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The Communicative and Physiological Manifestations of Relational Turbulence During the Empty-Nest Phase of Marital Relationships

Mary E. King & Jennifer A. Theiss

The relational turbulence model argues that periods of transition in romantic relationships are ripe for upheaval due to heightened relational uncertainty and interference from partners (Solomon & Knobloch, 2004). This research explores communicative and physiological manifestations of relational turbulence during the transition to the empty-nest phase of marriage. Participants completed surveys about their marriage, engaged in a videotaped conflict interaction, and provided saliva samples that were tested for cortisol levels. Multi-level modeling results indicated that relational uncertainty predicts avoidant conflict behaviors but not approach conflict behaviors, and interference from partners predicts indirectness, topic avoidance, withdrawal, and criticism in conflict interaction between empty-nest spouses. Results also revealed that indirectness and withdrawal were positively associated with increased cortisol following conflict. In addition, indirectness, topic avoidance, and withdrawal during conflict interaction corresponded with a more rapid decrease of cortisol following the episode, whereas criticism and demandingness were associated with an increase in cortisol.

Keywords: Conflict; Empty Nest Marriage; Physiology; Relational Turbulence; Relational Uncertainty

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The empty-nest phase of marriage is a relationship transition that calls for spouses to adopt new roles and routines as they adjust to life without children. When experienced as a positive stage in the family lifecycle, this transition is called the *empty-nest experience* (Raup & Myers, 1989), which produces feelings of a newfound freedom, more spontaneity and intimacy, increased alone time, and greater happiness (White & Edwards, 1990). When negative feelings are more prominent during this transition, individuals experience the *empty-nest syndrome*, which may involve feelings of grief, sadness, or depression and contribute to marital conflict and stress (Kahana & Kahana, 1982). In fact, divorce rates among individuals who have recently launched their children are the highest they have been for this segment of the population throughout history (Kreider, 2005). On one hand, relational deterioration during this transition may suggest that the potential for conflict was a latent factor in the marriage, suppressed by having the joint responsibility to care for children. On the other hand, this statistic may indicate that there are dynamics of the empty-nest transition that contribute to relational strife.

Two goals guide this study. First, we aim to identify relationship characteristics during the empty-nest transition that predict features of conflict interaction between spouses. To this end, we draw on the logic of the relational turbulence model, which argues that transitions in romantic relationships are ripe for upheaval due to heightened relational uncertainty and interference from partners, which contribute to increased arousal and heightened reactivity to relationship events (Solomon & Knobloch, 2004). The transition to the empty-nest phase of marriage is a transition that may be especially vulnerable to the conditions of relational turbulence, which manifest in polarized communication behavior. The second goal of this study is to investigate associations between features of conflict interaction and physiological reactivity. Specifically, we examine increases in the stress hormone cortisol as a physiological response to conflict interaction.

This research extends the literature in three important ways. Theoretically, this study advances the relational turbulence model by adding specific features of communication and physiological reactivity to the list of markers of relational turbulence. Methodologically, this study codes features of actual conflict interaction between spouses as markers of turbulence and measures salivary cortisol as a physiological manifestation of stress. Pragmatically, the results of this study can help married couples manage the transition to the empty-nest by identifying relationship qualities that may be heightened during the transition and contribute to relational turmoil. In the sections that follow, we outline the mechanisms in the relational turbulence model as they are related to message features and physiological reactivity in conflict. Then we describe a study designed to examine communicative and physiological markers of relational turbulence during the empty-nest transition in marriage.

Relational Turbulence and the Empty-Nest Phase of Marriage

The relational turbulence model suggests that transitions in romantic relationships contribute to heightened turmoil and upheaval for partners (Solomon & Knobloch,

2001, 2004). *Relational turbulence* arises when changes in a relationship give rise to increased reactivity to relationship conditions (Solomon & Knobloch, 2004), which can manifest as intensified emotional, cognitive, or communicative reactions to relationship circumstances (Solomon, Weber, & Steuber, 2010). According to the model, two interrelated mechanisms give rise to relational turbulence: relational uncertainty and interference from partners.

The first mechanism in the relational turbulence model is *relational uncertainty*, which refers to the degree of confidence people have in their perceptions of their involvement within interpersonal relationships (Knobloch & Solomon, 1999). Relational uncertainty is comprised of three interrelated sources of ambiguity that index doubts about one's own involvement in the relationship (*self uncertainty*), a partner's involvement in the relationship (*partner uncertainty*), and the future of the relationship more generally (*relationship uncertainty*). Although the three types of relational uncertainty reflect unique sources of ambiguity in close relationships and have occasionally produced divergent effects (e.g., Theiss & Solomon, 2006b), the vast majority of studies show that they are highly correlated (e.g., Knobloch & Solomon, 1999) and that typically all three types of uncertainty tend to be similarly associated with other variables (e.g., Knobloch & Theiss, 2011). Thus, in this study, we examine relational uncertainty as a broad construct that encompasses these three interrelated sources of doubt. We argue that spouses are faced with new roles and expectations during the empty-nest phase of marriage, which may contribute to experiences of increased relational uncertainty.

The second mechanism in the relational turbulence model is *interference from partners*, which refers to the degree to which individuals perceive a partner as undermining personal actions (Solomon & Knobloch, 2001, 2004). Partner interference manifests in situations when one person's routine is interrupted by efforts to coordinate actions with a relational partner (Berscheid, 1983). In established relationships, interference from partners may emerge during circumstances that require a change to well-established routines. The empty-nest transition is a point in relationships when formerly smooth patterns of behavior may be disrupted by new norms, routines, and expectations for involvement.

Features of Conflict Interaction as Markers of Relational Turbulence

Conflict is a naturally occurring event in all close relationships, but it can manifest in varying degrees of severity and may present challenges for romantic partners (Roloff & Ifert, 2000). The underlying characteristics of a romantic relationship can be influential in shaping partners' communication about conflict. For instance, couples who report high levels of relationship satisfaction employ fewer negative communicative strategies during conflict (Miller & Bradbury, 1995). In addition, increased commitment to a romantic relationship is associated with both a willingness to confront a romantic partner and a tendency to withhold complaints when the problem is perceived as minor or the partner is unlikely to change (Roloff & Solomon,

2002). The decision to withhold complaints is also associated with the degree of intimacy in a relationship (Cloven & Roloff, 1994) and the perceived power of a relationship partner (Cloven & Roloff, 1993). Drawing on the relational turbulence model, we nominate relational uncertainty and interference from partners as two additional relationship qualities that may influence message features during conflict interaction.

Several message features in conflict interaction may be sensitive to relational uncertainty and interference from partners. On one hand, the mechanisms in the relational turbulence model may encourage avoidance of conflict interaction (e.g., Theiss & Solomon, 2006b), which is reflected in topic avoidance, indirectness, and withdrawal. *Topic avoidance* involves the strategic decision not to disclose information on a particular issue (Roloff & Ifert, 2000). *Indirectness* involves hinting, evasion, and nonconfrontation (Holtgraves, 1997). *Withdrawal* is characterized by efforts to physically or psychologically distance one's self from interaction (Christensen & Shenk, 1991). On the other hand, relational uncertainty and interference from partners may also encourage more aggressive and confrontational communication during conflict (Theiss & Solomon, 2006b), which may take the form of criticism or demandingness. *Criticism* includes complaints, attributions of blame, or negative characterizations of a partner's behavior (Gottman, 1994). *Demandingness* is reflected in communication that places pressure on romantic partners to change or alter their behaviors, thoughts, or feelings (Caughlin & Vangelisti, 1999). As a starting point, then, this study examines the associations between the mechanisms in the relational turbulence model and these features of conflict interaction.

