Turbulent Times, Rocky Relationships: Relational Consequences of Experiencing Physical Instability

Amanda L. Forest1, David R. Kille2, Joanne V. Wood2, and Lindsay R. Stehouwer2
1University of Pittsburgh and 2University of Waterloo

Abstract
What influences how people feel about and behave toward their romantic partners? Extending beyond features of the partners, relationship experiences, and social context, the current research examines whether benign, relationship-irrelevant factors—such as one’s somatic experiences—can influence relationship perceptions and interpersonal behavior. Drawing on the embodiment literature, we propose that experiencing physical instability can undermine perceptions of relationship stability. Participants who experienced physical instability by sitting at a wobbly workstation rather than a stable workstation (Study 1), standing on one foot rather than two (Study 2), or sitting on an inflatable seat cushion rather than a rigid one (Study 3) perceived their romantic relationships to be less likely to last. Results were consistent with risk-regulation theory: Perceptions of relational instability were associated with reporting lower relationship quality (Studies 1–3) and expressing less affection toward the partner (Studies 2 and 3). These findings indicate that benign physical experiences can influence perceptions of relationship stability, exerting downstream effects on consequential relationship processes.

Keywords
interpersonal relationships, relationship stability, embodiment, risk regulation, uncertainty

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The earthquake that struck Sichuan, China, in 2008 made headlines not only because of the tremendous loss of life it caused, but also because after the quake, Sichuan came to lead the country in number of divorces (Zhiling, 2010). Experts and popular media outlets made causal claims (e.g., “Earthquake Boosts Divorce Rate,” 2010). If the earthquake truly caused changes in Sichuan’s divorce rate, why might this be? Emotional distress, financial hardship, and mortality salience may well contribute. Sociologist Guang Wei speculated that Sichuan residents “decided to live each day to the fullest . . . if they do not get along with their spouses, they decide to part ways” (Zhiling, 2010, paras. 9–10). We examine a different feature of earthquakes that may affect relationships: physical instability.

Certainly, the shaking ground was not solely responsible for the change in the divorce rate in Sichuan. However, theories of embodied cognition (e.g., Barsalou, 2008) led us to hypothesize that physical instability can threaten relationship security. Countless studies link concrete physical experiences with abstract, often metaphorically related cognitions or perceptions (Landau, Meier, & Keefer, 2010). For instance, consistent with metaphors linking physical and interpersonal warmth (e.g., a warm welcome), holding a warm rather than cold cup of coffee heightens perceptions of interpersonal warmth (Williams & Bargh, 2008). Such effects may result from scaffolding processes, in which abstract concepts that co-occur with somatic experiences over time are mapped onto those experiences. For example, security or comfort is scaffolded onto physical warmth and softness (Van Horen & Mussweiler, 2014; Williams, Huang, & Bargh, 2009)—probably because of early experiences with caregivers in
which these constructs co-occurred. Experiencing a given bodily state seems to activate the scaffolded abstract concept and bring about metaphor-consistent changes in perception (for a discussion of complementary vs. metaphor-assimilative effects, see Zhang & Risen, 2014).

We propose that feelings of relational security are also scaffolded onto physical stability. Experiences with loving, dependable caregivers are likely to have involved physical stability (e.g., being held, swaddled), whereas unreliable caregiving is likely to have co-occurred with physical instability (e.g., rough, careless handling). Indeed, metaphors describe troubled relationships as “turbulent” and “rocky,” but devoted couples are “going steady” and “building a solid foundation.” Thus, we predict that experiencing physical instability will affect judgments about the stability of one’s relationships. If so, then pondering one’s romantic relationship during an unsteady workout or a bumpy commute could undermine one’s sense of relationship stability. Indeed, participants in physically unstable (vs. stable) environments perceive celebrity relationships to be less enduring (Kille, Forest, & Wood, 2013). Here, we predict that such effects extend to people’s perceptions of their own relationships and that perceiving such relationships to be unstable leads people to distance themselves from their partners.

**Downstream Consequences of Perceiving Relational Instability**

Two lines of reasoning suggest that people withdraw psychologically when they perceive their relationships to be unstable. First, when people feel insecure about themselves, they often doubt their value to other people (e.g., Baldwin & Sinclair, 1996; Murray, Holmes, MacDonald, & Ellsworth, 1998). Physical instability may lead to personal insecurity and thereby may also raise doubts about a partner’s love and commitment.

