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Relational turbulence during the COVID-19 pandemic: A longitudinal analysis of the reciprocal effects between relationship characteristics and outcomes of relational turbulence

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Abstract

This study offers a longitudinal and dyadic test of relational turbulence theory during the COVID-19 pandemic. Specifically, this study highlights the severity of irritations and the aggressiveness and openness of relational communication as outcomes of relational turbulence that both shape and reflect relationship characteristics during this transition. Romantic dyads (N = 151) completed four weekly surveys during the pandemic's early stages. We used multilevel modeling to document between- and within-person effects and evaluate reciprocal effects over time. Results indicated that relational uncertainty and partner interference were positively associated with relational turbulence, whereas partner facilitation was negatively associated with turbulence. Relational turbulence was positively associated with the severity of irritations and the aggressiveness of communication, and negatively associated with the openness of communication, above and beyond the effects of the relationship mechanisms. Over-time analyses showed that relational turbulence, severity of irritations, aggressive communication, and open communication predicted subsequent levels of relationship qualities. These findings showcase the theoretical utility of relational turbulence theory for explaining how relationships are affected by the pandemic and highlight relationship processes to target in helping couples manage their relationship during these stressful times.

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On March 11, 2020, the World Health Organization declared COVID-19 a global pandemic prompting much of the United States to order citizens to shelter in place to slow the spread of the virus (Mervosh et al., 2020). Under these conditions, romantic partners and families were forced to stay home, spending more time together than they may be accustomed to, under increasingly stressful circumstances. Heightened stress during the pandemic was harmful to dyadic functioning (Pietromonaco & Overall, 2020), as relationship partners faced increased disruption to their goals and routines due to changes caused by stay-at-home orders. As a result, many couples struggled, experiencing increases in conflict (Luetke et al., 2020) and diminished relationship quality (Overall et al., 2020). Because the circumstances of the pandemic potentially exacerbated and amplified interpersonal and relational tensions, we examine the relationship characteristics that were heightened during the pandemic and potentially undermined dyadic functioning.

Relational turbulence theory (Solomon et al., 2016) provides a useful framework for understanding why people may be more reactive to circumstances during the pandemic by exploring relationship characteristics and features of interpersonal episodes that can contribute to turmoil and upheaval in romantic relationships. The theory proposes that transitions are marked by increased relational uncertainty and changes to interdependence, which can intensify people's cognitive, emotional, and communicative reactions to relationship circumstances. Over time, repeated volatile episodes between partners contribute to a climate of turbulence in the relationship, which further undermines relationship functioning. The theory points toward a variety of dyadic processes that become undermined under conditions of turbulence, including collaborative planning, supportiveness, relational inferences, and disclosures to social networks. This study points to assessments of irritating partner behavior and the perceived openness and aggressiveness of relational communication as indicative of relational inferences that are viewed differently when seen through the lens of relational turbulence. The COVID-19 pandemic serves as a transition ripe for uncertainty, interference, and turbulence as it can raise questions about relationship involvement and serve as a significant challenge to established routines (Goodboy et al., 2021). In turn, this can contribute to relational dynamics marked by more severe irritations, more aggressive communication, and less openness. Applying relational turbulence theory in this context offers a theoretical account of relationship dynamics that contribute to upheaval and undercut dyadic functioning.

Thus, the goals of this study are threefold. The first goal is to apply relational turbulence theory (Solomon et al., 2016) as a framework that accounts for turmoil during the COVID-19 pandemic. Second, we aim to underscore how conditions of relational turbulence undermine dyadic functioning in ways that shape relational inferences around irritations, aggressions, and lack of openness. Third, we document cyclical effects of pervasive tension on relationship conditions over time. This study also has three potential merits. Theoretically, this

research extends relational turbulence theory by investigating its claims in an unexpected, ongoing, and traumatic transition. Methodologically this research capitalizes on longitudinal data to demonstrate the reciprocal effects that turbulence can have on relationship qualities over time. Pragmatically, this study highlights relationship processes that should be targeted to help couples navigate these stressful circumstances. In this paper, we summarize the logic of relational turbulence theory in relation to the COVID-19 pandemic and report the results of a longitudinal, dyadic study designed to test the theory's logic during the early stages of the pandemic.

