Patterns of Stability in Adult Attachment: An Empirical Test of Two Models of Continuity and Change

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One of the core assumptions of attachment theory is that attachment representations are stable over time. Unfortunately, the data on attachment stability have been ambiguous, and as a result, alternative theoretical perspectives have evolved to explain them. The objective of the present research was to evaluate alternative models of stability by studying adults in 2 intensive longitudinal investigations. Specifically, we assessed attachment representations in 1 sample (N = 203) daily over a 30-day period and in the other sample (N = 388) weekly over a year. Analyses show that the patterns of stability that exist in adult attachment are most consistent with a prototype model—a model assuming that there is a stable factor underlying temporary variations in attachment. Moreover, although the Big Five personality traits exhibited a pattern of stability that was similar to that of attachment, they did not account for the stability observed in attachment.

Keywords: attachment styles, stability, personality, trait–state models

During the past 4 decades, John Bowlby's (1969/1982, 1973, 1980) attachment theory has become one of the leading theoretical frameworks for understanding social development, personality processes, and close relationships. In brief, Bowlby's theory was designed to explain the nature of a child's tie to his or her caregivers and the impact of that bond on subsequent adjustment throughout the life course. Attachment theory emphasizes the role of early experiences in shaping the beliefs a child constructs concerning the responsiveness and trustworthiness of significant others. According to the theory, an individual who is cared for in a responsive and consistent manner develops the expectation that others will be available and supportive when needed (Ainsworth, Blehar, Waters, & Wall, 1978). Such expectations, or *working models,* contribute to the way people subsequently regulate their attachment behavior and can have an important impact on shaping an individual's social development and interpersonal relationships.

One of the core assumptions of attachment theory is that people's working models are relatively stable over time. Indeed, this assumption is one reason why the theory has become such an appealing one for scholars in developmental, social, and personality psychology. However, this assumption has not gone unchallenged. Some psychologists have argued on theoretical grounds that there is little reason to assume that working models should be stable (e.g., Lewis, 1997). Moreover, the empirical data on the stability of working models has been ambiguous, with some researchers reporting moderate to high degrees of stability over long periods of time (e.g., Waters, Merrick, Treboux, Crowell, & Albersheim, 2000) and others reporting little to no stability (e.g., Lewis, Feiring, & Rosenthal, 2000). As a result, alternative theoretical models of stability have emerged in the literature, making it increasingly difficult for scholars to offer a consensual response to one of the most fundamental issues in the field.

The objective of the present article is to address some longstanding questions about stability and change in working models of attachment. We begin by reviewing the debate on attachment stability, drawing attention to two alternative perspectives that have evolved in the literature: the prototype and revisionist perspectives (Fraley, 2002). Next, we discuss some methodological limitations of previous research on stability. One of the key points we make is that the methods that are typically used to answer questions about continuity and change are, paradoxically, incapable of doing so. To address this problem, we present some contemporary methods based on developmentally inspired trait–state models (e.g., Fraley & Roberts, 2005; Kenny & Zautra, 1995, 2001) and show how those methods can be used to derive and differentiate alternative theoretical predictions. Finally, we test those predictions in two intensive longitudinal studies on attachment in adults who were followed daily over a period of 30 days in one sample and weekly over the course of a year in the other.

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We should note from the outset that our primary interest is in understanding stability and change in parental and romantic attachment among adults, as it is typically conceptualized and measured among social and personality psychologists (e.g., Hazan & Shaver, 1987). However, we begin by contextualizing the debate with respect to the child developmental literature on attachment, both for historical reasons and because the debates that exist in the social-psychological literature have their intellectual origins in the developmental literature.

Alternative Models of Stability and Change in Attachment

At least two distinct theoretical perspectives on stability and change have emerged in the literature on attachment (see Fraley, 2002). Some theorists have argued that individual differences in attachment are driven, in part, by a stable, latent factor—sometimes referred to as a *prototype.* According to the *prototype perspective,* a system of nonlinguistic representations, procedural rules of information processing, and behavioral strategies is constructed in early childhood and serves as an adaptation to the individual's early caregiving environment. This prototype is believed to influence interpersonal dynamics throughout the life course, lending continuity to a person's relational experiences (Sroufe, Egeland, Carlson, & Collins, 2005). Although this perspective assumes that working models can change over time, it holds that there is a stable factor underlying the variance in those representations. As Sroufe, Egeland, and Kreutzer (1990, p. 1364) noted,

> earlier [attachment] patterns may again become manifest in certain contexts, in the face of further environmental change, or in the face of certain critical developmental issues. While perhaps latent, and perhaps never even to become manifest again in some cases, the earlier pattern is not gone.

(See Owens et al., 1995; Roisman, Collins, Sroufe, & Egeland, 2005; Sroufe et al., 1990, for further discussion.) Advocates of the prototype hypothesis have cited studies that demonstrate stability over long spans of time as evidence for their claims (e.g., Waters, Merrick, et al., 2000). For example, Waters and his colleagues have shown that attachment assessed in infancy predicts attachment assessed at 18 years of age (Waters, Merrick, et al., 2000).

Although the prototype hypothesis has been widely advocated among attachment scholars, it has not been without its critics. Indeed, one of the most heated debates in the attachment literature concerns the stability of individual differences (see Fraley, 2002, for a review). Critics of the prototype hypothesis have argued that working models are relatively fluid structures that, by design, should be sensitive to changes in people's social environments (e.g., Kagan, 1996; Lewis, 1997). Thus, although working models may be somewhat resistant to change, the changes that do occur over time should accumulate in a fashion that would make it difficult to predict attachment security over the long run (Lewis, 1997, 1999). One reason this may happen is that some of the factors that shape people's interpersonal environments are uncorrelated with the working models that they already hold. For example, a parent may feel stressed over a professional deadline and, as a result, fail to be responsive or sensitive to his or her child's needs. This change in behavior is likely to impact the child's security to some degree. In this example, the change in the interpersonal environment is theoretically uncorrelated with the working models of either person. As such, the child's working models will be partially revised or updated in a manner that is unrelated to the security of existing working models.

The existence of contextual or revisionist dynamics has led several scholars to raise the question of whether it is appropriate for attachment researchers to assume prima facie that working models are stable (e.g., Kagan, 1996; Lewis, 1997, 1999). If people's representations are gradually modified to account for stochastic sources of variation in their environments, the accumulation of such changes over time will make it difficult to predict who will be secure and who will be insecure in the long run. It is important to note that this perspective, which we refer to as the *contextual* or *revisionist perspective* throughout this article, does not necessarily imply that there will be no stability in attachment. The essence of the perspective is that there is nothing inherently stable in the process (such as a latent prototype) that is anchoring change.

Conceptual and Methodological Challenges in Studying Stability and Change in Attachment

One reason that attachment researchers have been unable to resolve debates about stability is that they tend to focus almost exclusively on the degree of stability that exists in individual differences. For example, advocates of revisionist/contextual views on attachment dynamics have highlighted the small magnitude of the test–retest coefficients reported in the literature (e.g., Lewis et al., 2000), whereas advocates of the prototype hypothesis have drawn attention to the high degree of stability that has been found across expansive time frames (e.g., Waters, Hamilton, & Weinfield, 2000). Although the magnitude of stability estimates is not irrelevant to understanding the stability of attachment, the magnitude of these estimates explains very little about the processes that give rise to stability and change (see Fraley, 2002; Fraley & Brumbaugh, 2004; Fraley & Roberts, 2005). To illustrate this point, consider a hypothetical situation in which researchers assess security in a sample of individuals and, 3 months later, assess security again. Assume that the researchers find a test–retest correlation of .51 across these two time points. At face value, it would seem that the stability in security is relatively modest—a finding that some scholars would interpret as evidence for a prototype perspective on stability but that others would interpret as evidence for contextual/revisionist processes. However, consider the ways in which one's understanding of stability might differ if one had access to additional data. Assume that the researchers go on to conduct follow-up assessments and find that the association between initial measures of security and security assessed 6 months later is .26 and that the test–retest correlation between the initial assessment and the one taken 10 months later is .11. In other words, as the temporal interval between assessments increases (e.g., 3 months, 6 months, 10 months), the test–retest correlation gets smaller and smaller, ultimately approaching 0.00 in the limit (see the solid curve in Figure 1). This pattern of associations, often referred to as a simplex or quasi-simplex pattern (see Kenny & Campbell, 1989), suggests that although security might be moderately stable over brief periods of time, stability is ephemeral and will not persist as the time interval increases.

Contrast this scenario with another. Assume instead that the researchers find that the test–retest correlation for security is .51

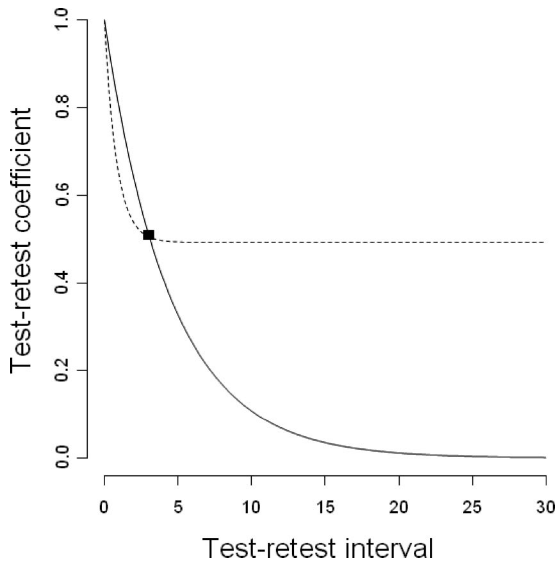

Figure 1. The ambiguity of test–retest correlations. In this example, a single test–retest correlation of .51 is compatible with two hypotheses: (a) that the test–retest correlations will diminish to 0.00 as the size of the test–retest interval increases (the solid line) and (b) that the test–retest correlations have a nonzero limiting value as the test–retest interval increases (the dashed line).

over 3 months, .51 over 6 months, and .51 over 10 months (see the dashed line in Figure 1). In this example, the stability of individual differences over a 3-month period is just as large as the stability observed over a 10-month period. This particular pattern has dramatically different implications than the previous one. Namely, it suggests that although stability might be somewhat modest in an absolute sense, the stability coefficients themselves are highly stable. As we explain in more detail below, this pattern of associations suggests that, regardless of how high or low the test–retest correlation might be, underlying the variance in security is a highly stable, enduring factor (Kenny & Zautra, 1995).