Such doubts can lead people to distance themselves from other people. In their work on risk regulation, Murray, Holmes, and their colleagues (e.g., Murray & Holmes, 2011) have provided extensive evidence that when people feel confident in their partner’s caring, they draw closer; but when people perceive a risk of being hurt, they often self-protectively disengage—for example, by derogating their partner or reducing interdependence (e.g., Murray, Rose, Bellavia, Holmes, & Kusche, 2002). Across numerous investigations, relationship threats—such as when a person learns that his or her partner perceives a problem in the relationship (Murray et al., 2002)—trigger such risk-regulation processes. We suggest that even benign, relationship-irrelevant experiences may activate this system. When physical instability triggers the perception that their relationship is unstable, people may perceive a threat and self-protectively withdraw from the relationship. Thus, the risk-regulation system may be so sensitive that it triggers regulatory processes even when no true risk exists.

The second reason that physical instability may lead to withdrawal is that it may make people feel uncertain about their own desire to continue in the relationship. If people have such doubts, it might be prudent for them to refrain from investing too much psychologically or behaviorally. Indeed, people who are less committed do tend to invest less in their relationships (e.g., Rusbult, 1980).

Evidence of instability effects on relationships would advance the literatures on both relationships and embodiment. The effects of embodied factors on behavior have received little attention (Meier, Schnall, Schwarz, & Bargh, 2012). Demonstrating that physical instability leads people to perceive their relationships to be less stable, and that such perceptions are associated with reduced relationship satisfaction, commitment, and affection, would reveal consequential implications of embodied experiences.

**Study 1**

**Method**

Romantically involved students were recruited from a university student center. Data collection was stopped once we reached the end of a set of timeslots booked in the university student center with the condition that there were at least 20 participants in each experimental condition. Data for 54 participants were collected. Because our main measure was perceived stability of a person’s relationship with a particular partner, only data from participants in exclusive romantic relationships were included in the analyses (36 exclusively dating, 8 cohabiting, 2 engaged, and 1 married; mean relationship length = 25.50 months, SD = 21.30). Thus, our final sample consisted of 47 participants (18 male, 29 female; mean age = 21.11 years, SD = 2.50). Participants received chocolate or gum as compensation.

Participants were randomly assigned to one of two workstations. In the unstable condition, participants completed their questionnaire at an unstable table and chair: Two of the chair’s legs had been shortened by approximately ¼ in. so that the chair wobbled slightly, and a small pebble was taped to one of the table legs so that the table wobbled slightly. These modifications were designed to be unnoticeable to the eye and not so wobbly as to irritate participants. Participants in the stable condition completed their questionnaire at a stable table and chair that looked identical to the unstable table and chair.

Sitting at the assigned workstation, participants provided demographic information and completed personality measures unrelated to the present hypotheses. Participants then responded to two items concerning...
relationship quality: “How satisfied are you in your current romantic relationship?” and “How committed are you to your current romantic partner?” (1 = not at all, 9 = completely). Next, participants responded to four items regarding the stability of their current romantic relationships, adapted from Marigold, Holmes, and Ross (2007): “How confidently do you feel that you and your partner will be together [in 6 months/in 1 year/in 3 years/for a lifetime];” 1 = not at all confident, 9 = extremely confident). Participants then completed seven more items concerning relationship quality (e.g., “I would not feel very upset if our relationship were to end in the near future”; reverse-scored; 0 = do not agree at all, 8 = agree completely). Additional items about the relationship were included for exploratory purposes; these items are described in the Supplemental Material available online. Finally, participants indicated how tired, happy, annoyed, relaxed, frustrated, sad, irritated, and excited they felt (1 = not at all, 9 = a great deal). We created a negative-affect composite (α = .84) by combining scores for tired, annoyed, frustrated, sad, and irritated with reversed scores for happy, relaxed, and excited.

Results
Data from 3 participants—1 who stood instead of sitting and 2 who communicated with friends while completing the questionnaire—were omitted from analyses. We averaged participants’ ratings of their beliefs that they would remain with their partners over each of the four time periods in the items on relationship stability (α = .94). As predicted, a one-way analysis of variance (ANOVA) revealed that, relative to participants in the stable condition (M = 7.60, SD = 1.30), participants in the unstable condition (M = 6.30, SD = 2.29) felt their relationships were less likely to last, F(1, 41) = 4.83, p = .034, η² = .105. Participants’ experience of negative affect did not differ between the two conditions, F < 1, which suggests that mood is not a viable alternative explanation for the observed condition differences.

