a construct and rigorously test taxonic (i.e.,

typological) conjectures. Importantly, these methods are designed to address the types versus dimensions question at the level of *latent* constructs; as such, they can be used to investigate latent structure regardless of whether the measurements themselves are continuous or categorical. In the late 1990s, Fraley and Waller adopted two of Meehl's techniques, MAXCOV and MAMBAC, to address the types versus dimensions question in the study of adult attachment. They administered Griffin and Bartholomew's (1994a) 30-item Relationship Scales Questionnaire (RSQ) to a sample of over 600 undergraduates and found that the data provided no evidence for a categorical model of attachment. Instead, their results were more consistent with what would be expected if individual differences in attachment were continuously distributed. In light of these findings, and the development of psychometrically sound instruments for assessing them (e.g., Brennan et al., 1998), many researchers began to conceptualize individual differences using a variant of a two-dimensional model originally proposed by Bartholomew and her colleagues (e.g., Bartholomew & Horowitz, 1991). This model, illustrated in the bottom panel of Figure 1, assumes that people vary continuously with respect to attachment-related anxiety and avoidance and that the additive combination of those dimensions gives rise to the theoretical prototypes emphasized in categorical models (e.g., Brennan et al., 1998; Fraley & Shaver, 2000; Griffin & Bartholomew, 1994b).

Why Should We Revisit the Types Versus Dimensions Question?

Although many contemporary researchers conceptualize and measure attachment styles in a continuous fashion, a substantial amount of research continues to rely on categorical models (e.g., Adamczyk & Bookwala, 2013; Malley-Morrison, You, & Mills, 2000; McWilliams & Asmundson, 2007; Meredith, Strong, & Feeney, 2006; Rogers, 2012–2013). For example, Konrath and her colleagues recently published a meta-analysis of studies that used a four-category measure of attachment (i.e., Bartholomew & Horowitz's, 1991, RQ) and, based on those data, argued that the base rate of the dismissing–avoidant attachment type has been increasing over the decades (Konrath, Chopik, Hsing, & O'Brien, 2014). Other recent research has used both categorical and continuous models (e.g., Adamczyk & Bookwala, 2013; McWilliams & Asmundson, 2007; Meredith et al., 2006), presumably because it is unclear which kind of model of individual differences is most appropriate. Some contemporary researchers have even used dimensional measures of attachment to assign people to discrete categories on the basis of median splits or other algorithms (e.g., Conradi & de Jonge, 2009; Kaitz, Bar-Haim, Lehrer, & Grossman, 2004; Rusby & Tasker, 2008; Schmitt et al., 2004)—sometimes despite acknowledging that continuous dimensions may underlie the purported types (e.g., Wearden, Lamberton, Crook, & Walsh, 2005; Welch & Houser, 2010). The most popular textbooks in social and personality psychology emphasize categorical models at the expense of dimensional ones (e.g., Gilovich, Keltner, Chen, & Nisbett, 2012; Larsen & Buss, 2010; Myers, 2012).

The continued visibility of categorical models in adult attachment research suggests that the types versus dimensions question has not been fully resolved. Indeed, in a recent review of measurement issues in the study of adult attachment, Ravitz et al. (2010) explicitly stated that "there is no consensus as to whether attachment phenomena are inherently categorical or dimensional" (p. 421). Clearly, there is a need for more conclusive research that speaks to the dimensional versus categorical nature of adult attachment styles.

Above and beyond these concerns, there are two reasons to revisit the types versus dimensions issue in the study of adult attachment. First, there have been advances in attachment theory and research that raise new questions about the latent structure of attachment orientations. As we explain later, the distinction between general and relationship-specific attachment representations raises the possibility that attachment representations may be categorical in specific relational contexts but continuous when conceptualized as generalized constructs. This possibility has not been empirically tested. Second, there have been important developments in taxometric methodology—advances that enable more accurate inferences to be drawn about latent structure. For example, current methods enable empirical curves to be formally compared against those expected under alternative models of latent structure (e.g., Ruscio et al., 2006). These methods make it possible to address the types versus dimensions question in ways that are less subjective and informal than was possible in the past (i.e., Fraley & Waller, 1998).

Theoretical Developments in Adult Attachment

Historically, researchers have conceptualized and measured attachment styles in a traitlike fashion, focusing on the ways in which people relate to others in general rather than the ways they relate to specific individuals. Drawing on social–cognitive theory, however, Collins and Read (1994) argued that attachment representations can vary in their specificity and that people can hold distinct representations of specific individuals (e.g., their romantic partners, their mothers, their fathers) as well as global or abstracted representations that pertain to close others more generally. Although Collins and Read proposed their hierarchical model in the 1990s, it was not until the last decade that researchers began to think carefully about how the level of specificity in attachment representations might be relevant to the study of relationship dynamics and personality processes (e.g., Cozzarelli, Hoekstra, & Bylsma, 2000; Klohnen et al., 2005; Overall et al., 2003).

The distinction between general and specific representational models has important implications for the types versus dimensions debate. Most obviously, it raises the question of whether the latent structure of attachment is similar across different levels of analysis. Even if previous taxometric research suggests that attachment styles appear continuous when conceptualized as general representations (i.e., Fraley & Waller, 1998), this does not necessitate that they be continuous when considered at the level of specific attachment relationships.

Are there compelling reasons to assume that relationship-specific representations may be categorical? Social–cognitive perspectives suggest that people tend to think in relatively categorical ways when evaluating others (e.g., Reis & Carothers, 2014). In the case of attachment dynamics, a person is essentially judging whether the target in question is the kind of person who is likely to be available and responsive when needed (see Fraley & Shaver, 2008). Although the relevant decision process might be complex—involving the weighting of multiple experiences across time—the outcome of that decision might be relatively discrete (e.g., *yes*, the

person is available and accessible, or *no*, the person is not). If so, it is possible that individual differences in attachment are categorically distributed within specific relationship contexts. That is, some people may be secure in their relationships with their romantic partners, for example, whereas others may be insecure.

Another reason relationship-specific representations may be categorical is that they conform to what Meehl (1992) referred to as "environmental molds": configurations of beliefs, assumptions, and biases that are self-reinforcing and, as a result, have the potential to create bifurcations in the ways in which people relate to others. Theorists have argued that attachment-related representations are organized around specific assumptions or beliefs (e.g., my partner is responsive and dependable) and that these assumptions bias the interpretation of new information that is encountered in social interactions (see Collins, Guichard, Ford, & Feeney, 2004). As a result, new information is more likely to be assimilated into existing knowledge structures than used to revise existing knowledge structures (Collins et al., 2004). Moreover, because those expectations can be used to shape social interaction in ways that are compatible with existing representations, it is unlikely that social interactions will substantially deviate from existing assumptions—especially in relatively established relationships. These kinds of cognitive process not only tend to be self-sustaining (i.e., it is difficult to revise one's core beliefs when one is discounting information that is inconsistent with those beliefs), they have the potential to be polarizing as well—leading people to be either secure or insecure in their core beliefs. In other words, attachment styles may serve as "attractor states" in a dynamic system—locations toward which people gravitate in the face of new experiences and within existing representational constraints (Mandara, 2003).

If this reasoning is sound, it implies that not only is it possible that relationship-specific representations are categorically distributed across people, but some kinds of relationship-specific representations may be more likely than others to be categorical. By the time people reach adulthood, the relationships they have with their parents are likely to be highly entrenched relative to their romantic relationships. In fact, Fraley, Vicary, Brumbaugh, and Roisman (2011) found that relationship-specific attachment with mothers and fathers was highly stable over the course of a year (test–retest correlations hovering around .90 across multiple retest intervals), whereas attachment security with romantic partners was much lower (test–retest correlations hovering around .50 across multiple retest intervals). If attachment styles function as attractors in a representational space, it may be the case that established, long-term relationships (such as those that adults have with their parents) are more likely to manifest as categories than are younger and less stable relationships (such as those that adults have with their romantic partners).

It is important to emphasize that the latent structure of attachment styles can be distinct across different levels of analysis. For example, even if attachment styles are categorical at the level of specific relationships (e.g., the relationships that people have with their mothers), attachment styles could be continuously distributed across people when considering general attachment representations. In fact, because general attachment representations are assumed to be aggregates of a person's history of interpersonal experiences (Fraley, 2007), it seems quite reasonable to expect that general representations will be continuously distributed, even if the specific experiences on which they are based are not.