Relationship conditions heightened during the COVID-19 transition

Relational turbulence theory suggests that transitions in romantic relationships are marked by changes to relationship qualities that intensify interpersonal turmoil and undermine dyadic functioning (Solomon et al., 2016). The COVID-19 pandemic has been an especially difficult transition for romantic couples to navigate, marked by upheaval to personal and relational routines (Haleem et al., 2020), increased stress and interpersonal tension (Luetke et al., 2020), and decreased relationship quality (Overall et al., 2020). Relational turbulence theory argues that transitions like COVID-19 are challenging because they prompt questions about relational involvement and call for changes to interpersonal routines that create instability in relationships.

The first relational mechanism in the theory that is heightened during transitions and intensifies reactivity to interpersonal events is relational uncertainty. *Relational uncertainty* indicates a lack of confidence in people's perceptions of relational involvement, which is reflected in three interrelated sources of ambiguity (Solomon et al., 2016): *self uncertainty* reflects doubts about one's involvement in the relationship, *partner uncertainty* refers to doubts about a partner's involvement in the relationship, and *relationship uncertainty* encompasses doubts about the relationship as a whole. Uncertainty about relational involvement is likely to be prevalent during the COVID-19 pandemic as individuals grow weary of increased exposure to their partner, worry their partner may grow tired of them, and wonder if the relationship will survive these unique and challenging circumstances.

A second proposition of relational turbulence theory focuses on changes in interdependence during transitions (Solomon et al., 2016). The theory assumes that relationship partners influence one another's lives and that a partner's influence can be helpful or harmful to achieving personal goals and enacting individual routines (Knobloch & Solomon, 2004). *Interference from partners* occurs when a partner's influence is disruptive to individual routines and goals. *Facilitation from partners* occurs when a partner's influence is helpful in achieving one's goals and coordinating routines. During the COVID-19 pandemic, conditions are ripe for increased interference as couples negotiate shared work and living space, navigate changes to established routines, manage responsibility for childcare, and contend with less alone time. Couples who successfully coordinate their actions during the pandemic likely experience increased facilitation from

partners by establishing new expectations for shared household tasks, sharing responsibility for childcare, or recognizing the need for personal space.

Relational uncertainty and patterns of partner influence as predictors of turbulence

Prior research has linked relational uncertainty with various cognitive, emotional, and communicative outcomes that are indicative of relational turbulence. For example, relational uncertainty is associated with intensified emotional reactions, such as heightened anger, sadness, and fear (Knobloch & Theiss, 2010), emotional and cognitive jealousy (Solomon & Brisini, 2019), and increases in depressive symptoms (Scott & Stafford, 2018). Cognitive outcomes heightened under conditions of relational uncertainty include appraisals of increased relational turmoil (Knobloch, 2007), and perceptions of a partner's actions as dominating (Theiss & Knobloch, 2013), hurtful (McLaren et al., 2011), or unsupportive (Priem & Solomon, 2015). In addition, relational uncertainty is associated with communication that can be both more indirect and avoidant (e.g., Knobloch & Theiss, 2010), as well as more direct (Theiss & Solomon, 2006b) and aggressive (Theiss & Knobloch, 2013). These volatile emotional, cognitive, and communicative outcomes contribute to a climate of turbulence in relationships. Thus, we anticipate that relational uncertainty during the COVID-19 pandemic is associated with a global assessment of the relationship as turbulent. Accordingly, we propose the following hypothesis:

H1: The experience of relational uncertainty during the COVID-19 pandemic is positively associated with experiences of relational turbulence.

Interference and facilitation from partners are also associated with reactivity that can heighten or dampen relational turbulence. Interference is associated with increased negative emotion (Knobloch & Theiss, 2010) and depressive symptoms (Scott & Stafford, 2018), appraisals of partners as unsupportive (Knobloch et al., 2018), and more assertive communication about irritating behaviors (Theiss & Solomon, 2006a), but also increased avoidance, indirectness, and withdrawal during conflict interactions (King & Theiss, 2016). This evidence suggests that interference from partners is associated with emotional, cognitive, and communicative reactivity that can contribute to a climate of relational turbulence. In contrast, research indicates that facilitation can effectively buffer the accumulation of relational turbulence by contributing to more positive emotions (Le & Agnew, 2001), more generous appraisals of a partner's supportive actions (Yoon & Theiss, 2019), and perceptions of decreased turbulence (McLaren et al., 2011). Thus, interference from partners should intensify negative reactions to interpersonal events in ways that are associated with increased relational turbulence, whereas facilitation from partners should contribute to more functional and positive relationship experiences that mitigate turbulence. To this end, we advance the following hypotheses:

H2: The experience of partner interference during the COVID-19 pandemic is positively associated with experiences of relational turbulence.