It is important to note that these fundamentally distinct empirical outcomes cannot be differentiated using traditional methods for analyzing data from longitudinal studies in developmental, social, and personality psychology. Many empirical studies based on longitudinal data sets report data from only two assessment waves, thereby making it impossible to discern the pattern of associations over time (i.e., whether those associations are approaching zero in the limit or stabilizing at a nonzero value). As illustrated in Figure 1, a test–retest correlation of .51 between security assessed on two occasions is consistent with dramatically different patterns of stability. This suggests that another approach is needed for evaluating alternative models of stability and change.

What Are the Implications of Alternative Perspectives on Stability and Change?

To evaluate alternative models of stability and change, it is useful to have a more precise understanding of the predictions the models make about the kinds of test–retest correlations that should be observed over time. Unfortunately, it is difficult to move beyond crude predictions about whether stability should be high or low without formal, mathematical models of the processes in question. In this section, we present some formal models of the prototype and revisionist perspectives and explore those models to illustrate the ways in which they converge and diverge in their implications. As we show below, the models do not differ so much with respect to the magnitude of stability that they predict (i.e., whether test–retest coefficients should be high or low), but they differ greatly in the pattern of coefficients that they entail—a finding that has enormous implications for understanding stability and change.

The basic structural model shown in the left-hand panel of Figure 2 represents some of the mechanisms of stability and change entailed by a prototype perspective (see Fraley, 2002;

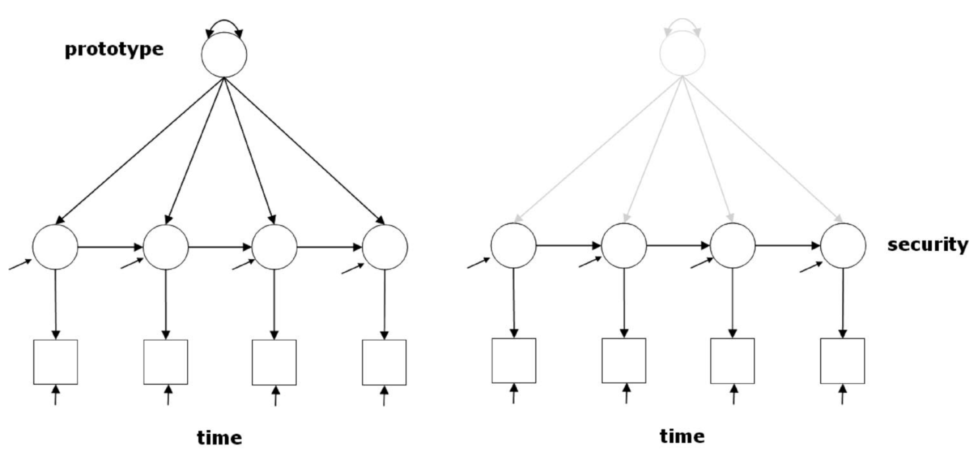

Figure 2. Models of stability and change in attachment. The left-hand panel illustrates a simple model of security assuming that, at any point in time, security is a function of (a) previous values of security, (b) a stable prototype, and (c) residual sources of variance that are uncorrelated with the previous factors. The right-hand panel illustrates the assumptions of a basic revisionist/contextual model by setting the variance of the prototype to 0.00.

Fraley & Roberts, 2005, for more mathematical details). The model assumes that security at any point in time is a function of security at the time point immediately preceding it, along with residual variance that is unrelated to preexisting levels of security. Moreover, the model assumes that there is a latent factor (i.e., a prototype) that is stable over time that contributes to security at each assessment wave. This model is statistically similar to and inspired by the well-known trait–state–error or STARTS model described by Kenny and Zautra (1995, 2001).

What does this model predict about stability and change in attachment? To answer this question, one can substitute numeric values into the various parameters of the model and solve the equations for the test–retest correlation matrix of security across all measurement occasions. Unfortunately, due to their size and complexity, it is not informative to present a variety of test–retest correlation matrices to summarize the predictions of the model. However, the basic patterns in these matrices can be illustrated efficiently through the use of stability functions—a graphical means for representing slices (i.e., rows or columns) from the full test–retest correlation matrix. A *Time* k *stability function* is a mathematical function that characterizes the form of stability, quantified by test–retest correlations, that should be observed in a construct between Time *k* and all other times (Fraley & Roberts, 2005). For example, if one were to assess security once a day for 30 days, a Time 1 stability function would characterize the expected test–retest correlation between security measured on Day 1 and Day 2, Day 1 and Day 3, Day 1 and Day 4, and so on. A Time 15 stability function would characterize the expected test–retest correlation between security measured at Day 15 and all days prior to it (Days 1–14) and all days following it (i.e., Days 16–30).

The upper row of Figure 3 illustrates the Time 1, Time 15, and Time 30 stability functions predicted by the prototype model under a variety of parameter values over a 30-day period. Under the assumptions of a prototype model, the Time 1 stability functions start relatively high and decrease as the length of the test–retest interval increases (see the upper left-hand panel of Figure 3). Importantly, however, the prototype model predicts that the Time 1 stability functions will not decline indefinitely; they approach a nonzero limiting value and stay there as the test–retest interval increases. For example, the test–retest correlation implied by the upper Time 1 stability function is .51 over 10 days, 15 days, and 30 days. The stability functions that go backward in time have similar properties. For example, the Time 30 stability functions in the upper right panel that illustrate the correlations between security assessed at Day 30 and all time points prior to that point also have nonzero asymptotic properties. However, it is important to note that the forward and backward stability functions are not symmetric. Holding the model parameters constant (see the uppermost functions of the panels in the first row of Figure 3), the Time 1 stability function represents test–retest correlations that are lower on average than those represented by the Time 30 functions. This is a relatively unique prediction that does not follow from the kinds of autoregressive models typically studied in the educational and developmental literature (see Kenny & Campbell, 1989). This asymmetry occurs because, at later time points in the model, the factors influencing security are more likely to be correlated among themselves than they are early in the process. In this respect, the model naturally captures the coherence that tends to develop between people and their intra- and interpersonal worlds over time (see Fraley & Roberts, 2005) and helps to buffer the overall

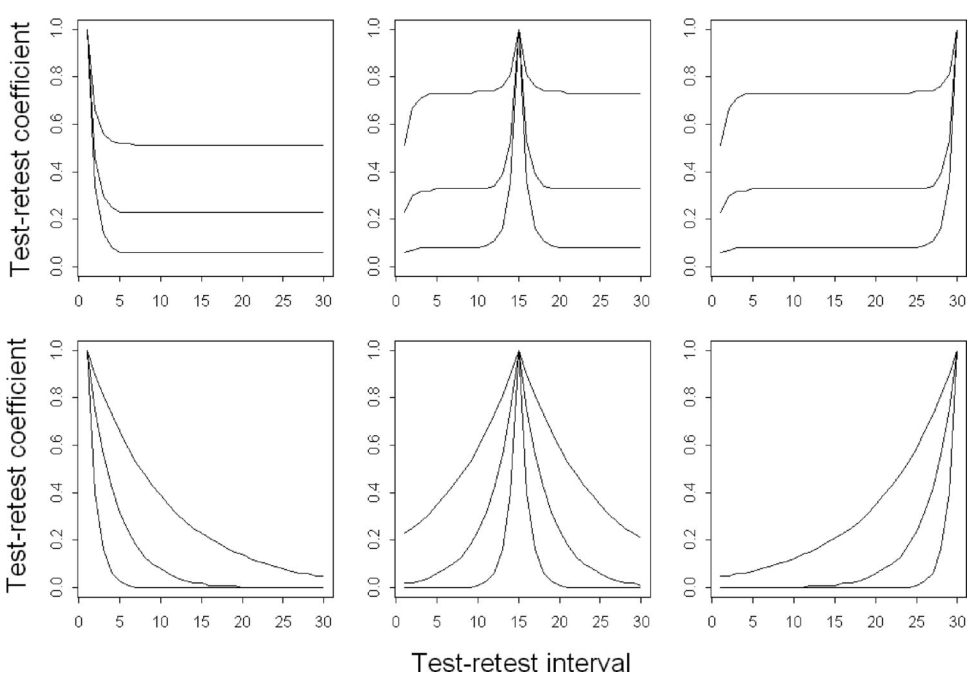

Figure 3. Stability functions under varying conditions. The upper row illustrates Time 1, Time 15, and Time 30 stability functions under the assumption of a prototype model. The lower row illustrates Time 1, Time 15, and Time 30 stability functions under the assumption of a revisionist/contextual model. The various curves in each row illustrate model predictions under varying parameter values.

stability of individual differences. (The technical reasons for the asymmetry and the dip on the extreme left side of the curves are discussed in more depth in the Results section.)

Another noteworthy implication of the model is that stability does not need to be high if a latent prototype is driving a portion of the variance in working models. Depending on the specific parameters used, the overall magnitude of stability observed can be high or low (see the curves of various elevations within each panel of the top row of Figure 3). This indicates that the raw magnitude of a stability coefficient between any two time points is neither consistent nor inconsistent with the predictions of a prototype model.