Advances in Taxometric Methods

There has only been one empirical investigation into the types versus dimensions issue in personality and social psychology that has used taxometric methods (i.e., Fraley & Waller, 1998). That report was fairly limited in scope, however. Fraley and Waller relied on a limited number of taxometric techniques to evaluate the extent to which individual differences in general attachment styles were categorical or continuous (Meehl & Yonce, 1996). In addition, the authors simply eyeballed the graphical results to determine whether those results were more consistent with a categorical or dimensional interpretation of individual differences (the so-called *intraocular test*; see, e.g., Waller & Meehl, 1998). This process is not only likely to be error prone (i.e., increasing the chances that researchers will infer dimensions when the latent variable is actually categorical, and vice versa) but may lead to confirmation bias in the interpretation of taxometric results.

In the last decade there have been several advances in taxometric methodology that enable researchers to evaluate categorical and dimensional assumptions with greater validity. For example, there are now multiple, well-validated taxometric procedures available to researchers (Ruscio et al., 2006). Moreover, recent simulation research suggests that three of those methods (i.e., MAXCOV-HITMAX [Meehl & Yonce, 1996], MAMBAC [Meehl & Yonce, 1994], and L-Mode [Waller & Meehl, 1998]) provide distinctive and valid information, thereby enabling taxometric conjectures to be examined in multiple, nonredundant ways (see Ruscio, Walters, Marcus, & Kaczetow, 2010). Second, although earlier methods required that investigators evaluate taxonicity primarily on the basis of graphical output, current methods allow those graphical analyses to be supplemented by quantitative comparisons. Specifically, it is now possible to compare the fit of categorical and dimensional models to empirical data and to index the relative fit of models in ways that lead to less subjectivity in taxometric inferences (Ruscio et al., 2006; Ruscio, Ruscio, & Meron, 2007).

Finally, modern methods involve simulating data sets from known dimensional or categorical models but in ways that preserve the statistical properties of the original dataset (i.e., same means, standard deviations, and interitem covariances; see Ruscio et al., 2006). By performing taxometric analyses of real data alongside with these simulated data, it is possible to compare the empirical results against those expected under alternative models. This particular advance is important for two reasons. First, it allows investigators to compare the data against those that would be expected under different theoretical models. This makes it possible to test those models against one another in a relatively direct way (Ruscio et al., 2006). Second, in some applied situations, categorical and dimensional models can make converging rather than diverging predictions about the kind of taxometric output that should be observed (e.g., Ruscio, Ruscio, & Keane, 2004). And, in the absence of appropriate comparison distributions, it is possible for researchers to reach the wrong conclusions, such as concluding that the empirical curves are consistent with a specific latent structure (e.g., dimensional) when, in fact, the data are indeterminate.

Overview of the Present Research

The goal of this research was to revisit the types versus dimensions question in the study of adult attachment. There are multiple reasons for doing so. For example, recent reviews of the field indicate that there has not been an adequate resolution to the types versus dimensions debate in the study of adult attachment (e.g., Ravitz et al., 2010). Moreover, from a theoretical perspective, contemporary models of individual differences acknowledge (a) variation in the generality versus specificity of attachment representations and (b) differences across relational domains (e.g., parents vs. partners). These distinctions raise the possibility that attachment styles could be categorical at one level of analysis or in specific relational domains even if they are dimensional in other contexts. Finally, from a methodological perspective, there have been substantial advances in taxometric methodology over the past 15 years. Such advances make it possible to examine the types versus dimensions more rigorously than was possible in the past.

In the present research, we used modern taxometric methods to compare categorical and dimensional models of attachment styles. Individual differences in adult attachment were assessed with the Experiences in Close Relationships–Relationships Structures Questionnaire (ECR-RS; Fraley, Heffernan, Vicary, & Brumbaugh, 2011). The ECR-RS is designed to assess attachment in a variety of relationship contexts, including relationships with mothers, fathers, romantic partners, and nonromantic best friends. We also used the ECR-RS to assess general attachment styles. Data were collected online from two samples. The first sample was an exploratory sample of approximately 2,400 adults. The second sample was composed of 2,300 individuals and functioned as a confirmatory sample. That is, the methods and protocol for the study were preregistered in advance of data collection and analysis.

Method

Participants

Data were collected through a Web site designed "to assess your attachment style in different relationships." The study was hosted on R. Chris Fraley's Web site, which contains a variety of Web studies and demonstrations regarding personality, attachment, and close relationships. The site can be found via Web searches for a variety of key words relevant to personality and relationships and receives approximately 500 visitors a day (although not all visitors participate in each study and exercise posted on the Web site). Previous studies have shown that Internet-based samples often provide useful and valid data for psychological research (see Gosling, Vazire, Srivastava, & John, 2004). Moreover, Web-based samples are often more diverse than traditional samples with respect to age, ethnicity, nationality, relationship status, and income. For an in-depth comparison of Web-based samples and more commonly used undergraduate samples, please see Gosling et al. (2004).

In this article, we report data from two samples. The first sample was used for exploratory analyses; the data were not collected with the intention of performing taxometric analyses. There were no a priori starting and stopping rules for data collection. On December 4, 2013, we added a general assessment of attachment to an online version of the ECR-RS. On January 14th, 2014, we downloaded the data for the purposes of data analysis. At that time, we had data on 2,399 usable cases (discussed later). The second sample was collected to enable us to provide a more formal, confirmatory evaluation of the types versus dimensions question. As such, the sampling plan and analytic strategy was preregistered at the Open Science Framework (OSF; https://osf.io/). We elected to analyze data on the first 2,300 usable cases, with data collection beginning on March 1, 2014. This sampling plan and the analytic plan were preregistered to facilitate transparency concerning the stopping rules for data collection and analysis (see https://osf.io/qd9z2/).

The demographic characteristics of the two samples were similar and are summarized in Table 1. The following inclusion criteria were used for both samples: (a) people had to report *not* having taken the questionnaire before (the default option was that the participant had taken it before; thus, respondents had to manually switch the default answer to be included in the analyses) and (b) people had to report being between the ages of 18 and 65 years, inclusive. Moreover, for the taxometric analysis of parental attachment, we limited our analyses to individuals who reported that their parents were still living.

Adult Attachment

To assess individual differences in attachment orientation, we used the ECR-RS (Fraley et al., 2011). The ECR-RS is a self-report measure of attachment derived from the Experiences in Close Relationships–Revised Inventory (ECR-R; Fraley, Waller, & Brennan, 2000). The ECR-RS is designed to assess individual differences separately in each of four relational domains: relationships with mother, father, romantic partner, and (nonromantic) best friend. Nine items are used to assess attachment in each domain, leading to 36 items in total. Within each relational domain, the ECR-RS assesses two variables: attachment-related anxiety and avoidance. *Attachment-related anxiety* concerns the extent to which a person is worried that the target may reject him or her (e.g., "I'm afraid that this person may abandon me"). Three items were used to assess anxiety in each relational domain. *Attachment-related avoidance* concerns the strategies that people use to regulate their attachment behavior in specific relational contexts. People with high scores are uncomfortable with closeness and dependency (e.g., "I don't feel comfortable opening up to this person"), whereas people with low scores are comfortable using others as a secure base and safe haven ("I find it easy to depend on this person"). Six items were used to assess avoidance in each relational domain.