H3: The experience of partner facilitation during the COVID-19 pandemic is negatively associated with experiences of relational turbulence.

Irritations and relational communication as outcomes of turbulence during COVID-19

A second major premise of relational turbulence theory is that a climate of relational turbulence brought on by increased relational uncertainty and changes to interdependence, undermines day-to-day dyadic functioning in close relationships (Solomon et al., 2016). The theory argues that conditions of relational turbulence undermine dyadic synchrony and discourage abstract thinking in ways that challenge fundamental dyadic processes, such as collaborative planning, enacting social support, and making relational inferences. Although some tests of relational turbulence theory position cognitive appraisals and features of communicative engagement as qualities of interpersonal episodes that are shaped by the theory's relationship mechanisms, we consider assessments of interpersonal behavior to reflect inferences about the state of the relationship that may be compromised by conditions of relational turbulence. Specifically, we consider the perceived severity of irritating partner behavior and the tenor of relational communication as two features of dyadic functioning that are vulnerable to conditions of relational turbulence.

The first relationship inference that we examine in this study is the perceived *severity of irritations*, reflecting the extent to which a romantic partner's habits, behaviors, or traits are appraised as problematic and threatening to the relationship (Theiss & Solomon, 2006a). During the COVID-19 pandemic, many of a partner's irritating behaviors became amplified by increased exposure to these idiosyncrasies and a climate of relational turbulence. Prior research has shown that relational uncertainty and interference from partners are associated with more severe appraisals of irritations (e.g., Theiss & Solomon, 2006a; Theiss & Knobloch, 2009), whereas facilitation from partners is associated with more positive appraisals of a partner's actions (e.g., Yoon & Theiss, 2019).

Beyond these relationship characteristics, a generalized state of relational turbulence should shape people's relationship inferences in ways that correspond with judgements that a partner's irritating behavior is particularly severe and threatening to the relationship. In particular, construals are cognitive structures that assist in organizing people's perceptions (Trope & Liberman, 2003). Under conditions of relational turbulence, construals tend to be constrained (Solomon et al., 2016), which limits reflection and sensemaking ability when drawing relational inferences from a partner's actions. The inferences people make about their partner's irritating behaviors under these conditions are likely to reflect more perceived threat to relationship functioning. Thus, we expect that relational turbulence corresponds with more severe appraisals of irritations, above and beyond the effects of other relationship characteristics.

H4: (a) Relational turbulence is positively associated with severity of irritations, above and beyond positive associations expected with (b) relational uncertainty and (c) partner interference, and negative association expected with (d) partner facilitation.

We also examine the perceived aggressiveness and openness of relational communication as correlates of relational turbulence that reflect relational inferences of affiliation and disaffiliation in the relationship (Dillard et al., 1996). *Aggressive communication* is marked by critical, hostile, or demanding actions toward a partner that assert dominance (Infante & Rancer, 1996). *Open communication* occurs when partners freely exchange information about various topics, which reflects interpersonal affiliation (Baxter & Montgomery, 1996). Conditions of relational turbulence arising due to the pandemic can shift the tenor of relational communication in ways that reflect disaffiliation and dominance in the relationship (Luetke et al., 2020).

Relational uncertainty generally corresponds with more avoidance and less openness in communication between partners (Knobloch & Theiss, 2011; Theiss & Solomon, 2006a), but in some contexts self uncertainty is associated with more direct confrontations about irritating partner behavior (Theiss & Solomon, 2006b), and partner uncertainty is associated with more criticism and demandingness in conflict interactions (King & Theiss, 2016). Interference from partners is associated with directness of communication about irritations (Theiss & Knobloch, 2009), which could come across as aggressiveness, whereas facilitation from partners is associated with more cooperative interaction aimed at collective processing (e.g., Brisini & Solomon, 2018), which is likely to encourage openness.