Prior research suggests that people are reluctant to engage in conversations about their relationship if there is doubt about the mutuality of the commitment to the relationship (Knobloch & Theiss, 2011). Along these lines, relational uncertainty is associated with increased topic avoidance (e.g., Knobloch & Carpenter-Theune, 2004). Individuals who are experiencing relational uncertainty tend to perceive relationship talk as threatening to themselves and their relationship (Knobloch & Theiss, 2011) and, consequently, tend to restrict the amount and the openness of relationship talk (Knobloch & Theiss, 2011; Theiss & Knobloch, 2013). In addition, relational uncertainty is positively associated with indirect communication about irritations (Theiss & Solomon, 2006b), jealousy (Theiss & Solomon, 2006b), and sexual intimacy (Theiss, 2011). Relational uncertainty tends to be positively associated with avoidant and indirect communication behaviors because when individuals are experiencing relational uncertainty, they struggle to predict the outcomes of their actions and fear saying something that might damage their relationship. Accordingly, we anticipate that avoidant features of conflict interaction are positively associated with relational uncertainty.

H1a: Relational uncertainty is positively associated with topic avoidance, indirectness, and withdrawal during conflict interactions.

In contrast to this body of literature suggesting avoidance and indirectness under conditions of relational uncertainty, other studies have pointed to more assertive and aggressive communication under conditions of relational uncertainty. Studies show

that individuals experience more extreme negative emotions under conditions of relational uncertainty, such as anger, sadness, hurt, and jealousy, which can prompt aggressive action tendencies (Knobloch & Theiss, 2010; Theiss, Knobloch, Checton, & Magsamen-Conrad, 2009). Moreover, relational uncertainty is positively associated with direct confrontations of irritating partner behavior (Theiss & Solomon, 2006b), with aggressiveness in relationship talk (Theiss & Knobloch, 2014), and with destructive conflict management tactics (Theiss & Knobloch, 2013). These studies imply that partners who are experiencing relational uncertainty may be driven to intensified confrontation in an effort to resolve their ambiguity. Thus, we predict that relational uncertainty is positively associated with more assertive and aggressive conflict tactics.

H1b: Relational uncertainty is positively associated with criticism and demandingness during conflict interactions.

A similar pattern of polarized communication behavior is expected when interference from partners is heightened. In some situations, interference from partners promotes avoidance and indirectness. For example, military couples reunited following deployment engage in less open relationship talk (Theiss & Knobloch, 2014) and enact fewer assurances (Theiss & Knobloch, 2013) under conditions of partner interference. Individuals are motivated to avoid confrontation and conflict because it represents one more context in which a romantic partner can disrupt or thwart one's personal goals. Thus, we predict a positive association between interference from partners and message features that reflect avoidance and indirectness.

H2a: Partner interference is positively associated with topic avoidance, indirectness, and withdrawal during conflict interactions.

In other circumstances, however, interference from partners tends to promote more assertive communication behavior. For instance, interference from a partner is associated with perceptions of relationship problems as more severe and relationally threatening, which promotes more direct confrontations about relationship issues (Solomon & Knobloch, 2004; Theiss & Solomon, 2006b). In addition, dating partners tend to be disaffiliative in their messages to one another when interference from partners is high (Knobloch, 2006). Moreover, interference from partners is positively associated with more aggressive relationship talk (Theiss & Knobloch, 2013) and more destructive conflict tactics (Theiss & Knobloch, 2014) among recently reunited military couples. More assertive communication behaviors are often necessary under conditions of partner interference in order to resolve disruptions to personal goals and improve coordination. Accordingly, we hypothesize that interference from partners is also positively associated with assertive and aggressive conflict behaviors.

H2b: Partner interference is positively associated with criticism and demandingness during conflict interactions.

Message Features of Conflict Interaction Predict Cortisol Reactivity

Another goal of this study is to examine features of conflict interaction as predictors of cortisol fluctuations following a conflict episode. Cortisol is a stress hormone that is

produced in response to perceived harm or threat. Acute stressors, such as having a fight with a loved one, getting in a car accident, or being told bad news, can result in the temporary increase of cortisol in an individual. Studies have revealed a number of conversation features that are associated with physiological reactivity. For example, affectionate communication is associated with decreased physiological responses to acute stressors (Floyd et al., 2007). Conversely, messages characterized by hurt and relational devaluation correspond with increased levels of cortisol (Priem & Solomon, 2011). In addition, perceptions of demand/withdraw patterns in conflict interactions have been found to influence stress and cortisol (Heffner et al., 2006). These studies suggest that the features of interpersonal communication during conflict interaction may be associated with physiological reactivity.

A conflict interaction can be more or less stressful depending on the nature of the conversation. The message features that are the focus of this study are all likely to increase cortisol in response to conflict, but they increase stress for different reasons. Three of these message features reflect a tendency to distance one's self from the conflict: topic avoidance, indirectness, and withdrawal. Although counterintuitive, disengaging from conflict can lead to increased stress. Research on the demand/withdraw pattern shows that individuals who withdraw from their partner's confrontations experience increased stress (Malis & Roloff, 2006a). Similarly, topic avoidance and indirectness are likely to contribute to increased stress because individuals who engage in these behaviors fail to voice their complaints and are prone to rumination about the event (e.g., Cloven & Roloff, 1991). Additionally, individuals who avoid conflict because they are resigned to the unresolvable nature of the conflict tend to experience more stress (Malis & Roloff, 2006b). This suggests that avoidant communication during conflict produces increased cortisol following the event. Therefore, we advance the following hypothesis:

H3a: Topic avoidance, indirectness, and withdrawal during conflict are positively associated with an increase in cortisol following a conflict interaction.

In this study we also highlight criticism and demandingness as two features of conflict interaction that reflect more assertive or aggressive conflict tactics. Individuals who demonstrate these types of attack behaviors during conflict are also likely to experience increased stress resulting from the interaction. Criticism and demandingness may generate stress because they are volatile communication behaviors that reflect underlying frustration, anger, aggression, and contempt, which may contribute to stress and dissatisfaction (Heffner et al., 2006). Moreover, research indicates that partners who initiate conflicts tend to experience heightened arousal and perceive greater disruptions to daily routines (Malis & Roloff, 2006a). Accordingly, we anticipate that individuals who display more aggressive and assertive behaviors during conflict will also have heightened cortisol following the event.

H3b: Criticism and demandingness during conflict are positively associated with an increase in cortisol following a conflict interaction.

Beyond the initial cortisol spike that people may experience following conflict, the message features that characterize the interaction may also slow cortisol recovery following the conflict episode. On one hand, topic avoidance, indirectness, and

withdrawal may slow the decrease of cortisol because the failure to enact a resolution can contribute to increased rumination about irritations, which keeps the conflict salient for a longer period of time (Cloven & Roloff, 1991). On the other hand, criticism and demandingness should also prolong the decrease of cortisol because these conflict behaviors are likely to generate arousal, which may be slow to decay as the spouse reflects on the conflict interaction (Verhofstadt, Buysse, de Clercq, & Goodwin, 2005). Research on the demand/withdraw pattern shows that wives who initiate a demand/withdraw sequence retain elevated cortisol levels throughout the day following the interaction (Kiecolt-Glaser et al., 1996). Thus, both approach behaviors and avoidance behaviors have the potential to delay the decay of cortisol following interaction.