To summarize, the prototype model makes two kinds of predictions. First and most important, it implies that it is possible for stability over a period of 5 days to be as high as stability over a period of 5 months. The test–retest correlations approach a nonzero value asymptotically as the length of the test–retest interval increases. Second, it predicts that stability functions will be asymmetric. That is, the retest correlations observed moving forward in time (e.g., the correlation between Time 1 and Time 5) will tend to be lower than retest correlations observed when looking backward in time (e.g., the correlation between Time 30 and Time 25) over comparable intervals. Taken together, these are relatively risky predictions in the broader study of social, developmental, and personality psychology. Moreover, it would be difficult to anticipate them in the absence of examining a formal model of the processes in question.

We can compare these patterns with those expected under revisionist/contextual assumptions. According to the revisionist perspective, there is not a stable prototype underlying security at each measurement occasion. This assumption can be formalized by setting the variance of the prototype in the previous model to 0.00 (see the right-hand panel of Figure 2). Some illustrative stability functions resulting from this model are presented in the lower row of Figure 3. Notice that the Time 1 stability functions start relatively high and decrease as the length of the test–retest interval increases. This is a consequence of the autoregressive structure of the model (see Kenny & Campbell, 1989). Importantly, a revisionist/contextual model predicts that the Time 1 stability functions approach 0.00 as the test–retest interval gets larger. This suggests that even if one were to observe a high degree of stability over an interval of, say, 6 weeks, one would expect that stability to dissipate as the interval increases. Although the functions might not reach 0.00 in the limited and finite duration of an empirical study, the asymptotic value is clear nonetheless and can be estimated without an empirical value of 0.00 actually being observed (see Fraley, 2002; Fraley & Roberts, 2005). It is also noteworthy that the Time 1 and the Time 30 stability functions are mirror images of one another. Unlike the functions entailed by the prototype model, the ones produced by the revisionist/contextual model are symmetric. Finally, it should be noted that, at any one point in time, a single test–retest correlation can be high or low, depending on the specific parameters that are substituted into the equations. This is of interest because the revisionist perspective is often used as a way of predicting or explaining a lack of stability. However, these simulations demonstrate clearly that it is possible within the context of a revisionist/contextual model to observe a high test–retest correlation between two measurement occasions even if there is no prototype contributing to stability over time.

Patterns of Stability in Attachment

There are two critical implications of the theoretical analyses we have presented up to this point. First, one cannot differentiate the predictions of prototype and contextual models by assessing attachment security at only two points in time—the kind of data that have historically been presented in the literature to argue in favor of or against alternative views of stability. Both models can account for small or large test–retest correlations between any two time points with a simple adjustment of their parameters. Second, although the models do not differ in the magnitude of the correlations they predict, they do differ in the patterns of correlations they predict (i.e., the symmetry of the stability functions and their asymptotic properties). Therefore, it is possible to test alternative models of stability and change by utilizing multiwave data and uncovering the patterns of stability that exist in those data.

Fraley (2002) attempted to do just that by examining patterns of stability in attachment using meta-analytic data on longitudinal samples of children who had been assessed in the strange situation at 12 months of age and at least one other time point between 1 year of age and 18 years of age. According to his analyses, the test–retest stability of security was approximately .39 from 1 to 2 years old, as well as from 1 to 18 years old—a pattern of results that cannot be explained exclusively by a revisionist/contextual perspective. These findings suggest that a prototype-like model is capable of explaining the patterns of stability that exist from infancy to young adulthood.

However, Fraley's (2002) data were limited in three crucial ways. First, because the data were obtained via meta-analysis, no one sample in the analysis contained data from multiple measurement occasions. Moreover, because the study was limited to samples that had used the strange situation at 12 months of age, Fraley was only able to examine Age 1 stability functions, despite the fact that the prototype and revisionist models also make distinct predictions about the full matrix of test–retest coefficients. Second, attachment security was assessed in distinct ways over time. This is necessary, of course, because security manifests itself in different ways as children develop. However, if the methods used to assess attachment at 12 months of age and late adolescence are more precise and refined than those used to assess attachment in early and middle childhood, then the data will conform more to the predictions of a prototype model than a revisionist model for reasons that have more to do with measurement artifacts than true developmental processes.

Finally, Fraley's (2002) analysis was restricted to studies of early childhood attachment. During the past 2 decades, however, scholars have become interested in understanding not only the quality of attachment relationships in childhood but also the quality of parental and romantic attachments in adulthood (e.g., Hazan & Shaver, 1987). Indeed, the study of attachment in adulthood is a thriving area of research in contemporary social and personality psychology, and attachment theory has become one of the leading theoretical frameworks for the study of close relationships in adulthood. As such, the fact that researchers do not know whether prototype-like or revisionist/contextual processes better explain patterns of stability and change in adult parental and romantic relationships represents a significant gap in the understanding of attachment processes.

Not surprisingly, the same kinds of debates about stability that exist in developmental literature have also appeared in the social-personality literature. Many scholars have advocated, either explicitly or implicitly, for the prototype hypothesis. Indeed, one of the more widely cited findings in the social-psychological literature is that attachment security assessed in a sample of women at 27 years of age correlated approximately .55 with attachment security assessed at 52 years of age (Klohnen & Bera, 1998)—a finding that reinforces the assumption that working models are highly stable constructs. In contrast, other scholars have argued that it is naïve or potentially incorrect to assume that working models are stable over long periods of time (e.g., Duck, 1994; Hendrick & Hendrick, 1994). For example, Baldwin and his colleagues found that self-report measures of attachment had low test–retest correlations and that relatively simple experimental manipulations were sufficient to lead people to report different attachment styles (Baldwin & Fehr, 1995; Baldwin, Keelan, Fehr, Enns, & Kohs-Rangarajoo, 1996). On the basis of such evidence, Baldwin and Fehr (1995) concluded that attachment security is not properly regarded as "an enduring general disposition or trait" (p. 247).

Questions about stability in adulthood are complicated by the fact that individual differences in adult attachment tend to be associated with the Big Five personality traits (see Noftle & Shaver, 2006, for a review). Neuroticism, for example, often correlates moderately and positively with attachment-related anxiety; Agreeableness and Extraversion often exhibit small to moderate negative associations with attachment-related avoidance. Given that some theorists conceptualize personality traits as being highly stable entities (e.g., Costa & McCrae, 1994, 2006; but see B. W. Roberts, Walton, & Viechtbauer, 2006), it is possible that personality traits might explain the patterns of stability that exist in adult attachment. To the best of our knowledge, no one has examined this possibility.

Objectives of the Present Investigation

The objective of the present research was to address some long-standing debates about the stability of attachment representations in adulthood. To do so, we studied adults who were involved in romantic relationships in two intensive longitudinal investigations. Specifically, we assessed parental and romantic attachment representations and personality traits in one sample daily over a 30-day period and in the other sample weekly over a 12-month period. This research was designed to help answer three questions. First, what patterns of stability exist in individual differences in adult attachment? Second, are the empirical patterns of stability consistent with a theoretical perspective which assumes that a stable prototype underlies temporary fluctuations in attachment security? Third, if there is evidence of a stable prototype, can it be understood as arising from basic personality traits, such as the Big Five?

Method

Participants were recruited from the Champaign–Urbana (Illinois) community via university announcements and newspaper ads. To participate in the research, people were required to be involved in a dating or marital relationship. Although the longitudinal portion of our data collection took place through the use of Internet surveys, we scheduled initial in-person, laboratory sessions with our research participants to establish rapport, obtain a set of basic measurements (e.g., demographic variables, detailed information about the nature of their relationships), establish the availability of Internet access, and illustrate how the online surveys worked. During the initial laboratory session, participants were allowed to choose a unique user name and password that they then used to log into the survey site for subsequent sessions.

We recruited two nonoverlapping samples of participants for three reasons. First, we wanted to examine stability at different time scales. As such, one sample was followed daily, and the other was followed weekly. Second, we wanted a means to determine whether the frequency of participation had an impact on the patterns of stability observed. If fundamentally different patterns emerged from the two samples, it would suggest that those patterns represent assessment artifacts rather than reflecting something important about the nature of stability and change in attachment. Finally, we wanted to be able to establish the replicability of any critical findings.

The first sample, which we refer to as the *daily sample* from this point forward, was composed of 203 people who participated once a day for 30 days in the online data collection. Seventy-two percent of this sample was female, with an average age of 21 years (SD = 3.7). The majority of the sample was Caucasian (79%) and Hispanic (7%). Eighty-one percent of the participants described themselves as being involved in exclusive dating relationships. Eleven percent described themselves as married (n = 17) or engaged to be married (n = 7). The remainder of the sample described their relationships as casual. The average relationship length was 25.6 months (SD = 29) at the start of the study. The second sample, which we refer to as the *weekly sample* from this point forward, was composed of 382 people who participated online once a week for 45 weeks. Sixty-five percent of this sample was female, with an average age of 22.5 years (SD = 6.3). The majority of the sample was Caucasian (72%) and Chinese American (9%). Seventy-one percent of the participants described themselves as being in exclusive dating relationships. Twenty percent described themselves as being married (n = 64) or engaged (n = 11). The remainder of the sample described their relationships as casual. The average relationship length was 29.6 months (SD = 37) at the start of the study. Participants were paid approximately 10% of their total stipend up front. Participants in the daily sample were paid $50 total if they completed the study; participants in the weekly sample were paid $150 total. Participants who dropped out of the study early were paid in a way that was proportional to their participation. At the conclusion of the study, participants were provided with detailed feedback about the way their attachment scores had changed over the course of the study via a customized, online website that summarized their data.

Several steps were taken to minimize the possibility that patterns of stability would be influenced by asking participants to answer the same questions across multiple sessions. First, the self-report items, which are described in more depth below, were designed to assess states (i.e., how people currently feel) rather than the way in which people typically behave and feel. Because people's behaviors, feelings, and perceptions of themselves and their relationships can vary in legitimate ways from one session to the next, we wanted to ensure that participants would not feel compelled to respond in ways that were similar to ways they had responded in the past. Second, although the order in which the questionnaires appeared in each online session was the same for each session, the order of items presented within a questionnaire was randomized within each session. Thus, although the content of the items surely became familiar to the participants over multiple sessions, it was not viable to respond in an automatic, stereotyped manner to each online survey. Third, we employed two samples—each with a different frequency of participation (i.e., once a day vs. once a week). As shown below, the results from the two samples were quite consistent, suggesting that frequency of responding did not impact the data in any appreciable way.