Beyond these specific relationship characteristics, however, a climate of relational turbulence should generally correspond with increased aggressiveness and decreased openness in relational communication due to a diminished capacity for abstract construals and dyadic synchrony under these conditions (Solomon et al., 2016). Constrained construal levels and a lack of dyadic synchrony encourage individuals to act independently and impulsively because they struggle to consider the implications of their actions (Trope & Liberman, 2003). Increased aggressiveness and decreased openness represent likely consequences of these limitations. Thus, we expect a positive association between relational turbulence and aggressiveness, and a negative association between relational turbulence and openness, above and beyond the effect of other relationship characteristics.

H5: (a) Relational turbulence is positively associated with the aggressive communication, above and beyond positive associations expected with (b) relational uncertainty and (c) partner interference, and negative association expected with (d) partner facilitation.

H6: (a) Relational turbulence is negatively associated with the open communication, above and beyond negative associations expected with (b) relational uncertainty and (c) partner interference, and positive association expected with (d) partner facilitation.

The reciprocal effects of turbulent outcomes on relationship mechanisms over time

Another central tenet of relational turbulence theory is the assumption that conditions of turbulence can have reciprocal effects on relationship characteristics that give rise to these conditions over time (Solomon et al., 2016). These cyclical effects can further exacerbate relational uncertainty and disrupt patterns of interdependence. Prior longitudinal research

has documented the reciprocal effects that conditions of relational turbulence can have on relationship characteristics over time. For example, avoiding conversations about the state of the relationship corresponds with increased relational uncertainty in subsequent weeks (Knobloch & Theiss, 2011). Furthermore, the experience of turmoil and negative emotion in one week has also been linked to increased relational uncertainty and partner interference in subsequent weeks (Knobloch & Theiss, 2010). Prior research has also linked the severity of irritations with subsequent perceptions of relational uncertainty and interference (Theiss & Knobloch, 2009). In light of this evidence, we expect that the experience of relational turbulence, the severity of irritations, and the aggressiveness of communication in one week are associated with increased relational uncertainty and interference from partners, and decreased facilitation from partners, in subsequent weeks.

In contrast, research indicates that direct communication about jealousy contributes to lower levels of subsequent relational uncertainty (Theiss & Solomon, 2006a) and that open communication between partners about relationship involvement increases subsequent levels of intimacy (Theiss & Solomon, 2008). Drawing on this logic, we expect that the openness of communication in one week will be associated with a decline in relational uncertainty and interference from partners, and an increase in facilitation from partners, in subsequent weeks. This logic is advanced in the following hypotheses:

H7: Relational turbulence in one week is positively associated with (a) relational uncertainty and (b) interference from partners, and negatively associated with (c) facilitation from partners, in the following week.
H8: Severity of irritations in one week is positively associated with (a) relational uncertainty and (b) interference from partners, and negatively associated (c) facilitation from partners, in the following week.
H9: Aggressive communication in one week is positively associated with (a) relational uncertainty and (b) interference from partners, and negatively associated with (c) facilitation from partners, in the following week.
H10: Open communication in one week is negatively associated with (a) relational uncertainty and (b) interference from partners, and positively associated with (c) facilitation from partners, in the following week.

Figure 1 provides a visualization of the direct, indirect, and reciprocal effects that are encompassed in our hypotheses. In the next section, we describe the method of a longitudinal, dyadic study designed to test this logic.

Methods

To assess the hypotheses, we collected data from cohabitating romantic couples during the COVID-19 pandemic in April through June of 2020. Participants were recruited by posting announcements to the researchers' social media accounts and various email listservs. For inclusion in the study, participants had to be over the age of 18, cohabiting with their romantic partner, living in the United States, and able to read and write in