Before completing the relationship-specific ratings, participants were asked to rate slightly modified versions of the items with respect to how they "generally think and feel in close relationships." We used these responses for the purposes of assessing global attachment styles. To summarize, each individual rated nine items for each of the following domains: global attachment, attachment to mother, attachment to father, attachment to romantic partners, and attachment to nonromantic best friends. In cases in which people did not have a current romantic partner, we instructed them to "please answer these questions with respect to how you felt in your most recent meaningful relationship with someone. If you have never been in a romantic relationship with someone, imagine what such a relationship would be like." We analyze

Table 1
Descriptive Statistics and Correlations for All Study Variables

	Study 1			Study 2			Correlations														
Variable	*M*	*SD*	Skew	*M*	*SD*	Skew	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	28.53	11.51	1.20	30.44	12.25	1.07	—	.06	.23	−.48	−.51	.17	.06	−.13	−.06	−.15	.17	.03	.06	.05	−.08
2. Male	0.22	0.42	1.32	0.20	0.40	1.47	.07	—	−.07	−.02	−.05	−.06	−.04	−.05	.02	−.09	.01	−.02	.02	.16	.07
3. Involved	0.53	0.50	−0.14	0.58	0.49	−0.32	.20	−.04	—	−.10	−.07	.03	.02	−.27	−.03	−.10	.03	.02	−.24	.04	−.10
4. Mom alive	0.92	0.27	−3.08	0.91	0.28	−2.90	−.39	−.03	−.05	—	.37	−.10	−.04	.08	.02	.08	−.03	−.03	−.02	−.03	.01
5. Dad Alive	0.85	0.36	−1.98	0.82	0.39	−1.65	−.49	−.03	−.08	.32	—	−.15	−.07	.03	.00	.05	−.12	.04	−.09	−.06	.01
											Anxiety										
6. Mother	2.28	1.60	1.26	2.24	1.53	1.27	.19	−.06	.02	−.13	−.13	—	.44	.27	.35	.38	.54	.18	.19	.21	.22
7. Father	2.57	1.72	0.99	2.59	1.71	0.94	.14	−.02	.01	−.13	−.11	.45	—	.27	.29	.36	.22	.57	.17	.17	.19
8. Partner	3.97	1.84	−0.03	3.72	1.84	0.12	−.12	−.05	−.30	.05	.05	.23	.21	—	.33	.61	.14	.16	.44	.10	.22
9. Friend	2.89	1.61	0.68	2.71	1.54	0.85	−.05	−.01	−.05	.01	−.03	.31	.31	.29	—	.46	.21	.17	.16	.50	.27
10. Global	4.47	1.62	−0.35	4.17	1.67	−0.16	−.13	−.12	−.10	.03	.06	.30	.28	.53	.44	—	.25	.22	.26	.18	.28
											Avoidance										
11. Mother	3.62	1.67	0.34	3.56	1.70	0.34	.23	.01	.00	−.05	−.11	.48	.18	.11	.17	.20	—	.31	.21	.24	.35
12. Father	4.20	1.66	−0.01	4.16	1.70	0.07	.10	.01	−.01	−.08	.00	.14	.50	.11	.18	.20	.30	—	.15	.18	.30
13. Partner	2.83	1.29	0.69	2.72	1.25	0.77	.12	.01	−.22	−.06	−.07	.19	.14	.41	.14	.20	.20	.17	—	.24	.41
14. Friend	2.59	1.18	0.85	2.49	1.15	0.95	.08	.16	.06	−.05	−.06	.12	.14	.07	.48	.12	.18	.18	.20	—	.47
15. Global	3.75	1.19	0.12	3.51	1.23	0.28	−.02	.08	−.11	−.04	−.04	.15	.17	.17	.23	.24	.29	.27	.40	.42	—

Note. Correlations for Study 1 are listed in lower matrix, and correlations for Study 2 are listed in upper matrix. The male, involved, mom alive, and dad alive variables are dummy coded (0 = false, 1 = true) such that the means represent the percentage of the sample that is, for example, male. The standard error of the correlations is approximately ±.02.

the romantic partner data separately for those in and those not in romantic relationships in the results that follow. For all five relationship domains, reliabilities for the anxiety and avoidance subscales were high (in Sample 1, αs ranged from .81 [global avoidance] to .92 [avoidance with mother]).

The means and standard deviations for each of the attachment dimensions, along with their intercorrelations across relational domains, are reported in Table 1. Similar to other reports, (e.g., Fraley et al., 2011; Klohnen et al., 2005), people's levels of anxiety tended to be moderately correlated across domains. People who were relatively anxious in their relationships with their partner, for example, also tended to report some degree of attachment-related anxiety in their relationship with their mothers. The same was true for avoidance. Attachment-related anxiety and avoidance tended to correlate moderately to highly with each other within each relational domain—a finding that is common among instruments based on the ECR-R or among samples of older individuals involved in long-term, intimate relationships (see Cameron, Finnegan, & Morry, 2012). Moreover, the global attachment ratings were moderately related to specific ratings in each domain but seemed to be a stronger reflection of variation in peer (partner, friend) relationships than parental ones (mother, father).

Taxometric Procedures

To address the types versus dimensions question, we used three taxometric procedures developed by Meehl and his colleagues: MAXCOV-HITMAX (MAXCOV; Meehl, 1973; Meehl & Yonce, 1996), MAMBAC (Meehl & Yonce, 1994), and L-Mode (Waller & Meehl, 1998). MAXCOV is one of the most widely used taxometric methods for addressing questions about taxonicity (for a detailed overview of MAXCOV, see Meehl, 1973; Waller & Meehl, 1998). In MAXCOV, one examines the covariance between two indicators of a latent construct as a function of a third indicator. The function characterizing these conditional covariances is called a MAXCOV function, and its shape depends on the categorical status of the latent variable under investigation. For example, if the latent variable is categorical with a base rate of 0.50, the MAXCOV curve tends to have a mountain-like peak. In samples in which the base rate is less than 0.50, the peak will be shifted to the right; in samples in which the base rate is larger than 0.50, the peak will be shifted to the left. If the latent variable is continuous, however, the MAXCOV curve will tend to resemble a flat line (for graphical illustrations, see Fraley & Spieker, 2003a).

MAMBAC (Meehl & Yonce, 1994) is a related taxometric procedure that is based on computing the mean difference between cases located above versus below a sliding cut score. Specifically, for any pair of indicators, one indicator is designated as the "input" and the other as the "output" indicator. The cases are then sorted from lowest to highest along the input indicator, and, at various regions along that input variable, cases are split into two groups with respect to the output indicator, and the mean difference between those two groups is saved. The MAMBAC function is the plot of those conditional mean differences across varying values of the input variable. Importantly, when the latent variable is categorical, the function will be peaked. In contrast, when the latent variable is continuous, the function characterizing the ordered mean differences will be concave.

The L-Mode procedure (Waller & Meehl, 1998) is based on examining the distribution of factor score estimates for the first factor extracted from a principal axis factor analysis of the indicators of a taxon. When the data are generated by a latent categorical model, the distribution of factor scores will be bimodal, with the location of the modes and their relative heights providing information about the base rate of the latent class. In contrast, when the data are generated by a latent dimensional model, the distribution of factor scores will be unimodal.

Historically, researchers have evaluated the output of taxometric methods by studying the shape of taxometric functions subjectively. Recently, however, Ruscio et al. (2007) developed useful tools for comparing quantitatively the empirical functions against those expected under categorical and dimensional models. In the present report, we focus on their *comparison curve fit index* (CCFI) as a way of determining whether the data are more compatible with a categorical or dimensional model. The CCFI can range from 0 to 1, with values of 0 being most compatible with a dimensional model and values of 1 being most consistent with a categorical model. Although there are no strict cutoffs in how to interpret the CCFI, Ruscio and his colleagues have recommended that CCFI values falling between .40 and .60 be interpreted with caution because they do not clearly rule out one model in favor of the other (Ruscio et al., 2007). Importantly, the CCFI can be computed separately on the basis of the output of MAXCOV, MAMBAC, and L-Mode analyses. Thus, when multiple taxometric procedures are used, the average CCFI across those procedures can be interpreted as a robust way of evaluating the evidence (see Ruscio et al., 2010). Recent simulation studies indicate that thresholds of .45 and .55 for the average CCFI perform comparatively well in discriminating latent dimensions from latent types (Ruscio et al., 2010).

Simulation of Taxonic and Dimensional Comparison Data

Historically, investigators using taxometric methods have compared the empirical patterns against the prototypical or idealized patterns expected under alternative theoretical models. This has the potential to be problematic, however, because the specific form that taxometric curves take can be sample dependent and can vary greatly depending on the statistical properties of the variables being analyzed (e.g., skewness, average interitem covariance). When indicators are skewed, for example, the resulting MAXCOV curves can be suggestive of categories, even if the data were generated from a known dimensional model (see Ruscio et al., 2006). This issue has the potential to be a problem for the assessment of attachment-related anxiety because, arguably, people in long-term relationships should be less likely to believe that their partners will abandon them given that they have yet to do so (see Table 1). One solution to this problem is to compare the empirical patterns against those that would be expected with simulated data that have the same statistical properties as the empirical data (e.g., similar variances, skewness) but were generated under alternative (i.e., categorical or dimensional) models. To do so, we simulated data using the R routines developed by Ruscio et al. (2006). Specifically, we simulated data for hypothetical individuals by generating scores from models in which the latent variable was either continuously distributed or categorical. Importantly, how-

ever, the simulated data were constructed to have distributional properties similar to those of the empirical data (i.e., similar means, standard deviations, skews, and interitem covariances). In short, this method allowed us to capture the surface-level statistical properties of the observed variables (i.e., their means, standard deviations, skew, and interitem correlations) while allowing us to vary the latent structure that generated them (i.e., categorical vs. continuous; Hankin, Fraley, Lahey, & Waldman, 2005; Ruscio et al., 2004). For the purposes of simulating categorical data, we used base rates derived from the empirical estimates in the actual analyses rather than theoretically derived base rate values.