Measures

Each online assessment session had four sections designed to assess: (a) parental and romantic attachment representations, (b) personality traits, (c) relationship functioning and life experiences, and (d) a construct selected at random during each session from a bank of several other measures that are not examined as part of the present report. A typical online assessment session took 10 to 15 min to complete. For the purposes of the present report, we focus on the self-reports of attachment and personality traits.

Attachment representations. To assess individual differences in attachment orientation, we used the Experiences in Close Relationships–Relationship Structures questionnaire (ECR-RS; Fraley, Heffernan, Vicary, & Brumbaugh, in press). 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. (In the present report, we focus on the first three of these domains.) Nine items are used to assess attachment in each domain, leading to 36 items total. Within each relational domain, the ECR-RS assesses two dimensions: 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"). Attachment-related avoidance concerns the strategies that people use to regulate their attachment behavior in specific relational contexts. On the high end of this dimension are people who are uncomfortable with closeness and dependency (e.g., "I don't feel comfortable opening up to this person"); on the low end are people who are more comfortable using others as a secure base and safe haven ("I find it easy to depend on this person"). The prototypical secure person is low on both of these dimensions.

Participants were instructed to rate each item with respect to how they felt at the moment. In other words, participants responded to the items with respect to their current state of mind, regardless of whether it was consistent or inconsistent with the way they had responded in the past. At the time we designed our research, there were no published measures for assessing attachment as a state (see Gillath, Hart, Noftle, & Stockdale, 2009). As such, we designed the ECR-RS for that purpose. Cronbach alphas based on the initial assessment session of both samples ranged from .81 (partner avoidance in the weekly sample) to .92 (father avoidance in the weekly sample).

Table 1 reports the means and standard deviations for each of the attachment dimensions, along with their intercorrelations across relational domains, based on data from the initial assessment session. As has been reported elsewhere in the literature (e.g., Cook, 2000; Klohnen, Weller, Luo, & Choe, 2005), the correlations tended to be moderately correlated across domains. People who were relatively anxious in their relationship with their partners, for example, also tended to report some degree of attachment-related anxiety in their relationship with their mothers. Moreover, attachment-related anxiety and avoidance tended to correlate moderately to highly 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 Finnegan & Cameron, 2009). Because of this association, when we conducted analyses on one attachment dimension (e.g., anxiety), as described in the sections that follow, we also conducted parallel analyses in which we controlled the variance in the other attachment dimension (e.g., avoidance). Because these statistical controls had no substantive influence on our results, we report the results from the original analyses.

Table 1
Summary of Correlations, Means, and Standard Deviations for Anxiety and Avoidance Within Each Relational Domain

	Anxiety			Avoidance		
Variable	1	2	3	1	2	3
Anxiety						
1. Mother	—	.44	.11	.51	.23	.11
2. Father	.36	—	.15	.22	.53	.16
3. Partner	.15	.15	—	.06	.12	.38
Avoidance						
1. Mother	.51	.12	.10	—	.40	.12
2. Father	.21	.49	.07	.50	—	.13
3. Partner	.08	.13	.41	.17	.19	—
M	1.39/1.48	1.44/1.61	2.22/1.92	2.78/2.94	3.47/3.55	1.67/1.65
SD	0.97/1.01	1.04/1.15	1.50/1.27	1.58/1.57	1.65/1.67	0.81/0.82

Note. Values below the diagonal represent correlations between variables in the daily sample. Values above the diagonal represent correlations between variables in the weekly sample. The left-hand means and standard deviations represent the descriptive summaries for the daily sample; the right-hand means and standard deviations represent the descriptive summaries for the weekly sample.

Big Five personality traits. Personality traits were assessed during each session using the Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003). The TIPI contains two items designed to assess each of the Big Five personality traits: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. As with the attachment items, participants were instructed to respond in a way that best characterized them at that moment, regardless of how they might have responded to the items in the past. The TIPI has been shown to be an effective means for assessing the Big Five personality traits in situations in which investigators are unable to administer longer questionnaires (see Gosling et al., 2003). The TIPI tends to correlate highly with other commonly used assessment instruments (Ehrhart et al., 2009; Gosling et al., 2003), and its scales have been shown to predict a number of theoretically relevant outcomes (e.g., Besser & Shackleford, 2007; Chamorro-Premuzic, Bennett, & Furnham, 2007). In the present samples, the internal consistency estimates for the five scales ranged between .40 (for Agreeableness in the weekly sample) and .77 (for Extraversion in the daily sample) during the initial assessment wave. It should be noted that some of these alphas are lower than what is commonly found in other personality inventories, but, as Gosling et al. (2003) explained, this is to be expected because the TIPI items were selected to represent as fully as possible the content domain, without regard to the homogeneity or redundancy of item content. The test–retest correlations of the TIPI scales (another method for estimating reliability) between Day 1 and Day 2 of the daily sample were quite high, ranging from .79 for Openness to .85 for Extraversion, in line with data reported by Gosling et al.

We also assessed the Big Five traits using the Big Five Inventory (BFI; John & Srivastava, 1999) during our initial in-lab assessment session and at random time points throughout the course of the projects. The findings we report below were the same regardless of whether we used the TIPI or the BFI as our measure of the Big Five traits; we focus on the TIPI results because the TIPI data were collected in tandem with the attachment data in each sample.

Attrition and Relationship Status

Overall, rates of attrition were low in the daily sample (93% of the initial sample participated until the end) and modest in the weekly sample (60% of the initial sample participated until the end). We sought to identify factors that might be related to attrition by examining the association between retention status and attachment, as assessed via the ECR-RS and the ECR-R; investment model constructs, as assessed via the Investment Model Scale (Rusbult, Martz, & Agnew, 1998); personality traits, as assessed via the TIPI; and sex. In the daily sample, none of these variables was related to retention with the exception of ECR-RS avoidance and anxiety with respect to the romantic partner. Specifically, people who were more anxious, $t(201) = 2.15$, $p < .05$, $d = .52$, and avoidant, $t(201) = 2.41$, $p < .05$, $d = .60$, in their romantic relationships had higher dropout rates than others. There was a tendency for Conscientiousness to be associated with retention as well, $t(201) = -1.82$, $p = .06$, $d = -.43$, such that highly Conscientious people were more likely to complete the study. We examined the same predictors of retention in the weekly sample and found that romantic attachment did not relate to retention as it did in the daily sample but that ECR-RS anxiety with mother did relate to retention. Specifically, people who had less anxious relationships with their mothers were more likely to complete the study, $t(385) = 2.94$, $p < .05$, $d = .28$. In addition, people who reported lower levels of Neuroticism via the TIPI were more likely to complete the study, $t(385) = 2.03$, $p < .05$, $d = .20$, as were people who reported higher levels of Conscientiousness, $t(385) = -4.04$, $p < .05$, $d = -.41$.

During each assessment, we included a question that was designed to ascertain whether the relationship was still intact. Of the individuals who participated until the end of the project, 38 had experienced a breakup (nine in the daily sample and 29 in the weekly sample). When a breakup was reported, the program that administered the online surveys continued to query participants about the relationship and its status but contextualized the relationship appropriately if individuals were broken up (i.e., the partner was acknowledged to be an ex-partner).

Results

Question 1: What Are the Empirical Patterns of Stability and Change in Attachment?

We proceeded in the general manner described by Fraley and Roberts (2005). We began by constructing the test–retest correlation matrix for each attachment dimension (i.e., avoidance and anxiety) within each relationship domain (i.e., mother, father, and partner) for each sample. The empirical continuity functions based on these matrices are illustrated in Figure 4 (daily sample) and Figure 5 (weekly sample). There are a number of noteworthy features of these empirical functions. First, the overall elevation of the functions is higher for attachment with parents than it is for attachment with partners. This indicates that even when a common set of items and dimensions are used, there appears to be more malleability in romantic attachment representations than parental ones.

Second, there does not appear to be any sizable difference in the magnitude or pattern of test–retest correlations as a function of the testing interval across the two samples. For example, if one focuses on the first 4 weeks of data from the weekly study, the kinds of correlations observed appear to be similar to those observed in the 30-day study. The correlations in the daily sample are a bit higher overall, suggesting that there might be some effect of answering the same questions once a day as opposed to once a week, but the difference is fairly small.

Third, the functions do not appear to be approaching 0.00 in the limit, as is implied by a revisionist/contextual model. For example, in both the daily and weekly samples, the test–retest stability of avoidance with mother tends to be approaching an asymptotic value of .80. And, although the overall elevation of the curves is lower for romantic attachment, the curves appear to reach a point at which increasing the test–retest interval does not lead to systematically smaller test–retest correlations. For example, in the weekly sample, the test–retest correlation for attachment avoidance with partner starts high but gradually approaches an asymptotic value of about .30 after 20 weeks and stays there.