Was perceived relationship stability associated with reports of relationship quality? We first standardized and averaged the nine relationship-quality items (α = .92). All mediation analyses were bootstrap analyses with 5,000 resamples and were conducted using PROCESS (Hayes, 2013). Confidence intervals (CIs) reflect unstandardized estimates of the indirect effects. For ease of interpretation, we report standardized path coefficients (β) from regression analyses to describe the individual steps in the path. Condition was dummy coded (0 = stable, 1 = unstable). Mediation analysis using PROCESS Model 4 revealed a significant indirect effect of condition on reports of relationship quality via perceived relationship stability, 95% CI = [−0.79, −0.09]. As the results of the ANOVA suggested, participants in the unstable condition perceived their relationships to be less stable than did those in the stable condition, β = −0.33, t(41) = −2.20, p = .034, and such perceptions were, in turn, associated with reports of lower relationship quality, β = 0.78, t(40) = 7.47, p < .001. A model in which the order of perceived relationship stability and relationship quality was reversed did not yield a significant indirect effect, 95% CI = [−1.56, 0.05]. Thus, physical instability led people to perceive their relationship to be less likely to last; these perceptions were associated in turn with reporting less satisfaction and commitment. These downstream effects are noteworthy; people who feel less satisfied and committed are more likely to break up than people who do not (e.g., Impett, Beals, & Peplau, 2001; Simpson, 1987).

Study 2
Employing a larger, more diverse sample, we sought to conceptually replicate Study 1 using a different stability manipulation. We also added a behavioral outcome measure—the expression of affection—in keeping with a recommendation from Meier et al. (2012) that embodiment researchers “consider outcome measures that are clearly linked to action …” (p. 712) and Baumeister, Vohs, and Funder’s (2007) call for greater use of behavioral measures in psychological research. We selected the expression of affection because of the importance of emotional expressivity for development of intimacy (e.g., Berscheid & Regan, 2005) and for relationship quality and stability (Sprecher, 1987; Sprecher & Hendrick, 2004), and because expressing affection makes one vulnerable and therefore is likely to be modulated by perceived relationship stability.

Study 2 included a check on the stability manipulation. Researchers can control the primes they use, but it is difficult to control the construct that primes activate (Stroebe & Strack, 2014). Experience of physical instability is especially important to assess because of wide individual differences in balance. Study 2 also explored whether physical instability’s effects are specific to the relationship domain or whether—consistent with metaphors relating instability to uncertainty (e.g., shaken confidence)—instability might arouse uncertainty in general.

Method
Participants recruited through Amazon Mechanical Turk (MTurk) completed a study on “Physical Postures.” Our a priori target sample size was 150 participants per editorial recommendations regarding a prior manuscript. Anticipating imperfect completion rates, we posted 200 human intelligence tasks on MTurk. Data collection was stopped once the 200 tasks were completed. One participant requested
that his or her data not be used, and 11 participants did not finish the survey. Data provided by these individuals were not analyzed. Our recruitment materials advised that individuals with a history of balance problems, injuries, or medical conditions that would make it painful to sit, stand, bend, or twist should not participate and that only participants in exclusive romantic relationships should participate. However, survey responses revealed that 14 participants were not in exclusive romantic relationships. Only data from participants in exclusive romantic relationships (66 dating exclusively, 21 cohabiting, 15 engaged, 72 married; mean relationship length = 65.97 months, SD = 76.94) were retained. Thus, our final sample consisted of 174 participants (71 male, 103 female; mean age = 31.18 years, SD = 10.19). Participants received $0.50.

Participants learned that they would be asked to adopt a specific physical posture while they completed a portion of the online survey. First, in ostensibly unrelated questionnaires, participants provided demographic information (e.g., age), indicated their relationship length and type (exclusively dating, married, etc.), and completed a brief personality measure unrelated to the present hypotheses. Participants then were randomly assigned to a condition. In the stable (two-foot) condition, participants were instructed to stand in an upright position, on two feet, while they completed the next few pages of the survey. In the unstable (one-foot) condition, participants were instructed to stand in an upright position, on one foot. These participants were told that they could switch feet as needed, but to try to remain standing on one foot. Participants were shown an image of a research assistant demonstrating the appropriate posture and were instructed that they could adjust their monitor and keyboard so that they could type comfortably.

While in the assigned posture, participants completed a brief personality measure intended to give participants time to experience instability or stability before completing the main dependent measures. Next, participants responded to six items (α = .96) regarding the stability of their current romantic relationship. These included the four items from Study 1 as well as similar items querying confidence in still being together in 10 and 20 years. Participants also completed a measure of relationship quality that comprised the first two items (r = .68) from the relationship-quality composite used in Study 1.

While maintaining their assigned posture, participants completed our behavioral measure of expression of affection. Participants were asked to type a message to their romantic partners telling them exactly how you feel about him/her right now. For example, you can describe the emotions you feel towards him/her and why you feel that way, and/or tell him/her about the quality or qualities that you most admire and appreciate in him/her.