As might be expected, simulated curves generated under each model within each procedure can vary from one simulation to the next because of random sampling errors. To quantify this variation, we simulated data under each kind of model (dimensional and categorical) 100 times to approximate sampling distributions for the functions expected under each model for MAXCOV, MAMBAC, and L-Mode. In the analyses that follow, we illustrate the average empirical functions (denoted as connected points in the figures) and the middle 50% of expected functions (solid gray areas). This latter region captures the range of taxometric functions that are expected 50% of the time under each theoretical model given sampling error.

Results

We present the results separately for attachment-related avoidance and anxiety. We present the results for global attachment in detail (including graphical output) to facilitate the interpretation of the findings. Owing to space constraints, however, we do not include graphical output for each domain. Such graphs are available as supplemental materials, along with the raw data and the R taxometric routines, at https://osf.io/qd9z2/. Also, for the purposes of narrative, we focus on the results of Sample 1. The CCFI results for Sample 2 are also reported in Tables 2 and 3; moreover, the graphical results are available at OSF.

Global Attachment

Avoidance. To examine whether variation in global avoidant attachment was more compatible with a categorical or dimensional model, we conducted taxometric analyses on the six items that were used to assess global avoidance, after reverse-scoring items that were keyed in the secure direction. Twenty cases contained missing data. As such, the analyses were based on 2,379 of the 2,399 cases available for analysis. The CCFI values from each analysis, along with the categorical base rate estimates from each analysis, are summarized in Table 2.

The averaged empirical MAXCOV curve was most similar to that expected under a dimensional model as opposed to a categorical one (see upper row of Figure 2). The empirical curve falls within the region expected if the data were generated from a dimensional model but deviates markedly from what would be expected under a categorical model. The CCFI value was .230, indicating that, on average, the data were most compatible with a dimensional model of individual differences.

The averaged empirical MAMBAC function was also indicative of dimensionality. As can be seen in the middle row of Figure 2, the empirical MAMBAC function has a U shape, with a higher elevation on the right side—a pattern most compatible with data generated under a dimensional model with moderate skew. The CCFI value was .362, indicating that the MAMBAC analyses were most compatible with a latent dimensional model of attachment. As can be seen in the lower row of Figure 2, the empirical L-Mode function is most compatible with what would be expected under a dimensional versus a categorical model. The CCFI value based on this analysis was .373. The average of CCFI values across these three taxometric procedures was .322.

The results for Sample 2 were similar to those for Sample 1. Although the CCFI for the MAMBAC analysis of avoidance produced an ambiguous result (CCFI = .526), the average of the CCFIs across the three procedures was .321, indicating dimensionality. Overall, then, taxometric analyses of global avoidant attachment were indicative of an underlying dimension rather than underlying categories.

Anxiety. To examine whether variation in global attachment-related anxiety was more compatible with a categorical or a dimensional model, we conducted taxometric analyses on the three items that were used to assess global anxiety. Ten cases contained missing data. As such, the analyses were based on 2,389 of the 2,399 cases available for analysis. The CCFI values from each analysis, along with the categorical base rate estimates from each analysis, are summarized in Table 3.

Table 2
Taxometric Results Based on MAXCOV, MAMBAC, and L-Mode Analyses for Analyses of Attachment-Related Avoidance Across Various Domains

	CCFI	
Domain and measure	Sample 1	Sample 2
Global		
MAXCOV	.23	.20
MAMBAC	.36	.53
L-Mode	.37	.24
Average	.32	.32
Mother		
MAXCOV	.22	.11
MAMBAC	.35	.27
L-Mode	.33	.23
Average	.29	.20
Father		
MAXCOV	.24	.11
MAMBAC	.34	.33
L-Mode	.35	.21
Average	.31	.22
Partner (Involved)		
MAXCOV	.24	.22
MAMBAC	.31	.27
L-Mode	.34	.29
Average	.29	.26
Partner (Not involved)		
MAXCOV	.24	.25
MAMBAC	.37	.28
L-Mode	.37	.29
Average	.33	.27
Best friend		
MAXCOV	.26	.36
MAMBAC	.40	.58
L-Mode	.43	.46
Average	.36	.47

Note. CCFI = comparison curve fit index.

Table 3
Taxometric Results Based on MAXCOV, MAMBAC, and L-Mode Analyses for Analyses of Attachment-Related Anxiety Across Various Domains

	CCFI	
Domain and measure	Sample 1	Sample 2
Global		
MAXCOV	.22	.21
MAMBAC	.33	.23
L-Mode	.32	.56
Average	.29	.33
Mother		
MAXCOV	.26	.20
MAMBAC	.24	.47
L-Mode	.33	.30
Average	.28	.32
Father		
MAXCOV	.29	.29
MAMBAC	.18	.32
L-Mode	.31	.50
Average	.26	.37
Partner (Involved)		
MAXCOV	.21	.29
MAMBAC	.15	.16
L-Mode	.26	.25
Average	.21	.22
Partner (Not involved)		
MAXCOV	.27	.19
MAMBAC	.23	.25
L-Mode	.35	.32
Average	.28	.28
Best friend		
MAXCOV	.28	.31
MAMBAC	.21	.21
L-Mode	.50	.45
Average	.33	.32

Note. CCFI = comparison curve fit index.

The averaged empirical MAXCOV curve was most similar to that expected under a dimensional model as opposed to a categorical one (see upper row of Figure 3). The empirical curve falls within the region expected if the data were generated from a dimensional model but deviates markedly from what would be expected under a categorical model. The CCFI value was .216, indicating that, on average, the data were most compatible with a dimensional model of individual differences.

The averaged empirical MAMBAC function was also indicative of dimensionality. As can be seen in the middle row of Figure 3, the empirical MAMBAC function followed the expectations under a dimensional model. The CCFI value was .328, indicating that the MAMBAC analyses were most compatible with a latent dimensional model of attachment. As can be seen in the lower row of Figure 3, the empirical L-Mode function is most compatible with what would be expected under a dimensional versus a categorical model. The CCFI based on this analysis was .318. The average of CCFI values across these three taxometric procedures was .287.

The results based on Sample 2 were similar to those from Sample 1, with the exception that the L-Model analysis produced an ambiguous CCFI value. The average of the CCFI values across the three analyses, however, was .333. Overall, then, taxometric analyses of global anxious attachment were indicative of an underlying dimension rather than underlying categories.

Relationship-Specific Attachment

We also conducted separate taxometric analyses for the indicators of avoidance and anxiety within each of the four relationship-specific domains. We limited our analyses of mother and father attachment to those participants who reported that their mothers and fathers were still living (see Table 1 for frequencies). For romantic attachment, we conducted analyses separately for individuals who indicated that they were involved in romantic relationships and those who were not (see Table 1 for frequencies).

The results for avoidance and anxiety are tabulated in Tables 2 and 3, respectively. As can be seen, the CCFI values for each relationship domain generally fell between .00 and .40, providing greater support for a dimensional than a categorical model. The exception was for MAMBAC and L-Mode analyses of best friendships; those analyses were more ambiguous in both samples. More important, perhaps, none of the analyses were strongly consistent with latent categories.

In sum, none of the analyses provided evidence for a categorical model of individual differences in attachment. On the whole, it appeared that variation in avoidance and anxiety, both in general and within specific relationship domains, was continuously distributed. The findings for friends were a bit more ambiguous but were leaning more toward a dimensional than a categorical interpretation. Taken together, these findings are incompatible with the notion that global representations are more likely to show signs of dimensionality than relationship-specific domains. Moreover, they suggest that highly established relationships, such as the relationships people have with their parents, are no more or less likely to show signs of taxonicity than romantic relationships.