Fourth, as anticipated by the prototype model, the Time 1 stability functions within each domain tend to be higher in elevation than the stability functions based on later time points. For example, in the daily

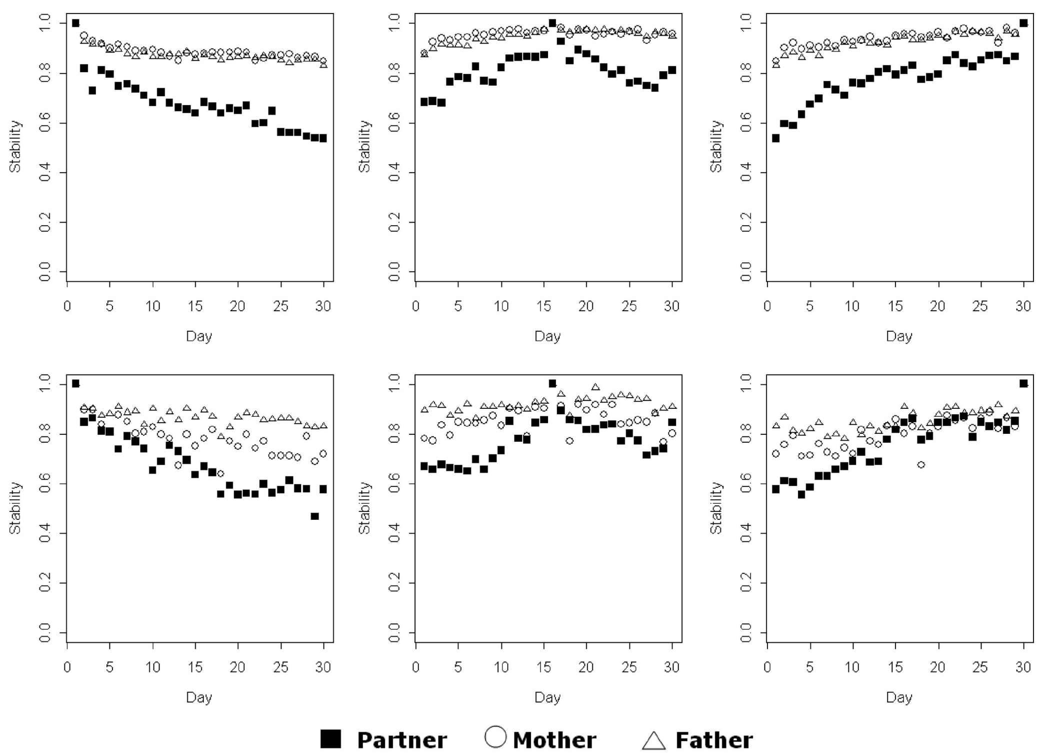

Figure 4. Empirical Time 1, Time 15, and Time 30 stability functions for attachment-related avoidance (top row) and anxiety (bottom row) in the daily sample.

sample, the average test–retest correlation for mother avoidance from Time 1 forward is about .80. However, the average test–retest correlation from Time 30 to each day prior to that is about .95. In summary, there is an asymmetry in the stability functions that is difficult to explain on the basis of a revisionist/contextual model but that is naturally entailed by the prototype model.

Question 2: Do Contextual or Prototype-Like Processes Better Account for Empirical Patterns of Stability and Change in Attachment?

To more formally evaluate alternative dynamic models of attachment, we developed a higher order system of linear structural equations that captured the casual mechanisms implied by both the prototype and contextual models (see Fraley & Roberts, 2005). The structure of this superordinate model is illustrated in the left-hand panel of Figure 2. In this framework, variation in attachment security is modeled partly as a function of a latent prototype—a construct that is assumed to be stable across time and circumstance. This model also allows security to carry over from one occasion to the next (i.e., security on Occasion k has direct effects on security at Occasion $k + 1$). These *autoregressive paths* and their corresponding residual terms capture the basic dynamics assumed by the contextual/revisionist model (see Fraley, 2002).

The core difference between the contextual model and the prototype model lies in the paths between the prototype and the manifestation of security at each point in time. The prototype model assumes that the prototype has a direct relation to security at each point in time, whereas the contextual model essentially assumes those paths are 0.00 (or, equivalently, that the variance of the prototype is 0.00; see the right-hand panel of Figure 2). In the analyses that follow, we examine the fit of a model in which each kind of parameter is estimated against one in which the variance of the latent prototype is fixed to 0.00.

To identify the parameters and to simplify the calibration of the model as much as possible, we made the following assumptions. First, we assumed the autoregressive paths were equivalent across assessment waves. Although this assumption necessarily undermines the absolute fit of the models, there is no way in which to derive from attachment theory which assessment waves will have larger coefficients than others. Thus, relaxing this constraint does not provide a better test of the theoretical principles per se, even if doing so produces better fit statistics (see S. Roberts & Pashler, 2000). Ultimately, we are less concerned with the absolute fit of the models and more concerned with their fit relative to one another. Second, we assumed that the attachment dimensions were measured with perfect precision by setting the paths from the attachment constructs to their measured counterparts to 1.00 and the corresponding measurement errors to 0.00. Although relaxing this assumption by using multiple indicators for each construct (e.g., via item parcels) improves the fit of each model, doing so requires that we shift the reader's attention away from the kinds of test–retest matrixes illustrated in Figures 4 and 5 and toward a matrix with multiple indicators. We opted to keep things as simple as possible so that we could focus on the differences between the two models.

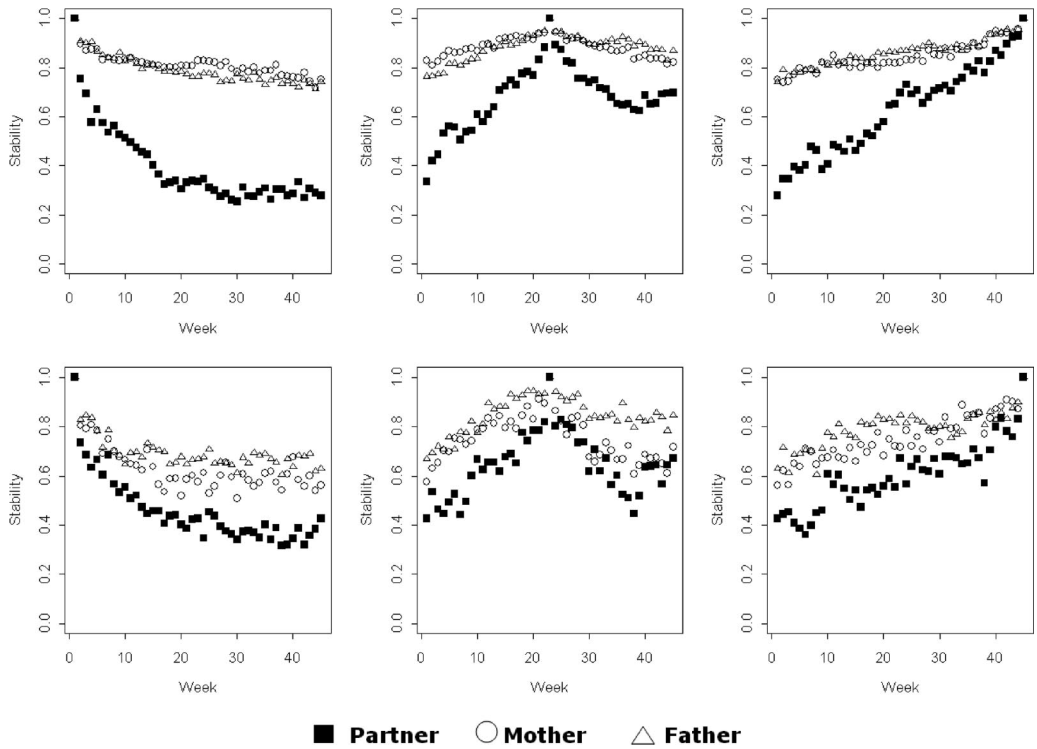

Figure 5. Empirical Time 1, Time 23, and Time 45 stability functions for attachment-related avoidance (top row) and anxiety (bottom row) in the weekly sample.

One important thing to note about the prototype model is that it implies that the covariation between Time 1 and all other times will necessarily be lower than other times because the natural or implied covariation among variables governed by the model's structure requires time to accumulate (see the upper row of Figure 3 for an illustration). This occurs because there are no variables feeding into Time 1 security beyond the latent prototype, whereas, once the dynamic processes get started, each manifestation of security is influenced by the prototype and levels of security from the previous occasion. The covariation among predictor variables that emerges helps to boost stability over time, allowing the model to predict that the elevation of the stability functions based on later time points (e.g., a Time 30 stability function) will be higher than those based on early time points (e.g., a Time 1 stability function). This asymmetrical feature of the model makes it an ideal one for modeling certain developmental phenomena (see Fraley & Brumbaugh, 2004; Fraley & Roberts, 2005). However, it also has the potential to create an artifact in the present situation because, although time in the model must begin somewhere, there is no reason to assume that the first measurement occasion in our study represents the actual starting point of the processes under empirical investigation. As such, beyond the asymmetries in the stability functions that can be seen in the upper row of Figure 3, the model also predicts a striking dip in the backward stability functions for the initial assessment wave. This dramatic dip has the potential to create a natural handicap in how well the prototype model can explain the data in an absolute sense and has the potential to disadvantage it against the revisionist/contextual model.

Some scholars have suggested a way around this issue by moving the autoregressive component of the model to the residuals rather than modeling the autoregressive process with respect to the construct of interest itself, as is done the in trait–state–occasion (TSO) model articulated by Cole, Martin, and Steiger (2005). The consequence of doing so is that the dramatic dip in the backward functions goes away. However, the TSO model also makes the forward and backward stability functions symmetric such that the Time 1 stability functions are mirror images of the Time 30 stability functions.[1] Because the empirical stability functions for attachment clearly had asymmetric properties (see Figures 4 and 5), we chose to focus on the version of the model that we articulated previously rather than on the TSO model. We should note, however, that we conducted TSO analyses and that although those analyses led to the same conclusions about the relative merits of

[1] Technically, the TSO model with a single indicator at each assessment wave is mathematically equivalent to Kenny and Zautra's (1995) STARTS model but with a subtle shift in focus. Namely, the measurements in Kenny and Zautra's formalization become states, and the errors in Kenny and Zautra's model are the occasions in the TSO model. Both models, while being similar to the ones upon which we focus, are different in some subtle ways. Most notably, in the TSO/STARTS formulation, the state-like component of security would not carry over from one point in time to the next. Instead, the only explanation of stability lies in the influence of the trait or prototype on security and the influence of residual terms (which contain an autoregressive structure in the TSO/STARTS model). The STARTS model also assumes that traits do not influence states and that neither are correlated at the first measurement occasion. Although the measured variable in the STARTS model is influenced by both the latent trait and the latent state, the latent trait does not influence the latent state—an assumption that is difficult to reconcile in the context of attachment theory.

the prototype and revisionist models, the absolute fits for the TSO model tended to be a bit worse than those from the original model because the TSO model could not account for the asymmetry in the stability functions that exists in the present data.