H4a: Topic avoidance, indirectness, and withdrawal during conflict are negatively associated with a decrease in cortisol following a period of decay after conflict.

H4b: Criticism and demandingness during conflict are negatively associated with a decrease in cortisol following a period of decay after conflict.

Method

To test the hypotheses in this study, three types of data were collected from couples who were transitioning to the empty-nest phase of marriage. The first goal was to evaluate partners' perceptions of their relationship during this transition, which was assessed through surveys about the relationship. The second goal was to examine how communication about conflict reflects the mechanisms in the relational turbulence model, which was assessed by videotaping and coding conflict interactions that occurred between partners. The final goal was to explore physiological reactivity to conflict interaction by measuring cortisol levels in saliva.

Sample

Participants were 50 married couples who launched their last child from the home within the 18 months prior to the study. Participants ranged in age from 39 to 78 (M = 54.83, SD = 6.61). The average length of marriage was 27.45 years (range 12–56 years). Couples had an average of two children. The mean length of time since the last child had left the home was 9 months (range = 1 to 18 months). The majority of participants (74%) were Caucasian, with 9% African American, 7% Indian, 6% Asian/Pacific Islander, 1% Hispanic, and 3% Other.

Procedures

Undergraduate students enrolled in communication classes at a large northeastern university were given extra course credit for identifying eligible couples to participate. Eligible couples were asked to email the researcher to set up a time to complete the study. All interactions occurred Monday–Friday between the hours of 5 pm and 10 pm. Participants were instructed not to eat, drink, smoke, or brush their teeth within 30 minutes of the start of the study.[1]

Upon arrival to the research lab, participants gave their consent to participate. Then, a "test" saliva sample was obtained, which allowed participants to get comfortable with the collection process and allowed for cortisol stabilization. Then, participants individually completed a survey about their marriage, including a question that asked them to identify five main sources of intense or recurring conflict with their spouse and to rank those sources of conflict in terms of their severity. After the spouses completed their surveys, the researcher examined the sources of conflict to identify sources of conflict that were reported by both spouses. The most frequently identified conflict topics included money and finances, retirement, division of household labor, or parenting the empty nest children. Out of the topics identified by both partners, the researcher then selected the source of conflict that was rated as most severe to be the focus of the couple's interaction. We selected the most severe sources of conflict to ensure that couples would experience some degree of stress or arousal during the conversation.

Following the initial questionnaire, the participants provided a second saliva sample, which served as the baseline sample for cortisol. Next, couples engaged in an initial interaction in which they discussed the ways in which their relationship had changed since becoming empty-nesters. Following this interaction, the couples provided another saliva sample and completed a survey about their perceptions of the interaction. Then, the couples were asked to engage in a 15-minute conversation about the chosen conflict topic until the researcher ended the interaction. After this interaction, participants provided a fourth saliva sample and completed a questionnaire about their perceptions of the interaction. After completing the questionnaire, participants gave a fifth saliva sample, which measured increased cortisol following conflict. Finally, to ensure that spouses left the research lab with positive feelings toward each other, the couples engaged in a final interaction about something they had done recently that made them feel more in love, followed by a final saliva sample that was used to measure the decline in cortisol following the conflict. Each individual was debriefed and compensated $25 for their participation.

Survey Measures

A variety of closed-ended questions were used to operationalize the variables in this study. Confirmatory factor analyses were conducted on all multi-item scales. The criteria for a good fitting factor structure were a nonsignificant χ^2, CFI > 0.90, RMSEA < 0.10, and RMSEA 90% confidence intervals (Kline, 2011). After confirming the unidimensionality of the scales, composite scores were constructed by averaging the responses to the individual items.

Relational Uncertainty

Knobloch's (2008) scale was used to measure relational uncertainty in marriage. A series of statements followed the stem "How certain are you about…?" and participants used a 6-point scale to indicate their response (1 = *completely or almost*

completely uncertain, 6 = *completely or almost completely certain*). Items were reverse coded so that higher values indicated uncertainty. We started by measuring the three separate sources of relational uncertainty. Seven items measured self uncertainty: (a) how you feel about your marriage, (b) your view of your marriage, (c) how important your marriage is to you, (d) your goals for the future of your marriage, (e) how much physical intimacy you should have with your spouse, (f) how best to communicate with your spouse, and (g) how to communicate effectively with your spouse (M = 1.79; SD = 0.94; α = 0.92; χ^2 = 11.61, p = 0.56; CFI = 1.0; RMSEA = 0.00, CI = 0.00 < RMSEA < 0.09). Five items measured partner uncertainty: (a) how important your marriage is to your spouse, (b) your spouse's loyalty to you, (c) you spouse's faithfulness to you, (d) how much you can trust your spouse, and (e) your spouse's fidelity to you (M = 1.55; SD = 1.05; α = 0.96; χ^2 = 1.45, p = 0.69; CFI = 1.00; RMSEA = 0.00, CI = 0.00 < RMSEA < 0.10). Four items measured relationship uncertainty: (a) how you can or cannot behave around your spouse, (b) the current status of your marriage, (c) the definition of your marriage, and (d) the future of your marriage (M = 1.98; SD = 1.68; α = 0.92; χ^2 = 1.57, p = 0.46; CFI = 1.00; RMSEA = 0.00, CI = 0.00 < RMSEA < 0.08).

Given that the three sources of uncertainty were highly correlated (self–partner r = 0.83, p < 0.001; self–relationship r = 0.94, p < 0.001; partner–relationship r = 0.85, p < 0.001), we examined the potential for a second order factor comprised of self, partner, and relationship uncertainty. Results of a second order CFA revealed that the three sources of relational uncertainty did successfully load onto a single latent variable reflecting relational uncertainty (χ^2= 1.17, p = 0.56; CFI = 1.0; RMSEA = 0.00, CI = 0.00 < RMSEA < 0.07). Thus, we created a composite variable for relational uncertainty that is calculated as the mean across the three types of uncertainty (M = 1.73, SD = 0.96, α = 0.95).

Interference from Partners

Partner interference was measured by asking participants to indicate the extent to which their partner interferes with everyday activities (Solomon & Knobloch, 2001). Participants indicated their agreement with statements on a 6-point scale (1 = *strongly disagree*, 6 = *strongly agree*) (M = 2.03; SD = 1.12; α = 0.83). A partner's interference was measured with five items: (a) my spouse interferes with whether I achieve the everyday goals I set for myself, (b) my spouse interferes with how much time I spend with my friends, (c) my spouse interferes with my ability to use my time well, (d) my spouse interferes with how much time I devote to my work, and (e) my spouse interferes with the things I need to do each day (χ^2 = 2.103, p = 0.62; CFI = 1.00; RMSEA = 0.00, CI = 0.00 < RMSEA < 0.09).

Sources of Conflict

To determine sources of conflict, partners were asked to generate a list of five topics that are a consistent source of conflict in their marriage. Individuals were asked to

focus on conflict topics that occur frequently and to focus on the importance and salience of the conflict. Using the Marital Agendas Protocol (Notarius & Vanzetti, 1983), the researcher reviewed each spouse's list to determine a conflict-inducing topic particular to each couple.