General Discussion

Do people vary continuously or categorically with respect to attachment styles? According to our taxometric analyses, individual differences in adult attachment styles are continuously distributed. This was the case not only at the level of global attachment representations but also in the context of specific relationships (e.g., attachment with mothers, fathers, romantic partners). Thus, the data were inconsistent with the hypothesis that attachment styles are categorical in the context of specific relationships even if they are continuous at a higher level of abstraction (i.e., global representations of attachment). The data were also inconsistent with the hypothesis that attachment styles in long-term or more established relationships (e.g., parental relationships) may be categorical even if attachment styles in younger, less established relationships (e.g., romantic ones) are not. People's relationships with their parents were just as likely to show signs of dimensionality as are their relationships with their romantic partners. Taken together, these data suggest that individual differences in adult attachment are best conceptualized and measured in a dimensional fashion regardless of the level of specificity and the type of relationship (e.g., parental or romantic).

Implications for Theory and Research

These findings suggest that researchers should conceptualize and assess individual differences using dimensional models of individual differences. Although many researchers do, in fact,

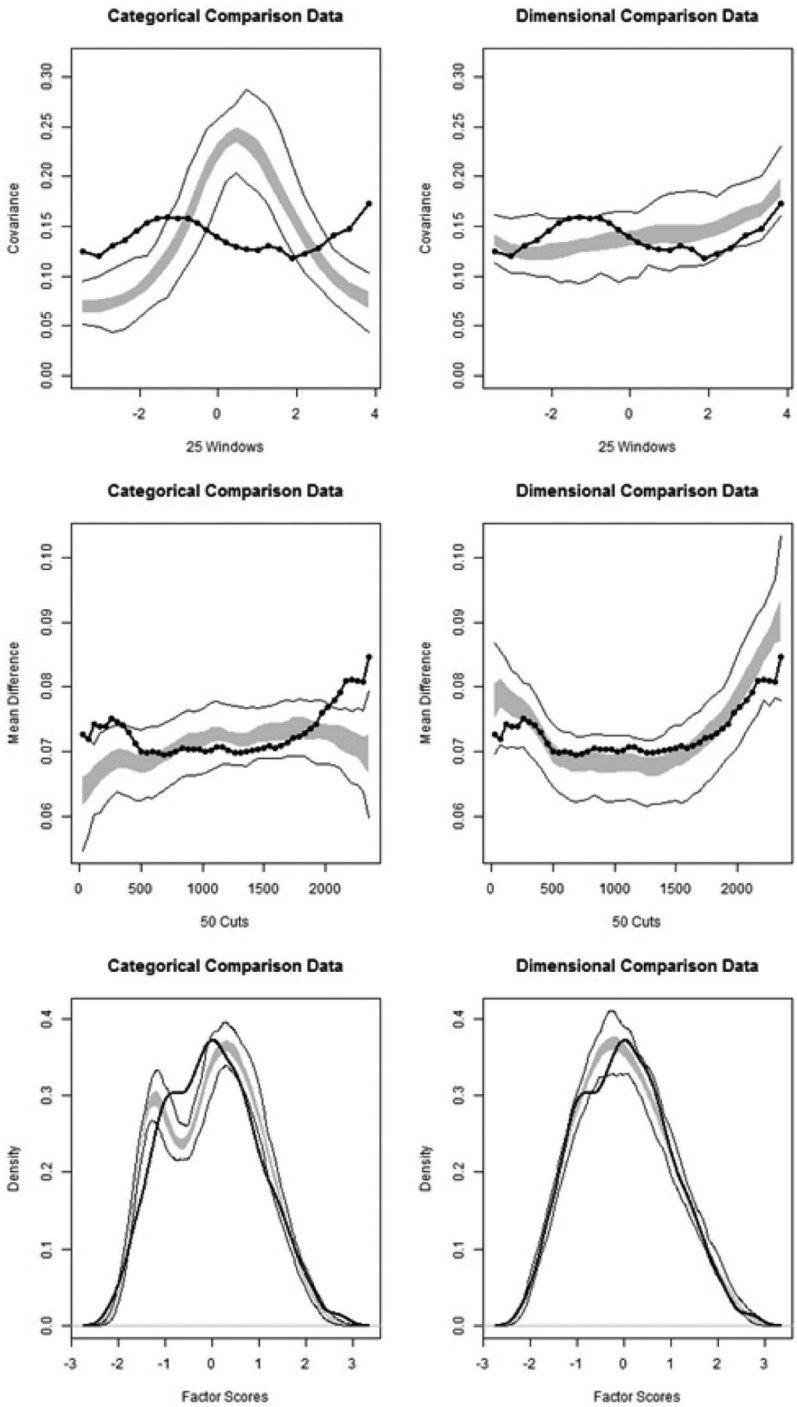

Figure 2. Taxometric functions for global indicators of attachment-related avoidance. The dark line in each panel represents the empirical function. The shaded region represents the range of values that would be expected 50% of the time under categorical or dimensional models. The first, second, and third rows illustrate MAXCOV, MAMBAC, and L-Mode results, respectively.

rely on dimensional models in theory and research, there are still a large number of researchers who conceptualize individual differences in categorical terms and who use their measurements (even when those are obtained using rating scales) to assign people to categories (for a review, see Ravitz et al., 2010). The findings from the present study suggest that such practices may misrepresent the nature of individual differences in attachment organization.

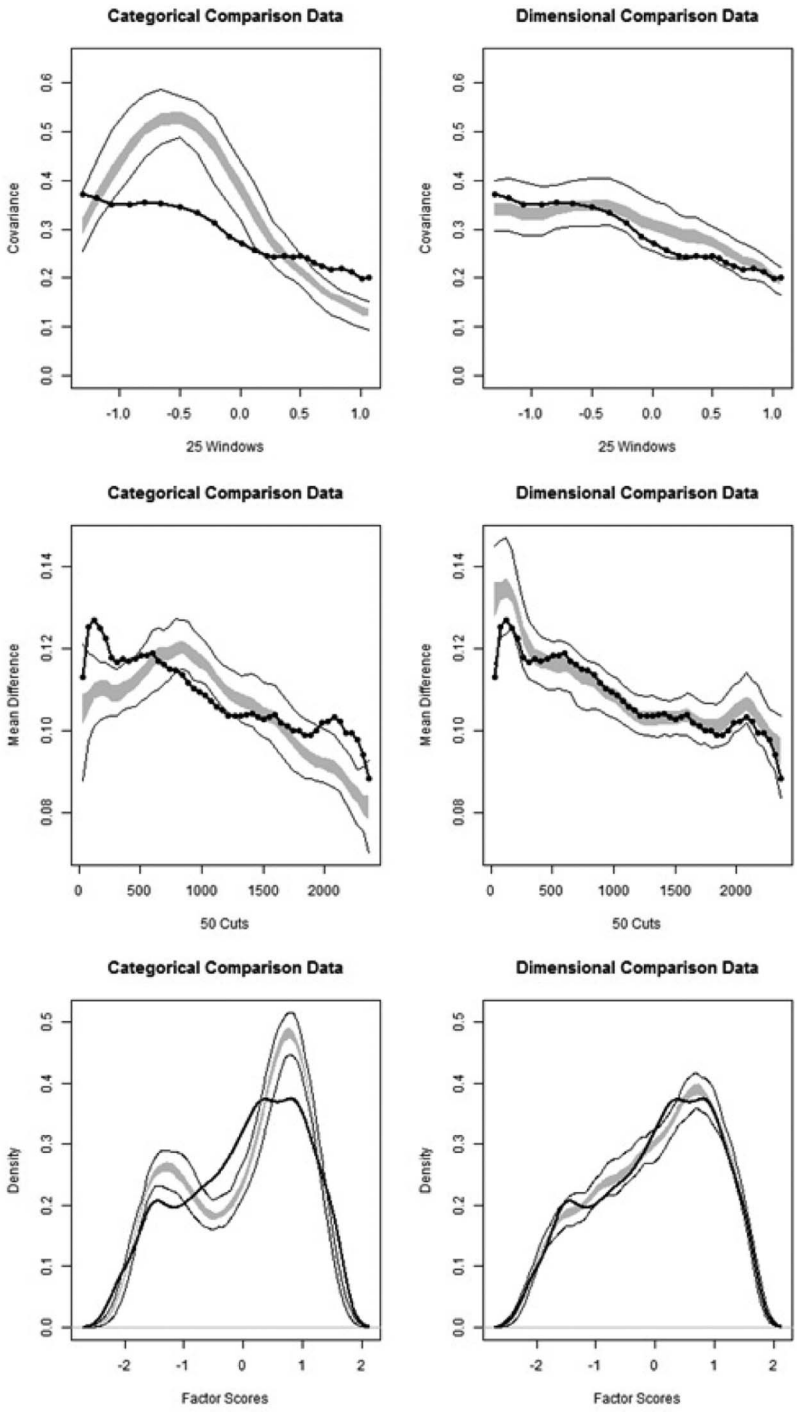

Figure 3. Taxometric functions for global indicators of attachment-related anxiety. The dark line in each panel represents the empirical function. The shaded region represents the range of values that would be expected 50% of the time under categorical or dimensional models. The first, second, and third rows illustrate MAXCOV, MAMBAC, and L-Mode results, respectively.