Participants were told that later they would be asked to provide the partner’s e-mail address. In reality, the messages were not sent to the partners. Three coders, blind to participants’ stability condition, rated the degree (1 = not at all, 9 = extremely/a great deal) to which each participant complimented the partner; expressed love, care, admiration, gratitude, and valuing the partner; or criticized the partner (the last item was reverse-scored). These seven items were combined to index expression of affection (α = .92; interrater α = .88).

Continuing to hold the assigned posture, participants indicated the likelihood that their relationship would end for each of five reasons (if in fact their relationship were to end at all): the partner decided to end it, the participant decided to end it, both partners mutually decided to end it, factors beyond the couple’s control (e.g., moving) ended it, and it ended for no particular reason/not sure why the relationship would end. Participants then completed a three-item (α = .73) general uncertainty measure assessing how uncertain, confused, and confident (the last item was reverse-scored) they felt; a two-item (r = .71) manipulation check, in which they rated the degree to which they felt physically unstable and off-balance; and items assessing how frustrated, tired, bored, challenged, happy, annoyed, and relaxed they felt. All of these items were rated on a scale from 1 (not at all) to 9 (very much). We created a negative-affect composite (α = .82) by combining scores for frustrated, tired, bored, challenged, and annoyed with reversed scores for happy and relaxed.

Participants were then asked to stop following the posture instructions and to write about a value that they shared with their romantic partners (Lomore, Spencer, & Holmes, 2007), so as to finish with a positive relationship task. After answering funnel-debriefing questions and indicating whether they had followed their posture instructions, participants read a debriefing letter explaining the study’s purpose and learned that their message would not be sent to the partner.

**Results**

Data from 4 participants—1 who reported not having followed the posture instructions and 3 who correctly guessed the study hypothesis—were omitted from analyses. As expected, participants in the unstable condition reported feeling more physically unstable and off-balance (M = 4.68, SD = 2.39) than did participants in the stable condition (M = 2.76, SD = 2.01), F(1, 168) = 32.51, p < .001, ηp² = .160.

To compute an index of perceived relationship stability, we averaged participants’ ratings of their beliefs that
they would remain with their current partner over each of the six time periods. A one-way ANOVA revealed that, relative to participants in the stable condition (M = 7.63, SD = 1.69), participants in the unstable condition (M = 7.04, SD = 2.03) felt their relationships were somewhat less likely to last, F(1, 168) = 3.34, p = .069, η_p^2 = .02. We reasoned that any effect of condition on perceived relationship stability should be mediated by participants’ experience of physical instability. This approach was similar to an examination by Rotella and Richeson (2013) of whether effects of bodily postures that were expected to induce guilt on reparative intentions toward victims of wrongdoing were, in fact, mediated by the experience of guilt. Although we observed only a marginally significant effect of posture condition on perceived relationship stability, it is widely accepted that indirect (i.e., mediated) effects can be examined even in the absence of any direct link between a predictor and outcome (e.g., Shrout & Bolger, 2002; Woody, 2011).

Mediation analysis revealed a significant indirect effect of condition (0 = stable; 1 = unstable) on perceived relationship stability via the experience of physical instability, 95% CI = [−0.61, −0.03]: Participants in the unstable condition felt more physically unstable than did participants in the stable condition, β = 0.40, t(168) = 5.70, p < .001; feeling physically unstable was associated in turn with participants’ perception of their romantic relationship as being less likely to last, β = −0.17, t(167) = −2.05, p = .042. A model in which the order of physical instability and perceived relationship stability was reversed did not yield a significant indirect effect, 95% CI = [−0.002, 0.03].

In light of its effects on perceived relationship stability, did physical instability exert downstream effects on reports of relationship quality? As in Study 1, there was a significant indirect effect of condition on participants’ report of relationship quality via perceived relationship stability, 95% CI = [−0.65, −0.002]. Compared with participants in the stable condition, those in the unstable condition perceived their relationships to be less stable, β = −0.14, t(163) = −1.89, p = .069, and such perceptions were associated with lower reports of relationship quality, β = 0.71, t(167) = 12.68, p < .001. A model in which the order of perceived relationship stability and relationship quality was reversed did not yield a significant indirect effect, 95% CI = [−0.55, 0.34].

We turned next to our behavioral outcome measure. The amount of affection expressed in the messages that participants wrote to their partners varied greatly. For example, a message rated as low in affection was “Um, I feel slightly annoyed at the fact that you think I should have to do all of the cooking and cleaning. We both work. You should help” (M = 1.90). A moderately affectionate message was “I feel very happy that you are with me. I’ve grown to respect your beliefs and views” (M = 4.76). A highly affectionate message (M = 8.10) was “I love you so much. I’ve never met a man who is more devoted, supportive, handsome, and intelligent . . . I can’t wait for the lifetime of love I get to share with you.”