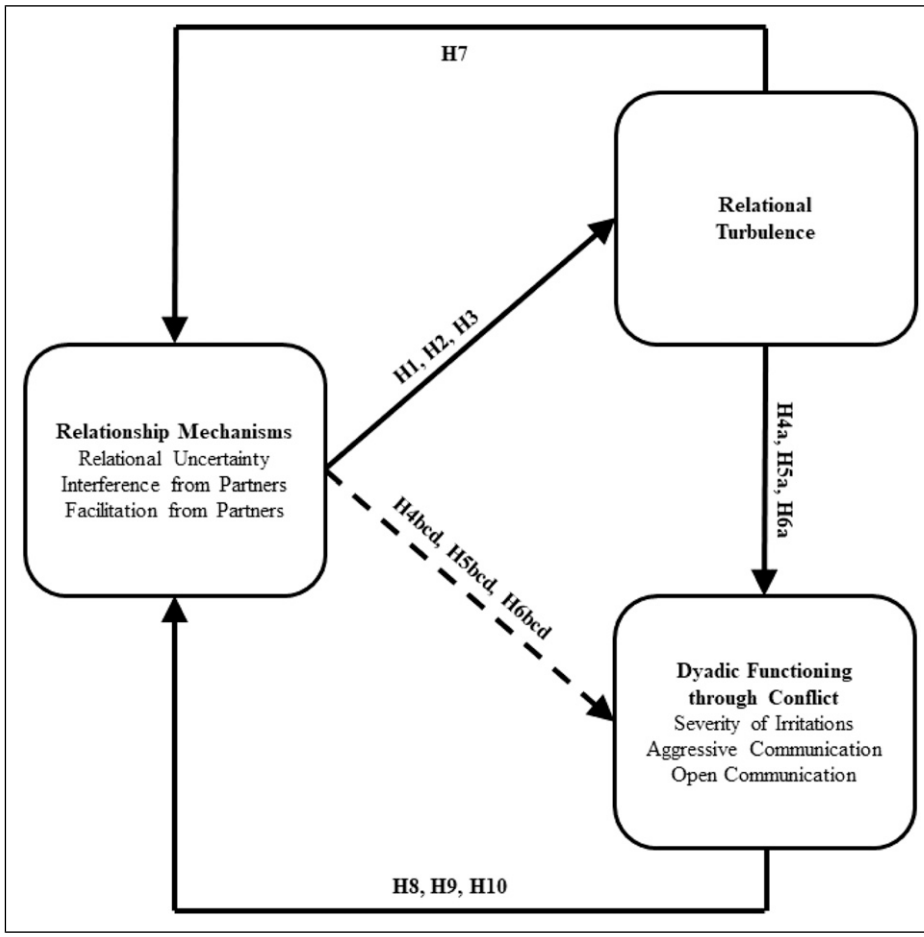

Figure 1. Hypotheses.

English. Participants completed an online survey about their relationship once per week for 4 weeks.[1]

Procedures

Eligible participants emailed the researchers to enroll in the study. The researchers sent each partner an individual email with the first Qualtrics survey link and a unique username and passcode used to track completion and pair partners' data. Each week participants received an email with a link to that week's survey and a reminder of their username and passcode. Participants were asked to complete the survey within two days to ensure responses could be tracked at an even pace.

In the first wave, participants provided demographic information and completed a series of open-ended questions and Likert scales reflecting on the pandemic's effect on their relationship. Surveys in Waves 2 through 4 asked participants to report any changes to their health, employment status, or relationship status in the previous week and contained the same open-ended and closed-ended items included in Wave 1. At the end of each survey, participants were instructed to email the researchers with their username and a uniquely generated completion code to receive a $10 Amazon.com gift card. Participants who completed all waves of the study received a total of $40 in Amazon.com gift cards.

Participants

The sample consisted of 151 romantic dyads, or 302 individuals (153 females, 148 males, 1 intersex). Ages ranged from 20 to 69 years (M = 30.58, Mdn = 29, SD = 7.50). Ethnicities were white (71.03%), Hispanic or Latino (11.24%), Asian (10.59%), Black or African American (4.64%), Indian or Middle Eastern (1.88%), and Native Hawaiian or Pacific Islander (0.62%). Participants lived in 34 US states. Participants primarily identified as being in an opposite sex relationship (92.7%). Participants were married (61.5%), engaged to be married (14.6%), or seriously dating (23.9%). Participants reported having been with their partner for an average of 6.34 years (SD = 5.92). In addition, 31.3% of participants reported having between one and six children (M = 1.88, SD = 1.18).

Participants were employed full-time (56.3%) or part-time (15.5%), with others identifying as retired, students, intentionally not working (15.5%), or unemployed (12.7%). Of those employed, 67.7% were working from home, 16.8% worked at their place of employment, and 15.5% worked a hybrid schedule. Participants reported household income of less than $60,000 (39.7% of participants), $60,001 to $120,000 (43%), and more than $120,001 (17.3%).

At the start of the study, no participants had been diagnosed with COVID-19, but 28.1% reported personally knowing someone who was diagnosed. Throughout the study, one participant was diagnosed with COVID-19. Further, 35.7% of participants reported a loss of household income due to COVID-19, ranging from less than $1000 to more than $10,000.