There are theoretical and practical limitations to the continued use of categorical models if, in fact, individual differences in attachment orientation are continuous. On the theoretical side, one of the problems is that the continued use of categorical models fundamentally distorts our understanding of the dynamics of adult attachment. In the four-category model, for example, researchers are naturally inclined to describe the types as involving four distinct psychologies. And although some scholars have high-

lighted the idea that preoccupied attachment, for example, is the psychological "opposite" of dismissing attachment (e.g., Griffin & Bartholomew, 1994a), it is not unusual for the various categories to be described and assessed as if they are mutually independent and distinctive.

A dimensional approach helps to underscore the notion that there are not necessarily four distinct "things" underlying the individual differences in attachment. In fact, the two-dimensional model that is often used in modern social-personality research helps make it clear that the psychological dynamics of interest can be understood with respect to two, rather than four, sources of variation. One interpretation of these dimensions holds that they reflect variation in the functioning of two key control processes in the attachment system (see Fraley & Shaver, 2000, 2008). Attachment-related anxiety, for example, is thought to reflect individual differences in the way in which people monitor and appraise the availability and accessibility of attachment figures. Attachment-related avoidance is thought to reflect variation in the way in which people regulate attachment-related thoughts, feelings, and behavior. This particular way of framing the dynamics would be difficult to achieve if we assumed that there were four distinct components instead of two.

Another problem with using categorical models if, in fact, individual differences are continuous, is that categorical models naturally lead to different kinds of questions about individual differences than what might be asked if one were using continuous assumptions. Consider etiology as an example. Many etiological models that involve categorical constructs tend to assume that there is a single or a limited number of causal variables that give rise to individual differences. In some respects, this way of thinking about etiology may seem natural in attachment research because, historically, attachment researchers have assumed that one of the primary determinants of attachment organization is parental sensitivity (Ainsworth et al., 1978). But recent research shows that the etiology of adult attachment styles can be relatively complex, potentially involving interpersonal experiences in the family of origin, peer relationships, relationship-specific dynamics, and potential genetic antecedents (e.g., Fraley, Roisman, Booth-LaForce, Owen, & Holland, 2013; Gillath, Shaver, Baek, & Chun, 2008). If we assume that individual differences are continuous, it seems natural to assume that multiple interpersonal factors play a role in shaping those individual differences. And, if we assume that those individual differences are categorical, it seems natural to ask instead questions about what factor leads people to belong in one category versus another.

There are also pragmatic limitations to using categorical models when the variation of interest is truly continuous. One limitation is the lack of measurement precision at the level of individual assessment. When a continuous variable is dichotomized, for example, a full 36% of the true score variance is discarded (see Cohen, 1983). This can have profound consequences in clinical or applied contexts when accurate assessments may have implications for diagnosis, constructing a treatment plan, or trying to map trajectories of change. Although these issues may be less critical when people have extreme scores with respect to the attachment dimensions, they can be problematic for people whose scores on the dimensions may place them near category boundaries. Indeed, if certain interventions are effective in producing change in attachment style, the use of categorical models may make it extremely difficult to detect gradual, yet real, change.

Another limitation of using categorical models when the variation is truly continuous concerns the lack of statistical power (i.e., the probability of detecting an effect when an effect truly exists). It has been repeatedly demonstrated that assigning people to categories on the basis of continuous scores can have negative and dramatic implications for statistical power (e.g., Fraley & Waller, 1998; MacCallum, Zhang, Preacher, & Rucker, 2002) More important, Maxwell and Delaney (1993) demonstrated that the use of categories in the presence of true continuous variables can lead to false positives—statistically significant findings that are, in fact, spurious. This issue becomes especially complex in the case of adult attachment because, theoretically, attachment styles are additive combinations of the dimensions of anxiety and avoidance (Fraley & Waller, 1998; Griffin & Bartholomew, 1994b). As a result, assigning a person to a category obscures their placement not only with respect to one dimension, but two, further undermining the statistical power of research designs and compounding problems concerning spurious findings.

We appreciate the notion that there is something intuitively compelling about typological thinking, not only in the study of adult attachment but in the study of personality and individual differences more generally. For example, some scholars have highlighted the notion that the use of dimensional models seems to make the attachment configurations seem less dynamic (e.g., Cassidy, 2003). This issue has been addressed in depth by Fraley and Spieker (2003b) in the context of debates about individual differences in infant attachment patterns, so we simply note here that it is possible to theorize in rich, dynamic ways about attachment regardless of whether one believes that individual differences in the way those dynamics function vary continuously or categorically across people. There is nothing inherently nondynamic about dimensional variation, just as there is nothing inherently dynamic about categories. Dimensional models contain all the richness and complexity of categorical ones but with one major difference—namely, if the individual differences of interest are continuous rather than categorical, dimensional models can capture that richness and complexity, whereas categorical models cannot.

In the early stages of research, theorists must make assumptions about whether the constructs of interest are categorical or continuous. And, in the context of adult attachment theory, we believe it was appropriate for theorists to assume that people can best be understood as belonging to one category or another. But one of Meehl's (1992, 1995) great insights was that assumptions about the distributions of latent variables can be tested empirically. In other words, scholars do not have to take these assumptions for granted; they can be scrutinized empirically and revised if the data suggest that alternative assumptions might be more appropriate. On the basis of our empirical tests, we believe that the categorical assumptions that once dominated the field of adult attachment—and which continue to persist (e.g., Ravitz et al., 2010)—are difficult to defend on empirical grounds. It is always possible that the conclusion we have reached regarding the dimensionality of attachment styles is incorrect—and we are open to that possibility. But, in the absence of compelling empirical evidence to the contrary, we no longer think it is defensible to use categorical measures in adult attachment research or to use continuous measures to assign people to categories.

Strengths and Limitations

One of the strengths of the present work is our use of two large samples to investigate the underlying structure of individual differences in attachment. Taxometric research generally requires large sample sizes, with some scholars suggesting a minimum of 300 participants (for a review of various recommendations, see Ruscio et al., 2006). The quantity of data examined here allows us to be relatively confident in the robustness of the general findings. A second strength of this work is that we were able to revisit the types versus dimensions issue in light of new developments in models of individual differences in attachment. We were able to study both individual differences in how people generally relate to attachment figures (i.e., global attachment representations) and how they think and feel in the context of specific relationships (e.g., relationships with parents and partners). Previous research on this issue (i.e., Fraley & Waller, 1998) only examined a general measure of attachment. Third, we used modern taxometric methods to analyze the data—methods that are much less subjective than methods that have previously been used. Finally, we preregistered our data collection and analytic plan for Sample 2, thereby helping to increase the transparency of the research—a feature that is increasingly useful in light of current debates on research practices in social and personality psychology (e.g., Asendorpf et al., 2013).

One of the limitations of the present research is that we focused exclusively on self-report measures of adult attachment. Bartholomew and her colleagues (e.g., Bartholomew & Horowitz, 1991) have developed interview-based measures of attachment that are inspired by the same theoretical framework that has driven the development of the self-report measures that are commonly used in social-personality psychology. It is possible that these interview methods may lead to different answers to the types versus dimensions question.

Another limitation of the present research is that we have not examined the differential predictive validity of categorical and continuous models. One could argue that, if attachment is best understood and assessed continuously, then measurements based on continuous models should predict attachment-relevant outcomes (e.g., relationship satisfaction, psychological well-being, coping with distress) better than (or at least not worse than) measurements based on categorical models. This research was not designed to examine this possibility.