Mediation analysis revealed a significant indirect effect of condition on affection expressed toward the partner via the mechanism of perceived relationship stability, 95% CI = [−0.40, −0.01]. Compared with participants in the stable condition, those in the unstable condition perceived their relationships to be less stable, β = −0.14, t(168) = −1.89, p = .069, and such perceptions were associated with expressing less affection toward their partners, β = 0.41, t(165) = 5.68, p < .001. When the order of perceived relationship stability and expression of affection was reversed, the indirect effect was not significant, 95% CI = [−0.25, 0.29].

We next explored the associations between perceived relationship stability and each of the five reasons that a relationship might end. Perceived relationship stability was negatively correlated with participants’ beliefs that if their relationship ended, it would be because they themselves decided to end the relationship, r(163) = −.50, p < .001, or because they and their partners mutually decided to end the relationship, r(163) = −.18, p = .016. These correlations suggest that participants who felt less confident in their relationship’s longevity were more likely to believe that if their relationships ended, they themselves, would play a role in its dissolution. We return to this finding in the General Discussion.

Next, we examined whether physical instability affected feelings of uncertainty in general. The difference between conditions did not approach significance (unstable condition: M = 3.39, SD = 1.99; stable condition: M = 3.05, SD = 1.55), F < 1.59. However, there was a significant indirect effect of condition on general uncertainty via experienced physical instability, 95% CI = [0.45, 1.23]: Participants in the unstable condition felt more unstable than did participants in the stable condition, β = 0.40, t(168) = 5.70, p < .001, and these feelings of instability were associated in turn with feeling greater uncertainty, β = 0.55, t(167) = 7.61, p < .001. When the order of instability and uncertainty was reversed, no indirect effect emerged, 95% CI = [−0.14, 0.56].

Might this general sense of uncertainty have contributed to perceptions of relationship stability? We used PROCESS Model 6 to test a mediation model in which condition affected perceived relationship stability through the two sequential mediators of experienced physical instability and general uncertainty. This analysis yielded evidence of a significant indirect effect, 95% CI = [−0.80, −0.23]. Extending the model described above, feeling
greater uncertainty was associated with perceiving one’s relationship to be less stable, $\beta = -0.47$, $t(166) = -5.86$, $p < .001$. However, this particular finding should be interpreted with caution, because an alternative model in which the order of uncertainty and perceived relationship stability was reversed also yielded a significant indirect effect, 95% CI = [0.022, 0.22].

Finally, we examined negative affect. Not surprisingly, participants who stood on one foot reported experiencing more negative affect (e.g., frustrated; $M = 4.50$, $SD = 1.72$) than did participants who stood on two feet ($M = 3.62$, $SD = 1.52$), $F(1, 168) = 12.29$, $p = .001$, $\eta^2 = .068$. We reran the mediation model described in the preceding paragraph using PROCESS Model 6, with negative affect entered as a covariate in the model of the dependent variable (perceived relationship stability). The significant indirect path from condition to perceived relationship stability via the sequential mediators of felt instability and general uncertainty persisted even when we controlled for the influence of negative affect on perceived relationship stability, 95% CI = [-0.54, -0.09]. When negative affect and uncertainty remained in the model, an indirect effect of condition on perceived relationship stability via physical instability also remained, 95% CI = [0.21, 1.11].

Although the association between experienced physical instability and perceived relationship stability was initially negative—with condition controlled, $\beta = -0.17$, $t(167) = -2.05$, $p = .042$—experienced physical instability exhibited a positive association with perceived relationship stability when negative affect and uncertainty were also included in the model, $\beta = 0.35$, $t(165) = 3.41$, $p = .001$. This finding was not predicted. A possible explanation is that once the affective or valenced experience associated with physical instability was controlled, what remained was a sense of arousal. Past evidence links higher arousal to greater romantic attraction (e.g., Dutton & Aron, 1974). Hence, it is possible that when the effects on general uncertainty and negative affect are controlled, greater feelings of physically instability could lead people to feel more strongly connected to their partners and hence to predict greater relationship longevity.

In Study 2, we used a new manipulation of physical instability and a larger, more diverse sample than in Study 1, and we replicated the finding that physical instability could undermine participants’ confidence in their relationships. Participants who perceived their relationships to be less stable reported less satisfaction and commitment and wrote messages to their partners that were less loving. This was true even though their worries were caused by physical instability rather than an authentic relationship threat. In Study 3, we sought to replicate Study 2’s findings using a new stability manipulation.