Measures

Variables were measured using Likert-type scales. During Wave 1, participants rated items with regard to their relationship in general and in Waves 2–4, participants were encouraged to reflect on conditions in their relationship "in the past week" since completing their last survey. Multi-item scales were subjected to confirmatory factor analysis (CFA) using Wave 1 data to ensure that they met criteria for internal consistency and parallelism. The same factor structure was then confirmed in data from Waves 2 through 4. Across all waves, adequate fit was determined by the χ^2 value, the comparative fit index (CFI) > .95, and root mean squared error of approximation (RMSEA) < .08

Table 1. Descriptive statistics for measures.

	Wave 1			Wave 2			Wave 3			Wave 4		
	α	M	*SD*	α	M	*SD*	α	M	*SD*	α	M	*SD*
Self uncertainty	.90	1.52	.87	.90	1.48	.79	.94	1.48	.87	.95	1.49	.91
Partner uncertainty	.93	1.85	1.10	.93	1.79	1.06	.96	1.76	1.11	.95	1.69	1.04
Relationship uncertainty	.88	1.87	1.02	.89	1.78	1.00	.89	1.77	.99	.90	1.68	.94
Interference	.87	1.98	.96	.89	1.88	.93	.90	1.83	.93	.93	1.75	.90
Facilitation	.90	4.41	1.14	.91	4.40	1.15	.94	4.38	1.23	.95	4.43	1.29
Relational turbulence	.87	1.74	.97	.90	1.61	.91	.92	1.60	.96	.89	1.48	.82
Severity of irritations	.78	3.17	1.59	.77	2.68	1.51	.80	2.59	1.54	.77	2.51	1.52
Aggressiveness	.74	2.93	1.41	.76	2.64	1.35	.79	2.55	1.40	.74	2.34	1.27
Openness	.68	5.54	1.15	.77	5.51	1.21	.80	5.49	1.27	.83	5.57	1.30

(Kline, 2011). Composite variables were computed as the average of the retained scale items. Table 1 summarizes reliabilities, means, and *SD*s for each variable across waves.

Relational uncertainty. Relational uncertainty was measured using Solomon and Brisini's (2017) scale. Participants used a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*) to indicate their agreement to 16 items, with higher scores indicating more uncertainty. *Self uncertainty* was measured with five items (e.g., "I sometimes wonder whether or not I want the relationship to work out in the long run"). *Partner uncertainty* was measured with six items (e.g., "I sometimes wonder whether or not my partner is strongly committed to me"). *Relationship uncertainty* was measured with five items (e.g., "I sometimes wonder whether or not my partner and I will stay together").[2]

Partner interference and facilitation. Solomon and Knobloch's (2001) scale was used to measure interference and facilitation from partners. Participants responded to items on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*) to reflect the extent to which their partner hindered or helped in their goals. *Partner interference* was measured with six items (e.g., "my romantic partner interferes with the things I need to do each day"). *Partner facilitation* was measured with five items (e.g., "my romantic partner helps me to achieve the everyday goals I set for myself").

Relational turbulence. Four items from Knobloch's (2007) scale were used to measure relational turbulence. Participants were presented with the stem "at the present time, this relationship is…" and were asked to rate a series of descriptors on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*). Items were (a) "hectic," (b) "frenzied," (c) "overwhelming," and (d) "stressful."

Severity of irritations. To measure the severity of irritations, we used a procedure developed by Theiss and Solomon (2006a, 2006b) in which participants were asked to identify and

describe an irritating partner behavior. Examples of irritations mentioned include not helping with chores, sleeping too much, talking on the phone to much, lack of affection, and stubbornness or passive-aggressiveness. Participants were then asked to characterize the severity of the behavior by indicating their agreement with two items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*): "This behavior or characteristic is a problem" and "This behavior or characteristic threatens our relationship."

Aggressive and open communication. Items from Theiss and Knobloch (2013) were used to measure aggressive and open communication. Participants indicated their agreement with items on a 7-point Likert scale (1= *strongly disagree*, 7 = *strongly agree*) as a description of their communication with their partner. *Aggressive communication* was measured with three items (e.g., "I have been argumentative with my partner"). *Open communication* was measured with four items (e.g., "I have freely disclosed my opinions to my partner.").