A final caveat is that research on taxometrics continues to evolve. The methods we used in the present study reflect recent developments and improvements in taxometric methodology, but it is quite likely that these methods will continue to be refined. This could lead us to discover that the conclusions we have reached here are either incorrect or simply less definitive than we have portrayed them as being. What are the costs of using continuous models if, in fact, attachment styles are truly categorical? One potential consequence of such an error is that theorists would be adopting the wrong model of individual differences, leading to incorrect inferences about the underlying psychology of attachment styles and their potential etiology (see our earlier discussion). On the measurement front, however, we suspect that the consequences of using continuous measurements for categorical variables may be less costly than using categorical models for continuous constructs. One reason for this assumption is that, even when researchers are working with categorical models, it is often the case that continuous information is used to assign people to categories. For example, when Meehl's taxometric methods indicate that a latent construct is categorical, individuals are sorted into categories based on Bayesian probability estimates—estimates that vary continuously (Ruscio et al., 2006; Waller & Meehl, 1998). Thus, within the framework of modern taxometrics, classifications can only be as good as the continuous information that is used to make those classifications.

In closing, one of the long-standing issues in the study of adult attachment concerns the distribution of individual differences. The findings of the present research indicate that people vary continuously, not categorically, in their attachment styles. Moreover, this seems to be the case both with respect to global attachment representations and relationship-specific representations. We encourage future researchers both to conceptualize and measure individual differences in a continuous fashion.

References

Adamczyk, K., & Bookwala, J. (2013). Adult attachment and single vs. partnered relationship status in Polish university students. *Psihologijske Teme, 22,* 481–500.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Oxford, England: Erlbaum.

Asendorpf, J. B., Conner, M., De Fruyt, F., De Houwer, J., Denissen, J. J. A., Fiedler, K., . . . Wicherts, J. M. (2013). Replication is more than hitting the lottery twice. *European Journal of Personality, 27,* 120–144.

Bartholomew, K. (1990). Avoidance of intimacy: An attachment perspective. *Journal of Social and Personal Relationships, 7,* 147–178. http://dx.doi.org/10.1177/0265407590072001

Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology, 61,* 226–244. http://dx.doi.org/10.1037/0022-3514.61.2.226

Bowlby, J. (1973). *Attachment and loss: Vol. 2. Separation: Anxiety and anger*. New York: Basic Books.

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York: Guilford Press.

Cameron, J. J., Finnegan, H., & Morry, M. (2012). Orthogonal dreams in an oblique world: A meta-analysis of the association between attachment anxiety and avoidance. *Journal of Research in Personality, 46,* 472–476. http://dx.doi.org/10.1016/j.jrp.2012.05.001

Cassidy, J. (2003). Continuity and change in the measurement of infant attachment: Comment on Fraley and Spieker (2003). *Developmental Psychology, 39,* 409–412. http://dx.doi.org/10.1037/0012-1649.39.3.409

Cohen, J. (1983). The cost of dichotomization. *Applied Psychological Measurement, 7,* 249–253.

Collins, N. L., Guichard, A. C., Ford, M. B., & Feeney, B. C. (2004). Working models of attachment: New developments and emerging themes. In W. S. Rholes & J. A. Simpson (Eds.), *Adult attachment: Theory, research, and clinical implications* (pp. 196–239). New York: Guilford.

Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology, 58,* 644–663. http://dx.doi.org/10.1037/0022-3514.58.4.644

Collins, N., & Read, S. (1994). Cognitive representations of attachment:

The structure and function of working models. In K. Bartholomew & D. Perlman (Eds.), *Attachment processes in adulthood: Advances in personal relationships* (Vol. 5, pp. 53–90). London: Kingsley.

Conradi, H. J., & de Jonge, P. (2009). Recurrent depression and the role of adult attachment: A prospective and a retrospective study. *Journal of Affective Disorders, 116,* 93–99. http://dx.doi.org/10.1016/j.jad.2008.10.027

Cozzarelli, C., Hoekstra, S. J., & Bylsma, W. H. (2000). General versus specific mental models of attachment: Are they associated with different outcomes? *Personality and Social Psychology Bulletin, 26,* 605–618. http://dx.doi.org/10.1177/0146167200267008

Feeney, B. C., & Kirkpatrick, L. A. (1996). Effects of adult attachment and presence of romantic partners on physiological responses to stress. *Journal of Personality and Social Psychology, 70,* 255–270. http://dx.doi.org/10.1037/0022-3514.70.2.255

Feeney, J. A., Noller, P., & Hanrahan, M. (1994). Assessing adult attachment. In M. B. Sperling W. H. Berman (Ed.), *Attachment in adults: Clinical and developmental perspectives* (pp. 128–152). New York: Guilford Press.

Fraley, R. C. (2007). A connectionist approach to the organization and continuity of working models of attachment. *Journal of Personality, 75,* 1157–1180. http://dx.doi.org/10.1111/j.1467-6494.2007.00471.x

Fraley, R. C., & Heffernan, M. E. (2013). Attachment and parental divorce: A test of the diffusion and sensitive period hypotheses. *Personality and Social Psychology Bulletin, 39,* 1199–1213.

Fraley, R. C., Heffernan, M. E., Vicary, A. M., & Brumbaugh, C. C. (2011). The Experiences in Close Relationships–Relationship Structures Questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment, 23,* 615–625. http://dx.doi.org/10.1037/a0022898

Fraley, R. C., Roisman, G. I., Booth-LaForce, C., Owen, M. T., & Holland, A. S. (2013). Interpersonal and genetic origins of adult attachment styles: A longitudinal study from infancy to early adulthood. *Journal of Personality and Social Psychology, 104,* 817–838. http://dx.doi.org/10.1037/a0031435

Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology, 4,* 132–154. http://dx.doi.org/10.1037/1089-2680.4.2.132

Fraley, R. C., & Shaver, P. R. (2008). Attachment theory and its place in contemporary personality research. In O. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 518–541). New York: Guilford Press.

Fraley, R. C., & Spieker, S. J. (2003a). Are infant attachment patterns continuously or categorically distributed? A taxometric analysis of strange situation behavior. *Developmental Psychology, 39,* 387–404. http://dx.doi.org/10.1037/0012-1649.39.3.387

Fraley, R. C., & Spieker, S. J. (2003b). What are the differences between dimensional and categorical models of individual differences in attachment? Reply to Cassidy (2003), Cummings (2003), Sroufe (2003), and Waters and Beauchaine (2003). *Developmental Psychology, 39,* 423–429. http://dx.doi.org/10.1037/0012-1649.39.3.423

Fraley, R. C., Vicary, A. M., Brumbaugh, C. C., & Roisman, G. I. (2011). Patterns of stability in adult attachment: An empirical test of two models of continuity and change. *Journal of Personality and Social Psychology, 101,* 974–992. http://dx.doi.org/10.1037/a0024150

Fraley, R. C., & Waller, N. G. (1998). Adult attachment patterns: A test of the typological model. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 77–114). New York: Guilford Press.

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology, 78,* 350–365. http://dx.doi.org/10.1037/0022-3514.78.2.350

Gillath, O., Shaver, P. R., Baek, J. M., & Chun, D. S. (2008). Genetic correlates of adult attachment style. *Personality and Social Psychology Bulletin, 34,* 1396–1405. http://dx.doi.org/10.1177/0146167208321484

Gilovich, T., Keltner, D., Chen, S., & Nisbett, R. E. (2012). *Social psychology* (3rd ed.). New York: W. W. Norton & Company.

Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust Web-based studies? A comparative analysis of six preconceptions about Internet questionnaires. *American Psychologist, 59,* 93–104. http://dx.doi.org/10.1037/0003-066X.59.2.93

Griffin, D. W., & Bartholomew, K. (1994a). The metaphysics of measurement: The case of adult attachment. In K. Bartholomew D. Perlman (Ed.), *Advances in personal relationships: Vol. 5. Attachment processes in adulthood* (pp. 17–52). London: Jessica Kingsley.