Conflict Interaction Coding

The video-taped conflict interactions were coded by a team of three trained coders. Coders were given a coding scheme tailored to each of the five message features examined in this study. Coders were given the instructions, "For each one-minute interval of the conversation, please rate the interaction on a five-point scale with regard to the male's and the female's directness or indirectness in their conversation." Separate coding schemes were developed for each message feature that contained the same instructions but inserted the message feature of interest in place of "directness or indirectness." The instructions then provided a five-point scale with a code of one indicating a low presence of the message feature and a code of five indicating a high presence of the message feature. Coders provided one code for the female partner's behavior and one code for the male partner's behavior for each minute of interaction. Reliability of the coders was determined using Krippendorf's Alpha. Reliability for all of the message features was acceptable: (a) topic avoidance ($\alpha = 0.80$; $M = 1.62$; $SD = 0.50$), (b) indirectness ($\alpha = 0.72$; $M = 1.55$; $SD = 0.45$), (c) criticism ($\alpha = 0.73$; $M = 3.11$; $SD = 0.40$), (d) demandingness ($\alpha = 0.68$; $M = 2.36$; $SD = 0.60$), and (e) withdrawal ($\alpha = 0.82$; $M = 1.71$; $SD = 0.59$). Composite variables were constructed by calculating the average rating across the three coders for each minute of interaction and then taking the mean of those averages across the 15 minutes of interaction.

Cortisol Analysis

Saliva was collected in plastic cryovials using the passive drool technique.[2] Samples were then stored at −20 degrees Celsius to maintain their integrity. Prior to analysis, the samples were thawed and centrifuged to prepare the samples for the procedure. Salivary cortisol was analyzed using a high sensitivity salivary cortisol enzyme immunoassay (EIA) kit. Each sample was tested in duplicate to ensure the reliability of the results. The average cortisol was 0.09 μg/dL across all time points, ranging from 0.01 μg/dL to 2.16 μg/dL.

Our dependent variables were the amount of an increase in cortisol following conflict interaction and the amount of a decrease in cortisol following a period of decay. An increase in cortisol was calculated as the difference between cortisol at Time 5 (T5) and baseline cortisol at Time 2 (T2) (i.e., T5 cortisol – T2 cortisol; $M = -0.01$; $SD = 0.13$; $RNG = -0.95$–0.56). A decrease in cortisol was calculated as the difference between cortisol at T5 and T6 (i.e., T5 cortisol – T6 cortisol; $M = 0.01$; $SD = 0.03$; $RNG = -0.06$–0.14).

Preliminary Results

As a starting point, we conducted paired-sample t-tests to evaluate each of the variables for mean differences between husbands and wives. No significant differences were found between males and females on any of the variables. Next, bivariate correlations were calculated among all variables (see Table 1). Results indicated that relational uncertainty was positively associated with indirectness and withdrawal. Interference from partners was positively associated with topic avoidance, withdrawal, indirectness, and criticism. In addition, topic avoidance, indirectness, and withdrawal were positively associated with a decrease in cortisol, whereas criticism and demandingness were each negatively associated with a decrease in cortisol.

Substantive Results

Hierarchical Linear Modeling (HLM) software version 6.8 was used to evaluate hypotheses because it accommodates nonindependent or nested data. We constructed a two-level model using maximum likelihood estimation with individual characteristics at Level 1 (e.g., cortisol levels, self-reported variables, message features) and dyadic characteristics at Level 2 (e.g., length of marriage, time since launching children). Variables were entered into the model as grand-mean centered variables (i.e., centered around the sample mean). All slopes were estimated as fixed effects and the intercept was estimated as a random effect.

Relational Uncertainty and Partner Interference Predicting Conflict Message Features

Recall that the first set of hypotheses predicted that relational uncertainty (*H1*) and interference from partners (*H2*) are positively associated with topic avoidance, indirectness, criticism, demandingness, and withdrawal. To test these hypotheses, we constructed a multi-level model in which the conflict message features were the

Table 1 Bivariate Correlations Between Relationship Characteristics and Variable Measured

	V1	V2	V3	V4	V5	V6	V7	V8
V1: Relational Uncertainty								
V2: Partner Interference	0.17							
V3: Cortisol Increase	0.05	0.09						
V4: Cortisol Decrease	0.10	0.21	−0.00					
V5: Topic Avoidance	0.14	0.39***	0.18	0.25*				
V6: Indirectness	0.24*	0.30**	0.13	0.23*	0.81**			
V7: Criticism	0.09	0.25*	−0.04	−0.25*	−0.08	−0.11		
V8: Demandingness	0.09	0.11	−0.05	−0.22*	−0.21*	−0.23*	0.78**	
V9: Withdrawal	0.20*	0.32***	0.16	0.31**	0.72*	0.73**	−0.02	−0.11

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

outcome variables in separate models. Relational uncertainty and interference from partners were entered in separate models as grand-mean centered predictors on Level 1. Length of marriage and the number of months since launching the last child from the home were entered as grand-mean centered predictors on Level 2. One-tailed tests were used to evaluate hypotheses. See the appendix for equations.

Our first hypothesis predicted positive effects of relational uncertainty on approach and avoid features of conflict interaction. Results revealed that length of marriage and time since launching children did not significantly alter the value of the intercept (see Table 2). Turning to the slopes, relational uncertainty was positively associated with topic avoidance, indirectness, and withdrawal, as predicted (*H1a*). In the models predicting criticism and demandingness, however, the effect for relational uncertainty was nonsignificant. Thus *H1b* was unsupported. The residuals revealed significant variability remained in the intercept for criticism.

Our second hypothesis predicted that interference from partners was positively associated with engagement and avoidance of conflict interaction. Again, the intercept was not altered by the covariates (see Table 2). The slopes for the models revealed that partner interference was positively associated with topic avoidance, indirectness, withdrawal, and criticism during the conflict interaction, but the effect for demandingness was nonsignificant. Thus, *H2a* was fully supported and *H2b* was partially supported. The residuals revealed significant variance left to be explained in the intercepts for criticism and withdrawal.

Message Features Predicting Increased and Decreased Cortisol

The next set of analyses evaluated the conflict message features as predictors of increased cortisol and cortisol recovery following the interaction. For these analyses, we constructed multi-level models in which increases (i.e., spike) and decreases (i.e., decay) in cortisol were the outcome variables and each of the message features were entered as grand-mean centered predictors in separate models. Length of marriage and time since launching children were included as Level 2 covariates on the intercept. See the appendix for equations.

We predicted that topic avoidance, indirectness, and withdrawal (*H3a)* and criticism and demandingness (*H3b*) are positively associated with increased cortisol immediately following the conflict interaction. In the models predicting a cortisol increase, length of marriage and time since launching children did not significantly alter the value of the intercept (see Table 3). One-tailed tests revealed that topic avoidance and withdrawal were positively associated with an increase in cortisol. Thus, *H3a* received partial support. *H3b* was not supported. The residuals revealed no significant variability left to be explained in any of the model intercepts.