To review, two theoretical models were tested: one that assumed the presence of a latent prototype and one that did not (i.e., a revisionist/contextual model). All analyses were conducted in LISREL on the variance–covariance matrices using maximum-likelihood estimation. For each analysis, we report several traditional kinds of fit statistics, including the chi-square, the root-mean-square error of approximation (RMSEA), and the comparative fit index (CFI). We also report the standardized root-mean-square residual (SRMS)—a statistic that quite literally represents the average discrepancy between the empirical values and the model-implied values in a standardized (i.e., correlation) metric. When we reference absolute fit below, we are largely referring to the SRMS because that provides the most intuitive method for evaluating absolute fit. However, because our primary interest concerns the relative fit of the two models (i.e., a model that assumes a latent prototype and one that does not), we focus on comparative rather than absolute fit. Because the revisionist model is nested within the more inclusive prototype model, the relative fit of these two models can be evaluated simply by comparing the chi-square difference between them.

The results of our analyses are presented in Tables 2, 3, 4, and 5. We estimated the parameters of the general model and the constrained model (i.e., one in which the prototype variance was fixed to 0.00) separately for each attachment dimension within each relational domain within each sample. For avoidance with mother in the daily sample, the estimated prototype variance was 1.18, and the autoregressive path was .24. This model fit the data relatively well, $\chi^2(433, N = 203) = 1{,}734.33$, $p < .001$, $RMSE = .12$, $CFI = .92$, $SRMS = .06$. When we removed the prototype by fixing its variance to 0.00, the model did not fit the data as well, $\Delta\chi^2 = 460.96$, $p < .001$; $\chi^2(434, N = 203) = 2{,}195.29$, $p < .001$, $RMSE = .14$, $CFI = .81$, $SRMS = .28$. The resulting autoregressive parameter was .95.

This general finding emerged for each of the relational domains (i.e., mother, father, and partner), for both anxiety and avoidance, and for both the daily and weekly samples (see Tables 2–5 for details). For example, for anxiety with mother in the daily sample, the estimated prototype variance was .33, and the autoregressive path was .20. When we removed the prototype by fixing its variance to 0.00, the resulting model did not fit the data as well ($\Delta\chi^2 = 754.43$, $p < .001$). For avoidance with mother in the weekly sample, the estimated prototype variance was .88, and the autoregressive path was .32. When we removed the prototype by fixing its variance to 0.00, the model did not fit the data as well ($\Delta\chi^2 = 1{,}776.41$, $p < .001$). For anxiety with mother in the weekly sample, the estimated prototype variance was .37, and the autoregressive path was .23. When we removed the prototype by fixing its variance to 0.00, the model did not fit the data as well ($\Delta\chi^2 = 878.08$, $p < .001$). In short, in each relational context (i.e., mother, father, and partner), for each attachment dimension (i.e., anxiety and avoidance), and in each sample (i.e., daily and weekly), when we removed the assumption that there was a stable prototype contributing to the dynamics, the resulting contextual/revisionist models did not explain the data as well.

As discussed previously, one interesting feature of the data is that romantic attachment exhibited a lower degree of stability than parental attachment. One potential explanation for this is that romantic relationships are relatively new relationships compared to parental relationships. As such, it might be the case that people are more actively revising and updating their working models in the romantic domain relative to the parental domain and, thus, exhibit lower degrees of stability in their romantic relationships. One way to examine this possibility is by examining stability in the romantic domain separately among people who have been involved with their partner for long periods of time versus those who have entered into that relationship more recently. To do so we created younger relationships and older relationships subgroups for our daily and weekly samples by splitting each sample at the median relationship length (16 months in the daily sample and 19 months in the weekly sample). Overall, the degree of stability observed in older romantic relationships was higher than that observed in younger relationships ($r = .77$ vs. .68 in the daily sample and $r = .66$ vs. 58 in the weekly sample).[2]

Question 3: Do the Big Five Personality Traits Fully Explain Prototype-Like Patterns of Stability?

Thus far, our data suggest that a prototype model of stability and change provides a better fit to the data than a revisionist/contextual one. However, as explained in the introduction, it is possible that the prototype-like component of attachment might be due to the influence of personality traits on attachment. Although there are several ways this hypothesis can be tested, we focused on one method in particular. Namely, we regressed the Big Five personality traits on each attachment dimension, saved the unstandardized residuals, and then modeled the covariation among those residuals. This approach allows patterns of stability in attachment to be studied after removing the variance that the attachment dimensions share with the Big Five personality traits. If it is the case that basic personality traits, such as Neuroticism, are responsible for the prototype-like pattern of stability we have observed in attachment, then the residualized variance–covariance matrix will be better explained by a revisionist/contextual model than a prototype model. If the Big Five personality traits are not the sole factor giving rise to the prototype-like pattern of stability, then the prototype model should still be able to account for the data better

[2] We also conducted analyses using a grid-search least squares estimation routine developed by R. Chris Fraley in S-Plus. These routines allowed us to provide a better fit to the data using a pure revisionist model than we were able to obtain using maximum-likelihood approaches in LISREL but at the expense of uncovering theoretically implausible parameter values. For example, it is possible to reproduce the data better from a basic least squares approach (i.e., focusing on the SRMS) if the autoregressive parameter is .99 as opposed to the values estimated using maximum likelihood. However, a value of .99 implies that there is virtually no change in individual differences over time, which, ironically, is an untenable conclusion for advocates of revisionist/contextual perspectives. We also conducted analyses separately for men and women. The basic pattern of results (i.e., that the prototype model explained the data better than a revisionist model) held for men and women across the three domains (i.e., maternal, paternal, and romantic), the two dimensions (i.e., anxiety and avoidance), and samples (i.e., 30 day and weekly).

Table 2
Model Comparisons for Attachment-Related Avoidance in the Daily Sample

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	1,734.33	433	.12	.92	.06	.24*	1.18*		
	Revisionist	2,195.29	434	.14	.81	.28	.95*		460.96	<.001
Father	Prototype	2,065.56	433	.14	.91	.07	.35*	1.09*		
	Revisionist	2,260.90	434	.15	.84	.20	.97*		195.34	<.001
Partner	Prototype	1,736.81	433	.12	.87	.11	.44*	0.22*		
	Revisionist	1,994.46	434	.13	.78	.40	.88*		257.65	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
* $p < .05$.

than a contextual model after the Big Five have been statistically controlled.

A few conditions must be met for personality traits to offer a viable alternative explanation for the patterns of stability observed in attachment. First, personality traits must correlate with the attachment dimensions in each relational domain. Second, the Big Five traits must exhibit patterns of stability that are similar to those predicted by a prototype model. With respect to the first point, the correlations between the attachment dimensions and the Big Five personality traits in the present samples are reported in Table 6. These correlations are based on creating composites of the attachment dimensions and personality traits across time (e.g., averaging the Neuroticism ratings for a person over the 30-day period in the daily sample). As can be seen, there were small to moderate correlations between the Big Five traits and the attachment dimensions in each relational domain, consistent with the findings of other researchers (e.g., Noftle & Shaver, 2006). Neuroticism tended to correlate most strongly with the attachment dimensions, particularly with respect to anxiety concerning the romantic relationship. Openness tended to exhibit the weakest correlations with the attachment dimensions.

With respect to the second point: On the basis of meta-analytic data, Fraley and Roberts (2005) demonstrated that patterns of stability in the Big Five traits adhere to a prototype-like pattern. To replicate their findings, we examined the patterns of stability of the Big Five traits in the present samples to determine whether they behaved in ways that were similar to those expected under a prototype hypothesis. Although we do not report detailed model-testing results in an effort to conserve space, we note that the patterns of test–retest coefficients for each of the Big Five traits were highly compatible with a prototype-like model. To illustrate, Figure 6 shows the empirical stability functions for two of the traits that correlated most highly with the attachment dimensions (i.e., Neuroticism and Agreeableness). These stability functions clearly reveal that both Neuroticism and Agreeableness behave in a stable, prototype-like fashion and, as such, are reasonable candidates for explaining the stability in adult attachment already documented.

To test the hypothesis that basic personality traits explain the patterns of stability observed in attachment, we conducted the same kinds of analyses we reported previously but using variance–covariance matrices from which variance in the Big Five traits had been removed. Tables 7, 8, 9, and 10 report the model comparisons. For avoidance with mother in the daily sample, the estimated prototype variance was .92, and the autoregressive path was .30. This model fit the data relatively well, $\chi^2(433, N = 203) = 2{,}083.40$, $p < .001$, $RMSE = .14$, $CFI = .91$, $SRMS = .07$. When we removed the prototype by fixing its variance to 0.00, the model did not fit the data as well, $\Delta\chi^2 = 401.82$, $p < .001$; $\chi^2(434, N = 203) = 2{,}485.22$, $p < .001$, $RMSE = .15$, $CFI = .83$, $SRMS = .23$.

Table 3
Model Comparisons for Attachment-Related Anxiety in the Daily Sample

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	1,343.29	433	.10	.93	.08	.20*	0.33*		
	Revisionist	2,097.72	434	.14	.73	.55	.81*		754.43	<.001
Father	Prototype	1,040.41	433	.08	.96	.07	.14*	0.69*		
	Revisionist	1,922.01	434	.13	.74	.55	.84*		881.60	<.001
Partner	Prototype	2,053.71	433	.14	.83	.13	.48*	0.33*		
	Revisionist	2,184.13	434	.14	.75	.40	.87*		130.42	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
* $p < .05$.