### Study 3

#### Method

Romantically involved participants were recruited from a university student center. We set our target sample size at 150 participants per editorial recommendations regarding a prior manuscript. Data collection stopped after 153 participants had completed the task. Data from one participant who requested that his or her data not be used were not analyzed. Although recruitment materials indicated that only participants in romantic relationships should participate, data collected revealed that 273 participants were not in exclusive romantic relationships. Only data from participants in exclusive romantic relationships were retained (113 were exclusively dating, 8 were cohabiting, 27 were engaged, 3 were married, and 2 were in “other” forms of long-term exclusive relationships, and 1 did not select a particular relationship category; mean relationship length = 21.53 months, $SD = 42.94$). Thus, our final sample consisted of 129 participants (41 male, 88 female; mean age = 20.83 years, $SD = 4.12$). Participants received chocolate or gum and a $2 coffee-shop gift card.

Participants were randomly assigned to one of two workstations, both of which used normal tables. In the unstable condition, participants were seated on a chair with a lightly padded seat cushion that concealed an inflatable balance training disc. In the stable condition, the same lightly padded seat cushion contained a solid wooden board. We anticipated that the altered cushions would be more noticeable than the slightly wobbly chair used in Study 1. We did not want participants to focus too much on the odd seat, so the experimenter said to participants in both conditions, “Don’t mind the chair; we’re just trying these new ones out.” While seated, participants completed questionnaires on demographic information, personality measures unrelated to the present hypotheses, the four items ($\alpha = .93$) from Study 1 regarding the perceived stability of their current romantic relationship, and the two items ($r = .65$) from Study 2 regarding the perceived quality of their current romantic relationship.

For our behavioral measure, participants were asked to select and send a “thinking of you” electronic greeting card (e-card) to their romantic partners. Each participant chose an e-card design from six choices that had been prerated and selected to vary in intimacy (for details, see Supplemental Material). The intimacy of the card design selected was one outcome of interest. However, we observed no direct or indirect effects of stability condition on card design intimacy, so we do not discuss it further.

The second behavioral outcome involved messages that participants wrote to include inside the e-card. Participants received instructions on the computer.
indicating that they should “tell your partner how you feel about him/her and about your relationship together.” In this study, unlike Study 1, participants actually sent their e-cards and messages to their partners. The contents of the e-cards were rated by four coders who were blind to participants’ stability condition. Messages were rated (1 = not at all, 9 = extremely/a great deal) for the degree to which they expressed affection, love, liking, admiration, caring, and gratitude, as well as the degree to which they complimented the partner and used couple-specific language (e.g., used nicknames. Coders’ ratings on these eight items were averaged to form an index of expression of affection (α = .93; interrater α = .93).

Participants rated how tired, happy, annoyed, relaxed, frustrated, sad, irritated, excited, and anxious they felt (1 = not at all, 9 = a great deal). We created a negative-affect composite (α = .82) by combining scores for tired, annoyed, frustrated, sad, irritated, and anxious with reversed scores for happy, relaxed, and excited. Participants also completed the three-item (α = .69) measure of general uncertainty from Study 2 and a two-item (r = .50) manipulation check, indicating the degree to which they felt unstable and off balance. Additional items not directly relevant to the present hypotheses are described in the Supplemental Material. Participants completed the shared-values affirmation, as in Study 2, and answered open-ended questions about the purpose of the study before being debriefed.

Results

Data from 12 participants who correctly guessed the study hypothesis were omitted from analyses. As expected, participants in the unstable condition reported feeling more unstable and off balance (M = 3.07, SD = 1.91) than participants in the stable condition (M = 2.40, SD = 1.59), F(1, 114) = 4.13, p = .044, η² = .035. The physical-stability manipulation used in this study did not produce significant condition differences in negative affect, F(1, 114) = 2.24, p = .137, η² = .02 (unstable condition: M = 3.50, SD = 1.38; stable condition: M = 3.14, SD = 1.15).

We computed an index of perceived relationship stability by averaging participants’ ratings of their beliefs that they would remain with their partners over each of the four time periods assessed. Contrary to prediction, a one-way ANOVA yielded no evidence of a direct effect of condition on perceived relationship stability, F < 1. However, consistent with the results of Study 2, mediation analysis revealed a significant indirect effect of condition (0 = stable, 1 = unstable) on perceived relationship stability via the experience of physical instability. 95% CI = [−0.50, −0.02]: Participants in the unstable condition felt more unstable than participants in the stable condition, β = 0.19, t(114) = 2.03, p = .044, and the more that participants felt physically unstable, the less stable they perceived their relationships to be, β = −0.25, t(113) = −2.74, p = .007. An alternative model in which the order of physical instability and perceived relationship stability was reversed did not yield a significant indirect effect, 95% CI = [−0.17, 0.19].