Finally, we predicted that topic avoidance, indirectness, and withdrawal (*H4a*) and criticism and demandingness (*H4b*) are negatively associated with a decrease in cortisol. To test this hypothesis, we constructed a multi-level model that was identical to Model 2, except that decreased cortisol was the outcome variable. Results for

Table 2 Relational Uncertainty and Partner Interference Predicting Message Features

	Topic Avoidance		Indirectness		Withdrawal		Criticism		Demandingness	
	RU	PI	RU	PI	RU	PI	RU	PI	RU	PI
Intercept	1.53***	1.63***	1.34***	1.55***	1.50***	1.72***	3.12***	3.12***	2.41***	2.36**
Length of Marriage	0.01	−0.00	0.00	−0.00	0.01	0.00	−0.01	−0.01	−0.01	−0.00
Time Post Launch	0.00	0.00	−0.00	−0.00	0.00	0.00	−0.01	−0.01	−0.02	−0.01
Slopes										
Relational Uncertainty	0.08*		0.13***		0.14***		0.00		0.02	
Partner Interference		0.17***		0.13***		0.17***		0.07*		0.07
Residual (t)	0.01	0.00	0.01	0.00	0.04	0.05***	0.07***	0.03***	0.04	0.00

Note. All hypotheses were tested using one-tailed tests. Cell entries in the intercept category are the change in the intercept attributable to the within-person mean, which represents the between-person effect on that variable. The cell entries in the slopes category represent the within-person slope over the course of the study. The cell entries in the random effects category are t and represent the remaining unexplained variation in that variable. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Table 3 Message Features Predicting Increased Cortisol

	Topic Avoidance	Indirectness	Withdrawal	Criticism	Demandingness
Intercept	−0.12	−0.12	−0.12	−0.12	−0.12
Length of Marriage	−0.00	−0.00	−0.00	−0.00	−0.00
Time Post Launch	0.00	0.00	0.00	0.00	0.00
Slopes					
Topic Avoidance	0.05*				
Indirectness		0.04			
Criticism			0.04*		
Demandingness				0.02	
Withdrawal					0.01
Residual (t)	0.00	0.00	0.00	0.00	0.00

Note. All hypotheses were tested using one-tailed tests. Cell entries in the intercept category are the change in the intercept attributable to the within-person mean, which represents the between-person effect on that variable. The cell entries in the slopes category represent the within-person slope over the course of the study. The cell entries in the random effects category are t and represent the remaining unexplained variation in that variable. * $p < 0.05$

the intercept, again, revealed that length of marriage and time since launching children did not significantly alter the value of the intercept (see Table 4). One-tailed tests for the slopes revealed that topic avoidance, indirectness, and withdrawal were positively associated with decreased cortisol (*H4a* not supported), whereas criticism and demandingness were negatively associated with a decrease in cortisol (*H4b* supported). In other words, individuals who were avoidant, indirect, and withdrawn during the conflict interaction recovered more quickly from the stressful episode, and individuals who were more confrontational saw a continued increase in their cortisol levels following conflict. Results indicated that there was no significant variability left to be explained in the intercepts.[3]

Discussion

This study explored the empty-nest relationship and the communicative and physiological reactions spouses experience during this transition. The relational turbulence model provided a theoretical framework for exploring how dynamics of the empty-nest relationship predict how spouses communicate about conflict. This study also adds cortisol as a form of physiological reactivity that may be implicated in the logic of the relational turbulence model. The results of this study extend the relational turbulence model in significant ways and provide insight into the qualities that may contribute to hardship during the empty-nest phase of marriage.

Implications for the Relational Turbulence Model

This study advances the relational turbulence model in three important ways. First, this research continues the recent trend of applying the model to relational contexts

Table 4 Message Features Predicting Decreased Cortisol

	Topic Avoidance	Indirectness	Withdrawal	Criticism	Demandingness
Intercept	0.01***	0.01***	0.01***	0.01***	0.01***
Length of Marriage	−0.00	0.00	−0.00	0.00	−0.00
Time Post Launch	−0.00	0.00	−0.00	−0.00	−0.00
Slope					
Topic Avoidance	0.01**				
Indirectness		0.01**			
Criticism			0.01**		
Demandingness				−0.02**	
Withdrawal					−0.01***
Residual (t)	0.00	0.00	0.00	0.00	0.00

Note. All hypotheses were tested using one-tailed tests. Cell entries in the intercept category are the change in the intercept attributable to the within-person mean, which represents the between-person effect on that variable. The cell entries in the slopes category represent the within-person slope over the course of the study. The cell entries in the random effects category are t and represent the remaining unexplained variation in that variable.
** $p < 0.01$. *** $p < 0.001$

beyond courtship. Although the relational turbulence model was initially designed to account for reactivity during the transition from casual to serious involvement during courtship, recent research has considered the potential for turbulence during other relationship transitions (e.g., infertility, Steuber & Solomon, 2008; parenthood, Theiss, Estlein, & Weber, 2013; military deployment, Theiss & Knobloch, 2013). The transition to the empty-nest phase of marriage marks another period in the relationship trajectory when new roles and routines may elicit relational turbulence.

The second way this study contributes to the model is that it adds depth to the way communication has typically been treated as a marker of turbulence. Prior tests of the relational turbulence model have typically evaluated the mechanisms in the model as predictors of self-reported communication behavior (e.g., Knobloch & Carpenter-Theune, 2004; Theiss & Knobloch, 2013; Theiss & Solomon, 2006a, 2006b). Here, conflict interactions between spouses were coded by outside observers for the presence of a variety of message features, including topic avoidance, indirectness, withdrawal, criticism, and demandingness. Relational uncertainty was positively associated with the three avoidant message features of topic avoidance, indirectness, and withdrawal, but was not significantly associated with the confrontational message features of criticism and demandingness. The results for the avoidant message features are consistent with previous tests of the relational turbulence model (e.g., Knobloch & Theiss, 2011; Theiss & Nagy, 2012). The nonsignificant results for the assertive message features may reflect our operationalization of relational uncertainty. In past research, self uncertainty has emerged more consistently as a predictor of confrontational or aggressive communication than the other forms of uncertainty (e.g., Theiss & Solomon, 2006b). Thus, our decision to combine the three sources of uncertainty into a single measure may

have obscured some of the nuanced effects the different types of relational uncertainty can have in conflict situations.

This study also constitutes one of the few investigations to examine a link between interference from partners and communication behaviors. Prior observational studies have linked interference from partners with message disfluencies, uncoordinated conversations, and disaffiliative messages (Knobloch, 2006). Studies that have attempted to link partner interference with self-reported indirectness or topic avoidance have had limited success (Theiss et al., 2009; Theiss & Solomon, 2006a, 2006b). The results of this investigation are promising because they document associations between partner interference and outside observers' ratings of communication behavior. Notably, there was no significant association between partner interference and demandingness. Perhaps interference from partners makes people reluctant to make demands, given that their partner has already demonstrated an inability to behave in ways that are responsive to their needs. If individuals already feel as though they cannot count on a partner to help facilitate daily goals, demanding something new of the partner may seem futile.

The third contribution to the relational turbulence model is that this study adds physiological reactivity as a marker of relational turbulence. Specifically, topic avoidance and withdrawal were associated with increased cortisol, likely due to increased cognitive and emotional load that occurs when individuals suppress their complaints during conflict (e.g., Roloff & Ifert, 2000). In other words, increased rumination, reflection, and emotion that are unexpressed during conflict are manifest in physiological reactivity to the event. This finding is supported by Selye's (1975) work indicating persistent stress that is not resolved through coping or adaptation may lead to anxiety or withdrawal behaviors. These results suggest that avoidance can be toxic in terms of the physical stress that results from these seemingly harmless behaviors.

Notably, indirectness, criticism, and demandingness did not produce any significant increase in cortisol following conflict. Why is the effect for indirectness nonsignificant while the effects for avoidance and withdrawal are associated with increased cortisol? We suspect that this stems from differences between the behaviors enacted in each case. When individuals avoid and withdraw, they do not participate in the interaction at all, whereas individuals who are indirect engage in the interaction but are not assertive in expressing their feelings. Thus, indirectness provides some opportunities to express one's feelings and mitigate stress, while avoidance leaves individuals prone to increased rumination, frustration, and stress. We were surprised that criticism and demandingness were not associated with immediate increases in cortisol following the interaction. This finding implies that perhaps it is not the act of aggression that people experience as stressful but the rumination and possible guilt that arise in the aftermath. Additional research is required to fully understand how stress covaries with confrontation.