Table 4
Model Comparisons for Attachment-Related Avoidance in the Weekly Sample

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	3,862.63	1,223	.07	.95	.06	.32*	0.88*		
	Revisionist	5,639.04	1,224	.10	.79	.59	.85*		1,776.41	<.001
Father	Prototype	10,188.88	1,223	.14	.79	.12	.58*	0.42*		
	Revisionist	10,419.88	1,224	.14	.75	.34	.96*		231.00	<.001
Partner	Prototype	4,325.61	1,223	.08	.87	.19	.59*	0.16*		
	Revisionist	4,735.09	1,224	.09	.81	.42	.81*		409.48	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
* $p < .05$.

This general finding emerged for each of the relational domains (i.e., mother, father, and partner), for both anxiety and avoidance, and for both the daily and weekly samples (see Tables 7–10 for details). For example, for anxiety with mother in the daily sample, the estimated prototype variance was .34, and the autoregressive path was .16. When we removed the prototype by fixing its variance to 0.00, the resulting model did not fit the data as well ($\Delta\chi^2 = 873.40$, $p < .001$). For avoidance with mother in the weekly sample, the estimated prototype variance was .32, and the autoregressive path was .55. When we removed the prototype by fixing its variance to 0.00, the model did not fit the data as well ($\Delta\chi^2 = 494.65$, $p < .001$). For anxiety with mother in the weekly sample, the estimated prototype variance was .32, and the autoregressive path was .24. When we removed the prototype by fixing its variance to 0.00, the model did not fit the data as well ($\Delta\chi^2 = 1{,}063.02$, $p < .001$). In summary, even after controlling for the Big Five personality traits, the prototype model continued to provide a better account of the stability of the attachment dimensions than did a contextual/revisionist model.

General Discussion

The objective of this research was to address some long-standing debates concerning the stability of working models of attachment. One of the core assumptions of attachment theory is that the representations that people hold are relatively stable. Despite the prevalence of this assumption, the empirical data on stability have been somewhat ambiguous, and as a result, alternative ways of conceptualizing continuity and change in attachment have evolved in the literature. According to one perspective, what we have referred to as the prototype hypothesis, underlying the variation in attachment security is a stable, enduring construct. According to the revisionist/contextual perspective, there is no grounding force underlying variation in attachment representations, leading to the possibility that there will be little stability over time.

One reason debates about stability and change have persisted for so long in the attachment literature is that the prevailing conceptual and methodological framework for thinking about continuity encourages scholars to focus on the magnitude of test–retest coefficients based on two waves of data. Drawing upon previous theoretical work (e.g., Fraley, 2002; Fraley & Roberts, 2005), we have argued that the traditional two-wave framework is inadequate for resolving debates about continuity and change for two reasons. First, when the prototype and revisionist models are formalized, it becomes clear that both models are equally capable of explaining low or high test–retest correlations across any two time points. As such, the magnitude of test–retest correlations does not distinguish the two models. Second, although the prototype and revisionist

Table 5
Model Comparisons for Attachment-Related Anxiety in the Weekly Sample

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	11,280.44	1,223	.15	.82	.09	.23*	0.37*		
	Revisionist	12,158.52	1,224	.15	.63	.61	.79*		878.08	<.001
Father	Prototype	7,998.62	1,223	.12	.88	.07	.23*	0.54*		
	Revisionist	9,808.42	1,224	.13	.68	.60	.81*		1,809.80	<.001
Partner	Prototype	5,293.15	1,223	.09	.81	.11	.43*	0.28*		
	Revisionist	7,595.89	1,224	.12	.68	.42	.72*		2,302.74	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
* $p < .05$.

Table 6
Correlations Between the Attachment Dimensions and the Big Five Personality Traits

	Avoidance						Anxiety					
	Mother		Father		Partner		Mother		Father		Partner	
Trait	Daily sample	Weekly sample	Daily sample	Weekly sample	Daily sample	Weekly sample	Daily sample	Weekly sample	Daily sample	Weekly sample	Daily sample	Weekly sample
Extraversion	−.17	−.17	−.17	−.19	−.03	−.12	−.11	−.13	−.09	−.13	−.19	−.16
Agreeableness	−.19	−.20	−.26	−.23	−.13	−.27	−.21	−.13	−.22	−.14	−.20	−.27
Conscientiousness	−.18	−.29	−.24	−.25	−.23	−.30	−.20	−.24	−.23	−.22	−.20	−.32
Neuroticism	.15	.18	.29	.22	.17	.24	.29	.20	.31	.29	.37	.32
Openness	−.07	−.11	−.10	−.17	−.07	−.12	−.07	−.06	−.08	−.10	−.03	−.19

perspectives do not make different predictions about the absolute value of the test–retest correlations that should be observed, they do differ in the patterns of stability that they predict across time—patterns that can only be revealed empirically through longitudinal research that utilizes repeated measurement across multiple occasions. The prototype perspective predicts that the stability functions (i.e., mathematical functions mapping the test–retest correlations across varying test–retest intervals) will have nonzero limiting values and will exhibit asymmetries when stability is examined moving forward versus backward in time. In contrast, the revisionist/contextual perspective predicts that those functions will be symmetric and will have a limiting value of zero even if that value is not literally observed in the limited duration of empirical research.

To test the predictions of these alternative models, we assessed attachment security longitudinally in two samples, one that was studied daily over the course of a month and one that was studied weekly over the course of almost a year. Our empirical analyses revealed that the patterns of stability in adult attachment representations have nonzero asymptotic properties, as implied by the prototype perspective. Moreover, our formal model comparisons indicated that the data were much easier to explain with the assumption that there was a latent, enduring factor (e.g., a prototype) underlying the attachment dimensions at each assessment wave. Finally, our analyses suggested that the prototype model is able to explain the data better than a revisionist/contextual one even when controlling for variation in the Big Five personality traits. This indicates that the patterns of stability reported here are

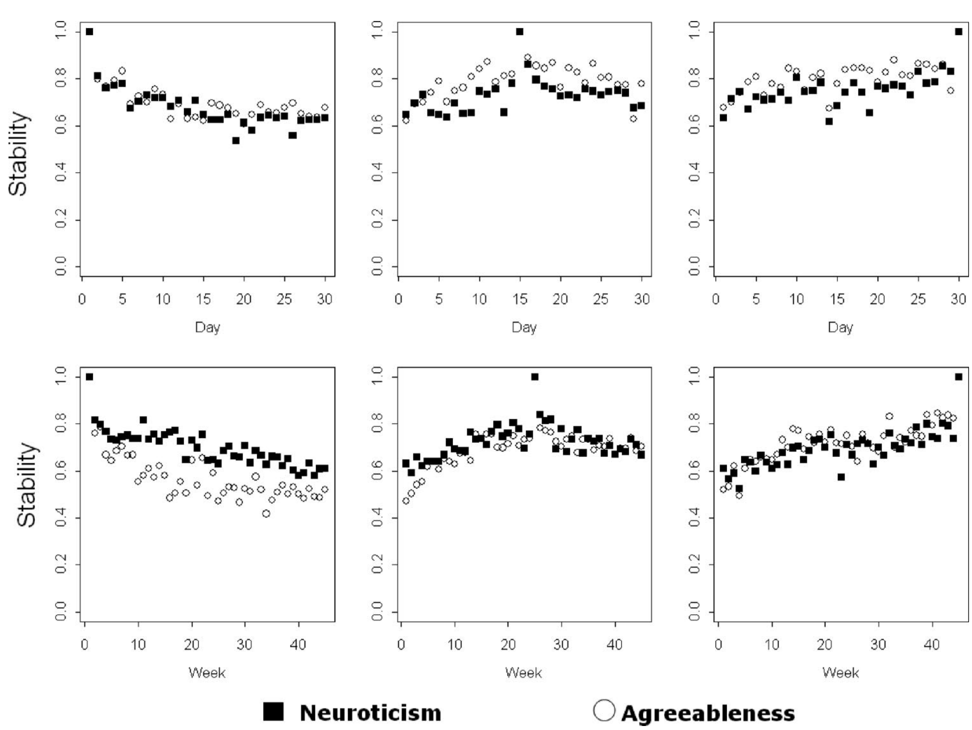

Figure 6. Empirical stability functions for Neuroticism and Agreeableness in the daily (top row) and weekly (bottom row) samples.

Table 7
Model Comparisons for Attachment-Related Avoidance in the Daily Sample, Controlling for the Big Five Personality Traits

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	2,083.40	433	.14	.91	.07	.30*	0.92*		
	Revisionist	2,485.22	434	.15	.83	.23	.86*		401.82	<.001
Father	Prototype	1,920.79	433	.13	.92	.06	.31*	1.01*		
	Revisionist	2,362.32	434	.15	.84	.22	.96*		441.53	<.001
Partner	Prototype	1,896.12	433	.13	.86	.11	.42*	0.24*		
	Revisionist	2,228.89	434	.14	.76	.40	.89*		332.77	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
$^* p < .05$.

not due to the relatively stable nature of basic personality traits. In summary, these data suggest that a prototype model may be preferable to a revisionist/contextual model for understanding and explaining empirical patterns of stability and change in adult attachment.

Why Are Romantic Relationships Less Stable Than Parental Relationships?