Next, we examined whether the experience of physical instability had downstream effects on reports of relationship quality. We used PROCESS Model 6 to test a model in which condition affected self-reported relationship quality via the sequential mediators of the experience of physical instability and perceived relationship instability. A significant indirect effect emerged via these two sequential mediators. 95% CI = [−0.20, −0.01]. In an extension of the model described in the preceding paragraph, we found that perceiving one’s relationship as less stable was associated with reporting lower relationship quality, β = 0.62, t(111) = 8.19, p < .001. An alternative model in which the order of perceived relationship stability and relationship quality was reversed also yielded a significant indirect effect, 95% CI = [−0.34, −0.007]. Our predicted model is consistent with risk-regulation theory, but this alternative model cannot be ruled out.

We next examined participants’ expression of affection in their e-card messages. An example of a message rated as low in expression of affection was, “Hey [name] . . . so I did this for a survey for free candy. Ok bye” (M = 1.19); a moderately affectionate message was, “You’re the smile at the end of my day, I love you babe!” (M = 4.13), and a highly affectionate message (M = 7.56) was, “I am so lucky to have you . . . I have never met anyone more patient and kind and considerate than you . . . There is no doubt in my mind that you are the man I will be with forever.”

A parallel bootstrap analysis revealed a significant effect of condition on expression of affection via the sequential mediators of the experience of physical instability and perceived relationship stability, 95% CI = [−0.12, −0.001]. The more unstable that participants felt their relationship to be, the less affection they tended to express toward their partners in their e-card messages, β = 0.17, t(107) = 1.77, p = .080. A model in which the order of perceived relationship stability and expression of affection was reversed did not yield a significant indirect effect, 95% CI = [−0.05, 0.02].

Did the physical stability manipulation undermine people’s sense of certainty in general? A one-way ANOVA yielded no direct effect of condition on general uncertainty, F < 1.68. However, consistent with the findings for perceived relationship stability in the present study (and for uncertainty in Study 2), condition did exert an indirect effect on general uncertainty via the mechanism of experienced physical instability, 95% CI = [0.02, 0.84]. Thus, the more the manipulation caused people to feel
unstable and off balance, the more they reported feeling uncertain, confused, and lacking in confidence, $\beta = 0.65$, $t(113) = 8.98$, $p < .001$. An alternative model, in which the order of physical instability and uncertainty was reversed, did not yield a significant indirect effect, 95% CI = [-0.11, 0.72].

As in Study 2, there was also a significant indirect effect of condition on perceived relationship stability via the sequential mediators of felt instability and general uncertainty, 95% CI = [-0.35, -0.005]. Thus, the somatic experience of physical instability was associated with the participants' perception of their relationships as less stable, and seemed to undermine their sense of certainty and confidence in general. However, a model in which the order of uncertainty and perceived relationship stability was reversed also yielded a significant indirect effect, 95% CI = [0.001, 0.09]. Therefore, the present data do not enable us to distinguish whether general uncertainty might contribute to or follow from perceived relationship instability.

**General Discussion**

In examining people’s thoughts and behaviors in relationships, researchers have typically focused on characteristics of partners and on relationship experiences. We examined the novel possibility that incidental environmental features can influence people’s relationship perceptions, which in turn lead to interpersonal behaviors. Across studies, participants who experienced physical instability perceived their romantic relationships as less stable than did those who did not experience physical instability. Even in established relationships (the mean relationship length was greater than 1.5 years in each of the studies presented here), perceptions of relationship stability seemed malleable, shifting with subtle physical experiences. Moreover, physical instability engendered responses typical of actual relationship risks: Participants who perceived more relationship instability displayed greater withdrawal, reported less satisfaction and commitment (Studies 1–3), and expressed less affection toward their partners (Studies 2–3). These responses are consequential; emotional expressivity is critical to satisfying relationships (e.g., Clark, Fitness, & Brissette, 2001), and partners who feel less satisfied and committed are less likely to stay together (Impett et al., 2001; Simpson, 1987).

The studies reported here used three operationalizations of physical instability and examined student and community samples. We ruled out negative affect as the sole basis of the observed effects, tested alternative mediation models, and complemented self-reports with ecologically valid behavioral measures.

Still, this research has limitations. The direct effect of condition on perceived relationship stability was inconsistent. The indirect effects that emerged (Studies 2 and 3) relied on correlations between experienced physical instability and perceived relationship stability, which prohibits interpretation of our results as making causal claims for these studies. However, these indirect effects also provide insight into how physically unstable environments or postures may exert effects; only when such environments produce feelings of instability do they predict relational withdrawal. Furthermore, the mediation analyses provided no support for the possibility that perceived relationship stability preceded experienced physical instability, which minimizes concerns about causal direction.