Results also indicated that topic avoidance, withdrawal, and indirectness were positively associated with the rate of a decrease in cortisol for the empty-nest couples, indicating that decline of cortisol was more pronounced under conditions of

avoidance. These effects were in the opposite direction of what was predicted (*H4a*), but the valence of the effect may be due to the nature of these particular message features. For example, topic avoidance, withdrawal, and indirectness are communication strategies used by individuals to mitigate potentially unpleasant conversations and to prevent embarrassment, serious conflict, or undesirable outcomes. Another possible explanation for this effect is related to the type of marriage that couples have. For example, if couples have an avoidant marriage (Gottman, 1993), it is possible that avoidance is a normative reaction to a distressing experience; thus, these couples may have been initially stressed by the prospect of discussing their conflicts but immediately found solace in returning to avoidance as their status quo. In other words, if avoidance is normative for the relationship, it is unlikely to contribute to the type of rumination that would typically increase stress.

On the other hand, demandingness and criticism were negatively associated with decreased cortisol, indicating that when these message features were present during conflict, cortisol levels actually continued to increase beyond the expected peak in cortisol following the interaction. One possible explanation for the continued increase in cortisol may be due to the topic of the conflict interaction. Spouses self-identified the most frequent sources of conflict they experience in their relationships. Given the chronic nature of these conflicts, individuals who are continually critical and demanding about the topic may be particularly frustrated by the continued lack of action or responsiveness on the part of their spouse (e.g., Caughlin & Vangelisti, 1999). Moreover, they may ruminate beyond the end of the conflict about their partner's failure to help resolve the conflict (e.g., Cloven & Roloff, 1991). In this case, the combination of a chronic stressor in the relationship and increased rumination sparked by criticism and demands may have provided a delayed stress reaction.

Implications for Empty-Nest Couples

This research suggests relational uncertainty and interference from partners may be salient issues for empty-nest couples. As couples begin to shift their focus back toward the marital relationship, questions of self, partner, or relationship uncertainty are likely to arise. Furthermore, as partners begin to integrate more wholly into one another's lives without the schedules of children to structure their time, it follows that some spouses may get in one another's way. Irritating behaviors, thoughtless action, or simple misunderstandings could lead to the perception of an interfering partner. Applying the relational turbulence model in this context may help empty-nesters prepare for these and other changes by highlighting the potential for relational uncertainty and partner interference during this transition.

The findings in this study also suggest that conflict-related stress is a physiological concern for empty-nesters. Passive conflict behaviors in particular may produce elevated cortisol levels and aggressive conflict behaviors may prolong the physiological impact of a conflict episode, which in turn can have health-related implications for the aging empty-nest population. Increased stress is related to disruptions in immune

system functioning (Kiecolt-Glaser et al., 1996), increased rate of illness and morbidity (Burman & Margolin, 1992), increased rates of cardiovascular disease (Matthews & Gump, 2002), atherosclerosis (Gallo et al., 2003), and hypertensive complications (Baker et al., 2000). The results of this study highlight features of conflict interaction that may increase stress and consequently contribute to health problems. Future research should consider the broader health implications that may arise when aging couples engage in destructive conflict interactions.

Strengths, Limitations, and Future Directions

This study has theoretical and methodological strengths. Theoretically, this study extends the relational turbulence model by (a) applying it to a relationship transition beyond courtship, (b) investigating message features in conflict interaction as communicative markers of turbulence, and (c) adding physiological reactivity to the list of potential markers of turbulence. Methodologically, this study is significant because it focuses on married dyads that are negotiating the empty-nest transition, which is an improvement over much of the literature on the empty-nest experience that focuses on individual perceptions. This study also employed mixed methods involving survey data, physiological data, and observational coding, which are important contributions in the field of interpersonal communication and close relationships.

Although this research has strengths there are also some noteworthy limitations. First, the sample size was limited to 50 empty-nest couples (100 individuals) due to the limited availability of resources. Although this is an adequate number of participants for conducting a multi-level model (Raudenbush & Bryk, 2002), the sample likely lacked sufficient power to detect small- and medium-sized effects. In addition, it is worth noting that the couples in this study self-selected to participate and may have been more satisfied and more comfortable discussing relationship issues than other empty-nest couples who chose not to participate and who may be experiencing a great deal of strife. Relatedly, the effect sizes in this study are relatively small. Small effects are still meaningful, especially in the context of empty-nest marriages, because they suggest that even subtle fluctuations and changes in the relationship environment can still have an impact on individual and relational well-being. Although the effects of a single event or interaction may be quite limited, the cumulative effect of these experiences in a long-term relationship can be rather influential. Nevertheless, the results in this particular study should be interpreted with some caution given that the effects were not very robust.

With regard to the cortisol, there were some additional limitations. First, cortisol typically follows a diurnal rhythm, such that as the day progresses, cortisol levels decline and are lowest in the evening. Due to the schedules of empty-nesters, participants arrived at the lab between 5pm and 7pm in the evening (after work), likely contributing to the low levels of cortisol in this study. Another factor limiting the cortisol levels is related to the age of the participants. Research indicates that healthy adults in this age range have average cortisol levels ranging from ND (None

Detected) to 0.254, which is much lower than the average cortisol levels for healthy individuals in their early 20s through 40s (ranging ND–3.59) (Aardal & Holm, 1995). The lower levels of cortisol in this population may have impacted this study's cortisol findings.

Future research should continue to examine the transitions that couples experience in later life. Much research to date has focused on developing relationships and the convenient sampling of college-aged students. Although this research is important and has provided significant insights for the field of communication, it does leave a large segment of the population under-represented. Future research may also examine the types of issues that incite conflict to determine if conflicts stem from general, chronic irritations in the marriage, or if they arise as a result of changing circumstances during this transition. Finally, future research should also continue to examine the associations between communication behavior and physiological effects, as well as the associations between physiological stress and self-reported experiences of arousal, stress, and anxiety. Issues of failing health and failing marriages are salient and timely issues for many couples in the later stages of life; thus, additional research is necessary to understand, explain, and predict the physiological and relational outcomes for this population.

Notes

[1] Although some medical conditions (e.g., cancer, diabetes, endocrine disease, hypertension) and medications (e.g., steroidal medications, hormonal birth control, antidepressants) have been shown to interfere with cortisol levels, participants were not pre-screened for these conditions for two reasons. First, given the challenges already inherent in obtaining a sample of married couples who had recently entered the empty-nest phase of marriage, adding extensive exclusion criteria based on health conditions and medications would have been too prohibitive to recruitment. In a study that examined cortisol in college undergraduates, extensive pre-screening resulted in the exclusion of approximately 50% of interested participants (Floyd et al., 2007), which likely would have been much greater in a population of aging empty-nest couples. Second, if participants did have a medical condition or were taking medications that affect cortisol, their cortisol samples would not be completely invalid, they would simply add to measurement error (e.g., Floyd & Riforgiate, 2008). Thus, pre-screening for the various health conditions and medications that can interfere with cortisol seemed too restrictive given the relatively modest impact these variables might have on the data.

[2] The researcher attended specialized training for analyzing salivary cortisol at the Salimetrics Laboratory in State College, PA. The analyses were conducted in an endocrinology laboratory at the researcher's institution under the supervision of a faculty member with expertise in conducting cortisol analysis.