Griffin, D. W., & Bartholomew, K. (1994b). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology, 67,* 430–445. http://dx.doi.org/10.1037/0022-3514.67.3.430

Hankin, B. L., Fraley, R. C., Lahey, B. B., & Waldman, I. D. (2005). Is depression best viewed as a continuum or discrete category? A taxometric analysis of childhood and adolescent depression in a population-based sample. *Journal of Abnormal Psychology, 114,* 96–110. http://dx.doi.org/10.1037/0021-843X.114.1.96

Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52,* 511–524. http://dx.doi.org/10.1037/0022-3514.52.3.511

Holland, A. S., Fraley, R. C., & Roisman, G. I. (2012). Attachment styles in dating couples: Predicting relationship functioning over time. *Personal Relationships, 19,* 234–246. http://dx.doi.org/10.1111/j.1475-6811.2011.01350.x

Kaitz, M., Bar-Haim, Y., Lehrer, M., & Grossman, E. (2004). Adult attachment style and interpersonal distance. *Attachment & Human Development, 6,* 285–304. http://dx.doi.org/10.1080/14616730412331281520

Klohnen, E. C., Weller, J. A., Luo, S., & Choe, M. (2005). Organization and predictive power of general and relationship-specific attachment models: One for all, and all for one? *Personality and Social Psychology Bulletin, 31,* 1665–1682. http://dx.doi.org/10.1177/0146167205278307

Konrath, S. H., Chopik, W. J., Hsing, C. K., & O'Brien, E. (2014). Changes in adult attachment styles in American college students over time: A meta-analysis. *Personality and Social Psychology Review, 18,* 326–348. http://dx.doi.org/10.1177/1088868314530516

Larsen, R. J., & Buss, D. M. (2010). *Personality psychology: Domains of knowledge about human nature* (4th ed.). New York: McGraw-Hill.

MacCallum, R. C., Zhang, S., Preacher, K. J., & Rucker, D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods, 7,* 19–40. http://dx.doi.org/10.1037/1082-989X.7.1.19

Malley-Morrison, K., You, H. S., & Mills, R. B. (2000). Young adult attachment styles and perceptions of elder abuse: A cross-cultural study. *Journal of Cross-Cultural Gerontology, 15,* 163–184. http://dx.doi.org/10.1023/A:1006748708812

Mandara, J. (2003). The typological approach in child and family psychology: A review of theory, methods, and research. *Clinical Child and Family Psychology Review, 6,* 129–146. http://dx.doi.org/10.1023/A:1023734627624

Maxwell, S. E., & Delaney, H. D. (1993). Bivariate median splits and spurious statistical significance. *Psychological Bulletin, 113,* 181–190. http://dx.doi.org/10.1037/0033-2909.113.1.181

McWilliams, L. A., & Asmundson, G. J. G. (2007). The relationship of adult attachment dimensions to pain-related fear, hypervigilance, and catastrophizing. *Pain, 127,* 27–34. http://dx.doi.org/10.1016/j.pain.2006.07.020

Meehl, P. E. (1973). MAXCOV-HITMAX: A taxonomic search method for loose genetic syndromes. In *Psychodiagnosis: Selected papers* (pp. 200–224). Minneapolis: University of Minnesota Press.

Meehl, P. E. (1992). Factors and taxa, traits and types, differences of degree and differences in kind. *Journal of Personality, 60,* 117–174. http://dx.doi.org/10.1111/j.1467-6494.1992.tb00269.x

Meehl, P. E. (1995). Bootstraps taxometrics: Solving the classification problem in psychopathology. *American Psychologist, 50,* 266–275. http://dx.doi.org/10.1037/0003-066X.50.4.266

Meehl, P. E., & Yonce, L. J. (1994). Taxometric analysis: I. Detecting taxonicity with two quantitative indicators using means above and below a sliding cut (MAMBAC procedure). *Psychological Reports, 74,* 1059–1274.

Meehl, P. E., & Yonce, L. J. (1996). Taxometric analysis: II. Detecting taxonicity using covariance of two quantitative indicators in successive intervals of a third indicator (MAXCOV procedure). *Psychological Reports, 78,* 1091–1227. http://dx.doi.org/10.2466/pr0.1996.78.3c.1091

Meredith, P., Strong, J., & Feeney, J. A. (2006). Adult attachment, anxiety, and pain self-efficacy as predictors of pain intensity and disability. *Pain, 123,* 146–154. http://dx.doi.org/10.1016/j.pain.2006.02.025

Mikulincer, M., Ein-Dor, T., Solomon, Z., & Shaver, P. R. (2011). Trajectories of attachment insecurities over a 17-year period: A latent growth curve analysis of the impact of war captivity and posttraumatic stress disorder. *Journal of Social and Clinical Psychology, 30,* 960–984. http://dx.doi.org/10.1521/jscp.2011.30.9.960

Myers, D. (2012). *Social psychology* (11th ed.). New York: McGraw-Hill.

Overall, N. C., Fletcher, G. J. O., & Friesen, M. D. (2003). Mapping the intimate relationship mind: Comparisons between three models of attachment representations. *Personality and Social Psychology Bulletin, 29,* 1479–1493. http://dx.doi.org/10.1177/0146167203251519

Ravitz, P., Maunder, R., Hunter, J., Sthankiya, B., & Lancee, W. (2010). Adult attachment measures: A 25-year review. *Journal of Psychosomatic Research, 69,* 419–432. http://dx.doi.org/10.1016/j.jpsychores.2009.08.006

Reis, H. T., & Carothers, B. J. (2014). Black and white or shades of gray: Are gender differences categorical or dimensional? *Current Directions in Psychological Science, 23,* 19–26. http://dx.doi.org/10.1177/0963721413504105

Rholes, W. S., Simpson, J. A., Kohn, J. L., Wilson, C. L., Martin, A. M., III, Tran, S., & Kashy, D. A. (2011). Attachment orientations and depression: A longitudinal study of new parents. *Journal of Personality and Social Psychology, 100,* 567–586. http://dx.doi.org/10.1037/a0022802

Rogers, P. (2012–2013). Investigating the relationship between adult attachment style and belief in the paranormal: Result for two studies. *Imagination, Cognition and Personality, 32,* 393–425. http://dx.doi.org/10.2190/IC.32.4.e

Rusby, J. S. M., & Tasker, F. (2008). Childhood temporary separation: Long-term effects of the British evacuation of children during World War 2 on older adults' attachment styles. *Attachment & Human Development, 10,* 207–221. http://dx.doi.org/10.1080/14616730802113737

Ruscio, J., Haslam, N., & Ruscio, A. M. (2006). *Introduction to the taxometric method: A practical guide*. Mahwah, NJ: Erlbaum.

Ruscio, J., Ruscio, A. M., & Keane, T. M. (2004). Using taxometric analysis to distinguish a small latent taxon from a latent dimension with positively skewed indicators: The case of involuntary defeat syndrome. *Journal of Abnormal Psychology, 113,* 145–154. http://dx.doi.org/10.1037/0021-843X.113.1.145

Ruscio, J., Ruscio, A. M., & Meron, M. (2007). Applying the bootstrap to taxometric analysis: Generating empirical sampling distributions to help interpret results. *Multivariate Behavioral Research, 42,* 349–386. http://dx.doi.org/10.1080/00273170701360795

Ruscio, J., Walters, G. D., Marcus, D. K., & Kaczetow, W. (2010). Comparing the relative fit of categorical and dimensional latent variable models using consistency tests. *Psychological Assessment, 22,* 5–21. http://dx.doi.org/10.1037/a0018259

Schmitt, D. P., Alcalay, L., Allensworth, M., Allik, J., Ault, L., Austers, I., . . . ZupanÈiÈ, A. (2004). Patterns and universals of adult romantic attachment across 62 cultural regions: Are models of self and of other pancultural constructs? *Journal of Cross-Cultural Psychology, 35,* 367–402. http://dx.doi.org/10.1177/0022022104266105

Sibley, C. G., & Overall, N. C. (2008). Modeling the hierarchical structure of attachment representations: A test of domain differentiation. *Personality and Individual Differences, 44,* 238–249. http://dx.doi.org/10.1016/j.paid.2007.08.003

Simpson, J. A. (1990). Influence of attachment styles on romantic relationships. *Journal of Personality and Social Psychology, 59,* 971–980. http://dx.doi.org/10.1037/0022-3514.59.5.971

Waller, N. G., & Meehl, P. E. (1998). *Multivariate taxometric procedures: Distinguishing types from continua*. Newbury Park, CA: Sage.

Wearden, A. J., Lamberton, N., Crook, N., & Walsh, V. (2005). Adult attachment, alexithymia, and symptom reporting: An extension to the four category model of attachment. *Journal of Psychosomatic Research, 58,* 279–288. http://dx.doi.org/10.1016/j.jpsychores.2004.09.010

Welch, R. D., & Houser, M. E. (2010). Extending the four-category model of adult attachment: An interpersonal model of friendship attachment. *Journal of Social and Personal Relationships, 27,* 351–366. http://dx.doi.org/10.1177/0265407509349632

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