We argued that physical instability may lead people to withdraw from their relationships for one of two reasons: either because they feel uncertain about whether they want to maintain the relationship, or because they fear that their partner may not want to maintain the relationship. The first possibility received some support from a finding in Study 2, which suggested that less confidence in a relationship’s longevity was correlated with attributing the possible ending of the relationship to the participants’ own decision or to a mutual decision. However, we hesitate to draw strong conclusions from this finding, which involved single-item measures that were presented in a fixed order. Moreover, attributing a possible breakup to one’s own decision may itself reflect defensive withdrawal.

The second reason that perceived relationship instability may encourage withdrawal comes from the rich literature on risk regulation: When people feel insecure about their partners’ caring, they self-protectively distance themselves to diminish the pain of possible rejection. Previous research has indicated that personal insecurities can awaken such doubts about a partner’s caring (e.g., Murray et al., 1998). Likewise, our findings suggest that physical instability may lead to personal insecurities (e.g., uncertainty, lowered confidence), which may lead to doubts about a partner’s caring, which in turn may encourage self-protective distancing. Further research is needed to identify which of these two reasons best explains the effects of physical instability.

Risk-regulation research often reveals that people with low self-esteem engage in self-protection when their relationships are threatened, whereas people with high self-esteem do not (e.g., Murray et al., 1998). In the present research, however, self-esteem never moderated condition effects on perceived relationship stability and only once moderated a downstream effect (such that perceived relationship stability was related to relationship quality more strongly for people with higher self-esteem). Several exceptions to the rule in risk-regulation research
are consistent with our finding that there were few effects of self-esteem in these studies. Specifically, like people with low self-esteem, people with high self-esteem do self-protect when they cannot exert cognitive control (Cavallo, Holmes, Fitzsimons, Murray, & Wood, 2012; Murray, Derrick, Leder, & Holmes, 2008) and when risk is primed unconsciously (e.g., Murray, Aloni, et al., 2009; Murray, Holmes, et al., 2009). Our findings fit nicely with these unconscious risk situations; the subtle effects of physical instability may “fly below the radar,” leading even high self-esteem people to withdraw.

Our work makes important contributions to the literatures on close relationships and embodiment, which have begun to converge only recently (e.g., Huang, Dong, Dai, & Wyer, 2012). We have provided the first demonstration that somatic experiences can affect people’s perceptions of their own ongoing relationships, with downstream consequences for meaningful relationship behavior. That people respond swiftly even to relationship-irrelevant cues and that their resulting perceptions guide their interpersonal behavior may underscore the highly sensitive nature of the risk-regulation system or, at least, the fundamental need to have relationships. In addition, previous research has virtually always assessed relationship withdrawal through self-report (e.g., relationship evaluations; Cavallo et al., 2012), behavioral intentions (e.g., to behave destructively; Jaremka, Bunyan, Collins, & Sherman, 2011), or the partner’s report (e.g., of the other person’s rejecting behavior; Murray, Gomillion, Holmes, Harris, & Lamarche, 2013). The present investigation is one of the first to assess such withdrawal behaviorally (see also Forest & Wood, 2011; Gaucher et al., 2012). In so doing, we also answer the call from Meier et al. (2012), who encouraged embodiment researchers to study action-relevant outcomes.

Conclusion

Relationship perceptions and behaviors are shaped by many features: individual and couple characteristics, relationship events, and the social context in which those relationships are embedded, to name a few. The present research suggests a role for somatic experiences caused by features of the physical world: Physical instability may plant a seed of doubt about one’s romantic future. Evidently, our relationships feel only as stable as we do.

Author Contributions

A. L. Forest, D. R. Kille, and J. V. Wood developed the concept and study design for all studies. L. R. Stenhower participated in the development of study materials and collected preliminary data. Data collection was performed by research assistants under the supervision of A. L. Forest and D. R. Kille. D. R. Kille judged suspicion (on the basis of the funnel-debriefing responses) and made decisions about other exclusions reported in text. A. L. Forest performed the data analysis and interpretation. A. L. Forest drafted the manuscript, and D. R. Kille and J. V. Wood provided critical revisions. All authors approved the final version of the manuscript for submission.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Supplemental Material

Additional supporting information can be found at http://pss.sagepub.com/content/by/supplemental-data

Note

1. Condition should produce similar changes in perceived relationship stability only among participants who experienced the intended level of stability or instability. In Studies 2 and 3, a subset of participants in the unstable conditions reported feeling not at all (i.e., a score of 1) physically unstable or off-balance. Analyses of direct effects in which data from such participants were omitted yielded a significant direct effect of condition on perceived relationship stability, which is reported in the Supplemental Material available online.

References

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