[3] We conducted a series of post-hoc analyses to assess the indirect effects of relational uncertainty and interference from partners on cortisol increases and decreases. We constructed structural equation models in which either relational uncertainty or interference from partners predicted one of the conflict message features, which in turn predicted either cortisol increase or cortisol decrease. To evaluate the indirect effects in our models, we conducted bootstrap analysis with 2,000 bootstrap samples and 95% bias-corrected confidence intervals. Given the nonindependence in our data, we ran the models separately for males and females. Results indicated that none of the indirect effects were statistically

significant. A few of the tests approached significance. Specifically, in the models where criticism was the mediator of effects on cortisol decrease, the standardized, indirect effects for partner interference approached significance for both males ($\beta = 0.29$, $p = 0.06$) and females ($\beta = 0.28$, $p = 0.07$). In addition, in the models for females where topic avoidance was the mediator of effects on cortisol increase, the standardized, indirect effects for relational uncertainty ($\beta = 0.09$, $p = 0.13$) and partner interference ($\beta = 0.11$, $p = 0.13$) were marginally nonsignificant. Finally, in the male model where topic avoidance mediated effects on cortisol decrease, the standardized, indirect effect for partner interference ($\beta = 0.13$, $p = 0.12$) also approached significance. Given the small sample size in this study, we are reluctant to dismiss the possibility of indirect effects for relational uncertainty and interference from partners out of hand. Future studies should attempt to retest these associations in a larger sample that has sufficient power to detect small and medium sized effects.

References

Aardal, E., & Holm, A. (1995). Cortisol in saliva—Reference ranges and relation to cortisol in serum. *Clinical Chemistry and Laboratory Medicine*, *33*, 927–932. doi:10.1515/cclm.1995.33.12.927

Baker, B., Paquette, M., Szalai, J. P., Driver, H., Perger, T., Helmers, K.,…Tobe, S. (2000). The influence of marital adjustment on 3-year left ventricular mass and ambulatory Blood pressure in mild hypertension. *Archives of Internal Medicine*, *160*, 3453–3458. doi:10.1001/archinte.160.22.3453

Berscheid, E. (1983). Emotion. In H. H. Kelley, E. Berscheid, A. Christensen, J. Harvey, T. L. Huston, & G. Levinger et al. (Eds.), *Close relationships* (pp. 110–168). San Francisco, CA: Freeman.

Burman, B., & Margolin, G. (1992). Analysis of the association between marital relationships and health problems: An interactional perspective. *Psychological Bulletin*, *112*, 39–63. doi:10.1037/0033-2909.112.1.39

Caughlin, J. P., & Vangelisti, A. L. (1999). Desire for change in one's partner as a predictor of the demand/withdraw pattern of marital communication. *Communication Monographs*, *66*, 66–89. doi:10.1080/03637759909376463

Christensen, A., & Shenk, J. L. (1991). Communication, conflict, and psychological distance in nondistressed, clinic, and divorcing couples. *Journal of Consulting and Clinical Psychology*, *59*, 458–463. doi:10.1037/0022-006X.59.3.458

Cloven, D. H., & Roloff, M. E. (1991). Sense-making activities and interpersonal conflict: Communicative cures for the mulling blues. *Western Journal of Speech Communication*, *55*, 134–158. doi:10.1080/10570319109374376

Cloven, D. H., & Roloff, M. E. (1993). The chilling effect of aggressive potential on the expression of complaints in intimate relationships. *Communication Monographs*, *60*, 199–219. doi:10.1080/03637759309376309

Cloven, D. H., & Roloff, M. E. (1994). A developmental model of decisions to withhold relational irritations in romantic relationships. *Personal Relationships*, *1*, 143–164. doi:10.1111/j.1475-6811.1994.tb00059.x

Floyd, K., Mikkelson, A. C., Tafoya, M. A., Farinelli, L., La Valley, A. G., Judd, J.,…Wilson, J. (2007). Human affection exchange: XIII. Affectionate communication accelerates neuroendocrine stress recovery. *Human Communication*, *22*, 123–132. doi:10.1080/10410230701454015

Floyd, K., & Riforgiate, S. (2008). Affectionate communication received from spouses predicts stress hormone levels in healthy adults. *Communication Monographs*, *75*, 351–368. doi:10.1080/03637750802512371

Gallo, L. C., Troxel, W. M., Kuller, L. H., Sutton-Tyrrell, K., Edmundowicz, D., & Matthews, K. A. (2003). Marital status, marital quality, and atherosclerotic burden in postmenopausal women. *Psychosomatic Medicine*, *65*, 952–962. doi:10.1097/01.PSY.0000097350.95305.FE

Gottman, J. M. (1993). The roles of conflict engagement, escalation, and avoidance in marital interaction: A longitudinal view of five types of couples. *Journal of Consulting and Clinical Psychology*, *61*, 6–15. doi:10.1037/0022-006X.61.1.6

Gottman, J. M. (1994). *What predicts divorce? The relationship between marital processes and marital outcomes*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Heffner, K. L., Loving, T. J., Kiecolt-Glaser, J. K., Himawan, L. K., Glaser, R., & Malarkey, W. B. (2006). Older spouses' cortisol responses to marital conflict: Associations with demand/withdraw communication patterns. *Journal of Behavioral Medicine*, *29*, 317–325. doi:10.1007/s10865-006-9058-3

Holtgraves, T. (1997). Styles of language use: Individual and cultural variability in conversational indirectness. *Journal of Personality and Social Psychology*, *73*, 624–637. doi:10.1037/0022-3514.73.3.624

Kahana, B., & Kahana, E. (1982). Clinical issues of middle age and life. In F. M. Berardo (Ed.), *The annals of the American academy of political and social science: Middle and late life transitions* (pp. 140–161). Beverly Hills, CA: Sage. doi:10.1177/0002716282464001013

Kiecolt-Glaser, J. K., Newton, T. L., Cacioppo, J. T., MacCullum, R. C., Glaser, R., & Malarkey, W. B. (1996). Marital conflict and endocrine function: Are men really more physiologically affected than women? *Journal of Consulting & Clinical Psychology*, *64*, 324–332. doi:10.1037/0022-006X.64.2.324

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Knobloch, L. K. (2006). Relational uncertainty and message production within courtship: Features of date request messages. *Human Communication Research*, *32*, 244–273. doi:10.1111/j.1468-2958.2006.00275.x

Knobloch, L. K. (2008). The content of relational uncertainty within marriage. *Journal of Social and Personal Relationships*, *25*, 467–495. doi:10.1177/0265407508090869

Knobloch, L. K., & Carpenter-Theune, K. E. (2004). Topic avoidance in developing romantic relationships: Associations with intimacy and relational uncertainty. *Communication Research*, *31*, 173–205. doi:10.1177/0093650203261516

Knobloch, L. K., & Solomon, D. H. (1999). Measuring the sources and content of relational uncertainty. *Communication Studies*, *50*, 261–278. doi:10.1080/10510979909388499

Knobloch, L. K., & Theiss, J. A. (2010). An actor-partner interdependence model of relational turbulence: Cognitions and emotions. *Journal of Social and Personal Relationships*, *27*, 595–619. doi:10.1177/0265407510368967

Knobloch, L. K., & Theiss, J. A. (2011). Relational uncertainty and relationship talk within courtship: A longitudinal actor-partner interdependence model. *Communication Monographs*, *78*, 3–26. doi:10.1080/03637751.2010.542471

Kreider, R. M. (2005). Number timing, and duration of marriages and divorces: 2001. *Current Population Reports*, P70–97. U.S. Census Bureau, Washington, D.C

Malis, R. S., & Roloff, M. E. (2006a). Demand/withdraw patterns in serial arguments: Implications for well-being. *Human Communication Research*, *32*, 198–216. doi:10.1111/j.1468-2958.2006.00009.x

Malis, R. S., & Roloff, M. E. (2006b). Features of serial arguing and coping strategies: Links with stress and well-being. In R. M. Dailey & B. A. LePoire (Eds.), *Applied interpersonal communication matters: Family, health, and community relations* (pp. 39–65). New York, NY: Peter Lang.