One of the intriguing findings emerging from this research is that the overall level of stability observed in attachment representations was lower in romantic relationships than it was in parental relationships, despite the fact that a prototype model was able to account for the patterns of stability in both kinds of relational domains. Why might the overall levels of stability be lower in romantic relationships relative to parental relationships? One possibility, which we refer to as the *entrenchment hypothesis,* is that people in our sample probably had an extensive developmental history with their parents, reaching back over 2 decades on average. In contrast, the romantic relationships on which they were reporting were new by comparison. It may be the case that many of the people in our samples were still negotiating their relationships with their romantic partners—trying to figure out their common interests and their shared goals, as well as, more generally, finding a way of relating to one another that worked for them. This situation affords more opportunities for people to adjust their working models in their romantic relationships and might help explain why the overall levels of stability were lower in romantic relationships compared to parental relationships. In fact, when we examined the stability of working models with partners separately among people who had been involved for a short period of time versus a longer period of time, we found that the overall levels of stability in romantic attachment were higher among people who had been involved with their partners for a longer period of time. This provides some support for the notion that, early in their romantic relationships, people's working models are essentially works in progress. As the relationship persists, the representational systems become more consolidated and more resistant to change.

Another possibility that we were not able to examine in our research is what we call the *contact hypothesis*. Participants in our research probably had more frequent interactions with their romantic partners than they did with their parents. If this was the case, then there would have been more opportunities for people's working models of their romantic relationships to be modified (even if in subtle ways) over time. Conversely, if participants were not in frequent contact with their parents, there would have been fewer opportunities to revise their working models in those domains. It should be relatively straightforward to test this hypothesis in future research by examining patterns of stability and change

Table 8
Model Comparisons for Attachment-Related Anxiety in the Daily Sample, Controlling for the Big Five Personality Traits

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	1,342.55	433	.10	.93	.08	.16*	0.34*		
	Revisionist	2,215.95	434	.14	.71	.56	.81*		873.40	<.001
Father	Prototype	1,117.05	433	.08	.96	.07	.16*	0.64*		
	Revisionist	1,922.56	434	.13	.75	.53	.84*		805.51	<.001
Partner	Prototype	2,225.69	433	.14	.81	.12	.46*	0.32*		
	Revisionist	2,386.42	434	.15	.73	.41	.85*		160.73	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
$^* p < .05$.

Table 9
Model Comparisons for Attachment-Related Avoidance in the Weekly Sample, Controlling for the Big Five Personality Traits

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	6,051.49	1,223	.12	.87	.12	.55*	0.32*		
	Revisionist	6,546.14	1,224	.12	.82	.41	.94*		494.65	<.001
Father	Prototype	8,488.72	1,223	.12	.86	.11	.54*	0.43*		
	Revisionist	8,703.74	1,224	.13	.80	.41	.94*		215.02	<.001
Partner	Prototype	9,978.96	1,223	.14	.67	.23	.72*	0.05*		
	Revisionist	10,453.95	1,224	.14	.65	.36	.86*		474.99	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
* $p < .05$.

among people who vary in their frequency of contact with their parents.

Within-Person Variation in Attachment

One of the implications of the prototype model is that changes in working models can be conceptualized as momentary deviations from a stable equilibrium value (see Fraley & Brumbaugh, 2004, for an in-depth explanation). In other words, the natural dynamics of the system create a situation in which, if a person experiences a substantial change in security, that change will only be temporary. After a period of time, the person will gravitate back toward the levels of security most compatible with his or her prototypical value. This has a number of implications for the way in which within-person variation in attachment is understood. For example, if it is the case that an intervention or experimental manipulation produces an observed change in attachment security, the prototype model predicts that those changes will be temporary and that the individual will eventually revert to levels of security that are consistent with his or her latent prototype.

These dynamics indicate that research designed to influence, change, or prime attachment orientations would benefit by recognizing and attempting to assess two distinct forms of change—a point nicely made by Gillath, Selcuk, and Shaver (2008). One form of change can be conceptualized as momentary deviations from a more stable equilibrium value—a state-like change in working models. Another form of change can be conceptualized as changes in the equilibrium value itself (i.e., changes in the prototype). It should be possible to assess these distinct forms of change by assessing working models over repeated occasions, both before and after the manipulation, to (a) estimate the prototypical value of security and (b) determine whether the individual in question is approaching that value asymptotically after the manipulation or approaching a new equilibrium time.[3]

Our intuition is that most experimental manipulations are selectively affecting working models in a temporary, state-like fashion. Theoretically, it should be relatively difficult to create enduring change in a system with prototype-like dynamics. However, according to the perspective outlined by Fraley and Brumbaugh (2004), it might be possible to do so not by trying to change the prototype itself but by introducing another enduring latent factor into the system—one that opposes or counteracts the one that is being targeted for change. This could be done, theoretically, by fundamentally changing a person's social networks, introducing a new relationship partner, or automating specific patterns of thought, feeling, and behavior. What is unknown, however, is how the introduction of a new prototype would impact the behavior of the system. There are at least two possibilities. One possibility is that a new dynamic equilibrium would emerge, one that is a weighted composite of the trajectories entailed by the original prototype and the new one. Another possibility is that the two equilibria could coexist but that only one might be dominant or functionally active at any one time. This conceptualization would imply that a person's security would generally deviate around a specific equilibrium point but that if an intervention took place that sufficiently affected security, he or she would begin to deviate around the alternative equilibrium point (see Fraley & Brumbaugh, 2004, pp. 121–127).

One of the potential benefits of conceptualizing stability and change with respect to prototype dynamics is that it provides a valuable way to reconcile some of the debates that have existed in the field concerning the meaning of change. Some authors have implied that it is not productive to conceptualize working models as if they represented enduring, dispositional features of people because (a) self-reported attachment can be changed relatively easily via priming manipulations and (b) people's reports do not exhibit strong degrees of test–retest stability (e.g., Baldwin & Fehr, 1995). The prototype framework suggests that there may be some value in separating the state-like or momentary reports of attachment from the more enduring factors that partly anchor those reports. In other words, a person's attachment orientation at any one time is not simply a state or a trait. Instead, it is a combination of influences from contextual factors and enduring ones. Thus, understanding attachment dynamics fully requires attention to both of these sources of variance.

[3] We should note that this is not the same thing as asking whether an intervention or manipulation has an effect over a short versus long period of time. The question is whether the change alters the equilibrium value of the system—a question that is better answered through multiple assessments over time rather than a single assessment that is taken after a long period of time following the intervention or manipulation.

Table 10
Model Comparisons for Attachment-Related Anxiety in the Weekly Sample, Controlling for the Big Five Personality Traits

		Model statistics							Model comparisons	
Domain	Model	χ^2	*df*	*RMSEA*	*CFI*	*SRMS*	*a*	*b*	$\Delta\chi^2$	*p*
Mother	Prototype	11,047.92	1,223	.14	.81	.09	.24*	0.32*		
	Revisionist	12,110.94	1,224	.15	.62	.60	.78*		1,063.02	<.001
Father	Prototype	8,390.20	1,223	.12	.86	.08	.25*	0.46*		
	Revisionist	10,015.81	1,224	.14	.68	.59	.81*		1,625.61	<.001
Partner	Prototype	11,386.68	1,223	.15	.61	.16	.59*	0.12*		
	Revisionist	12,239.65	1,224	.15	.57	.39	.79*		852.97	<.001

Note. The model comparison columns report the chi-square test ($df = 1$) for the nested comparison of the revisionist and prototype models within a relational domain. *RMSEA* = root-mean-square error of approximation; *CFI* = comparative fit index; *SRMS* = standardized root-mean-square residual; *a* = the constrained, unstandardized path estimate for the autoregressive component of attachment; *b* = the estimated variance of the prototype.
* $p < .05$.

Limitations and Caveats

One of the limitations of the current research is the relatively short duration of our longitudinal studies. Because we were interested in studying patterns of stability and change, we focused on doing intensive longitudinal investigations (i.e., ones with multiple assessments in close proximity to one another) rather than doing less frequent assessments across longer time scales. However, it is possible that the time scales we used were not expansive enough to allow for more nuanced questions about stability and change to be addressed accurately.

Theoretically, it is probably the case that some life events are going to have a greater capacity to produce change than others. For example, we know from previous research that people report lower levels of security after a breakup or separation (Ruvolo, Fabin, & Ruvolo, 2001) and that important life transitions (e.g., the transition to parenthood; see Rholes, Simpson, Campbell, & Grich, 2001; Simpson, Rholes, Campbell, & Wilson, 2003; the transition to marriage; see Davila, Karney, & Bradbury, 1999) have the potential to intensify attachment-related effects or produce change. Although the conceptual model presented here raises the question of whether contextual changes have enduring or temporary impact, it seems reasonable to assume that an event that fundamentally alters the nature of the relationship would have the potential to produce an enduring impact on a person's working models of that relationship. This kind of question, unfortunately, will require studies that are much more sophisticated and extensive than the present one to answer. Thus, we think that an appropriate caveat to our conclusions is that, although prototype-like dynamics might be operative in many situations, there are probably low-base-rate—but important—situations that have the potential to fundamentally change the way in which people's prototypes are expressed. As we have discussed previously, these experiences might create change by introducing new prototype-like structures to the system or affecting the expression of the latent prototypes that already exist.

A third potential limitation of our research is that the majority of our participants were relatively secure with respect to attachment. This is not necessarily a limitation of our research per se (i.e., many empirical investigations of close relationships tend to sample people in well-functioning relationships), but it does have the potential consequence of inflating our estimates of stability. In short, if people are relatively secure (i.e., low on the dimensions of anxiety and avoidance), there is less room for change (see Fraley et al., 2000). In contrast, if people tend to be closer to the midpoint of the theoretical distribution, there will be more room for movement, leading to potentially lower estimates of stability. It is important to note, however, that the fact that most of our participants were highly secure does not obscure some of the issues that we investigated. Separating prototype and revisionist processes is mathematically possible regardless of the average levels of security. Nonetheless, the overall magnitude of the test–retest coefficients could be biased.

In closing, attachment theory has proven to be an invaluable theoretical perspective for scholars interested in social development, close relationships, and personality dynamics. Our goal in this article has been to elaborate upon of the core assumptions of the theory, to outline some methods for testing those assumptions, and to evaluate them via two short-term but intensive longitudinal investigations. We hope this work will help move attachment theory and research forward in novel and exciting directions.

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