Matthews, K., & Gump, B. B. (2002). Chronic work stress and marital dissolution increase risk of posttrial mortality in men from the Multiple Risk Factor Intervention Trial. *Archives of Internal Medicine*, *162*, 309–315. doi:10.1001/archinte.162.3.309

Miller, G. E., & Bradbury, T. N. (1995). Refining the association between attributions and behavior in marital interaction. *Journal of Family Psychology*, *9*, 196–208. doi:10.1037/0893-3200.9.2.196

Notarius, C. I., & Vanzetti, N. (1983). Marital agendas protocol. In E. Filsinger (Ed.), *Sourcebook of marriage and family assessment* (pp. 209–277). Beverly Hills, CA: Sage.

Priem, J. S., & Solomon, D. H. (2011). Relational uncertainty and cortisol responses to hurtful and supportive messages from a dating partner. *Personal Relationships*, *18*, 198–223. doi:10.1111/j.1475-6811.2011.01353.x

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchal linear models* (2nd ed.). Thousand Oaks, CA: Sage.

Raup, J. L., & Meyers, J. E. (1989). The empty-nest syndrome: Myth or reality? *Journal of Counseling & Development*, *68*, 180–183. doi:10.1002/j.1556-6676.1989.tb01353.x

Roloff, M. E., & Ifert, D. E. (2000). Conflict management through avoidance: Withholding complaints, suppressing arguments, and declaring topics taboo. In S. Petronio (Ed.), *Balancing the secrets of private disclosures* (pp. 151–163). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Roloff, M. E., & Solomon, D. H. (2002). Conditions under which relational commitment leads to expressing or withholding relational complaints. *International Journal of Conflict Management*, *13*, 276–391. doi:10.1108/eb022877

Selye, H. (1975). Confusion and controversy in the stress field. *Journal of Human Stress*, *1*, 37–44. doi:10.1080/0097840X.1975.9940406

Solomon, D. H., & Knobloch, L. K. (2001). Relationships uncertainty, partner interference, and intimacy within dating relationships. *Journal of Social and Personal Relationships*, *18*, 804–820. doi:10.1177/0265407501186004

Solomon, D. H., & Knobloch, L. K. (2004). A model of relational turbulence: The role of intimacy, relational uncertainty, and interference from partners in appraisals of irritations. *Journal of Social and Personal Relationships*, *21*, 795–781. doi:10.1177/0265407504047838

Solomon, D. H., Weber, K. M., & Steuber, K. R. (2010). Turbulence in relationship transitions. In S. W. Smith & S. R. Wilson (Eds.), *New directions in interpersonal communication research* (pp. 115–134). Thousand Oaks, CA: Sage.

Steuber, K. R., & Solomon, D. H. (2008). Relational uncertainty, partner interference, and infertility: A qualitative study of discourse within online forums. *Journal of Social and Personal Relationships*, *25*, 831–855. doi:10.1177/0265407508096698

Theiss, J. A. (2011). Modeling dyadic effects in the associations between relational uncertainty, sexual communication, and sexual satisfaction for husbands and wives. *Communication Research*, *38*, 565–584. doi:10.1177/0093650211402186

Theiss, J. A., Estlein, R., & Weber, K. M. (2013). A longitudinal assessment of relationship characteristics that predict new parents' relationship satisfaction. *Personal Relationships*, *20*, 216–235. doi:10.1111/j.1475-6811.2012.01406.x

Theiss, J. A., & Knobloch, L. K. (2013). A relational turbulence model of military service members' relational communication during reintegration. *Journal of Communication*, *63*, 1109–1129. doi:10.1111/jcom.12059

Theiss, J. A., & Knobloch, L. K. (2014). Relational turbulence and the post-deployment transition: Self, partner, and relationship focused turbulence. *Communication Research*, *41*, 27–51. doi:10.1177/0093650211429285

Theiss, J. A., Knobloch, L. K., Checton, M., & Magsamen-Conrad, K. (2009). Relationship characteristics associated with the experience of hurt in romantic relationships: A test of the relational turbulence model. *Human Communication Research*, *35*, 588–615. doi:10.1111/j.1468-2958.2009.01364.x

Theiss, J. A., & Nagy, M. E. (2012). A cross-cultural test of the relational turbulence model: Relationship characteristics that predict turmoil and topic avoidance for Koreans and Americans. *Journal of Social and Personal Relationships*, *29*, 545–565. doi:10.1177/0265407512443450

Theiss, J. A., & Solomon, D. H. (2006a). Coupling longitudinal data and multilevel modeling to examine the antecedents and consequences of jealousy experiences in romantic relationships: A test of the relational turbulence model. *Human Communication Research*, *32*, 469–503. doi:10.1111/j.1468-2958.2006.00284.x

Theiss, J. A., & Solomon, D. H. (2006b). A relational turbulence model of communication about irritations in romantic relationships. *Communication Research*, *33*, 391–418. doi:10.1177/0093650206291482

Verhofstadt, L. L., Buysse, A., de Clercq, A., & Goodwin, R. (2005). Emotional arousal and negative affect in marital conflict: The influence of gender, conflict structure, and demand-withdrawal. *European Journal of Social Psychology*, *35*, 449–467. doi:10.1002/ejsp.262

White, L., & Edwards, J. N. (1990). Emptying the nest and parental well-being: An analysis of national panel data. *American Sociological Review*, *55*, 235–242. doi:10.2307/2095629

Appendix

The following equations represent the model when relational uncertainty was the substantive predictor. Identical models were constructed for interference from partners.

Model 1: Relational Uncertainty and Partner Interference Message Features

Level 1 Equation

$$Y_{(ij)} = \pi_{oj} + \pi_{1j}\left(\text{RELATIONAL UNCERTAINTY}_{ij}\right) + r_{ij}$$

Level 2 Equation

$$\pi_{oj} = \beta_{00} + \beta_{01}\left(\text{MYEAR.}_j\right) + \beta_{02}\left(\text{MONTHS.}_j\right) + u_{0j}$$

$$\pi_{1j} = \beta_{10}$$

In the Level 1 model, π_o represents the intercept for the model, π_1 represents the linear effect for relational uncertainty, and r represents the random effect. In the Level 2 equation for the intercept, β_{01} represents the between-groups differences in the intercept based on years a couple has been married, and β_{02} controls for months since the last child left the home. In the model the subscript *i* refers to the individual (Level 1) and the subscript *j* refers to the dyad (Level 2).

Model 2 shows the equations that were used when criticism was a predictor. Identical models were constructed for topic avoidance, indirectness, demandingness, and withdrawal.

Model 2: Message Features Predicting Cortisol Fluctuation

Level 1 Equation

$$Y_{(ij)} = \pi_{oj} + \pi_{1j}\left(\text{CRITICISM}_{ij}\right) + r_{ij}$$

Level 2 Equation

$$\pi_{oj} = \beta_{00} + \beta_{01}\left(\text{MYEAR.}_j\right) + \beta_{02}\left(\text{MONTHS.}_j\right) + u_{0j}$$

$$\pi_{1j} = \beta_{10}$$