Results

We ran bivariate correlations on all variables separately for males and females using Wave 1 data (see Table 2). Results indicated that for males and females, all sources of relational uncertainty were interrelated and were positively associated with partner interference, relational turbulence, severity of irritations, and aggressiveness, and negatively associated with facilitation and openness. Interference from partners was positively associated with relational turbulence, severity of irritations, and aggressiveness, and negatively associated with facilitation and openness. Facilitation was negatively associated with relational turbulence, severity of irritations, and aggressiveness, and positively associated with openness. Relational turbulence was positively associated with severity of irritations and aggressiveness, and negatively associated with openness. Finally, severity of irritations was positively associated with aggressiveness and negatively associated with openness.

Analyses

We used hierarchical linear modeling 6.0 software to create multilevel models to account for nonindependence in the data (Bryk & Raudenbush, 1992), with repeated measures nested within individuals and individuals nested in dyads. We constructed models to assess how relationship characteristics in one week corresponded to turbulence, severity of irritations, and relational communication within the same week, and, in turn, how turbulent relationship outcomes in one week shaped experiences of relational uncertainty, partner interference, and partner facilitation in the subsequent week. Changes in the relationship were represented with a three-level model using maximum likelihood (ML) estimation of time-varying predictors at Level 1, individual characteristics at Level 2, and dyadic variables at Level 3. We include the within-person mean across waves for each variable as a covariate on the intercept for each model as a test of between-person effects and look to the slopes as a test of within-person effects.

Table 2. Bivariate correlations among variables.

	V1	V2	V3	V4	V5	V6	V7	V8	V9
V1: Self uncertainty		.60***	.75***	.35***	−.31***	.53***	.60***	.17*	−.35***
V2: Partner uncertainty	.70***		.82***	.35***	−.47***	.55***	.61***	.30***	−.41***
V3: Relationship uncertainty	.74***	.90***		.39***	−.45***	.70***	.62***	.29***	−.51***
V4: Interference	.28**	.31***	.28***		−.52***	.44***	.39***	.38***	−.38***
V5: Facilitation	−.21**	−.27**	−.28**	−.48***		−.39***	−.42***	−.27**	.42***
V6: Relational turbulence	.37***	.51***	.50***	.41***	−.27**		.55***	.34***	−.40***
V7: Severity of irritations	.44***	.43***	.47***	.24**	−.31***	.38***		.30***	−.41***
V8: Aggressiveness	.30***	.45***	.41***	.20*	−.21*	.40***	.33***		−.11
V9: Openness	−.33***	−.23**	−.32***	−.19*	.30***	−.22**	−.23**	−.08	

Note. Correlations for females are below the diagonal and correlations for males are above the diagonal. Correlations were computed using data from Week 1 of the study.
*$p < .05$. **$p < .01$. ***$p < .001$.

Relationship characteristics predicting relational turbulence

We hypothesized that relational uncertainty and partner interference are positively associated with relational turbulence (*H1, H2*), and that partner facilitation is negatively associated with relational turbulence (*H3*). To assess these hypotheses, we constructed multilevel models with relational turbulence as the dependent variable and each relationship characteristic as predictors in separate models. As a first step, the within-person mean for each relationship characteristic was included as a Level 2 covariate on the intercept to account for between-person effects. Next, the Level 1 repeated measures of each variable were entered as group mean-centered predictors to test the within-person effects of the relationship characteristics on relational turbulence, which are reflected in the slopes of the models. We also controlled for the passage of time by including Wave as an uncentered Level 1 predictor. Time was estimated as a fixed effect, whereas relationship mechanisms were estimated as random effects.

Results for the between-person effects revealed that all three sources of relational uncertainty and interference from partners increased the value of the intercept for relational turbulence, whereas facilitation from partners decreased relational turbulence (see Table 3). Similarly, within-person effects reflected in the slopes of the model show that all three forms of relational uncertainty (*H1*) and partner interference (*H2*) were positively associated with relational turbulence, suggesting that during weeks in the pandemic when individuals experienced above average amounts of relational uncertainty and partner interference, they also reported increased relational turbulence. In addition, partner facilitation was negatively associated with relational turbulence (*H3*), illustrating that during weeks where individuals experienced greater than their average amounts of partner facilitation, they also reported decreased relational turbulence. Thus, *H1, H2,* and *H3* were supported.[3]

Relationship mechanisms and turbulence predicting relationship outcomes

Our next hypotheses examined severity of irritations, aggressive communication, and open communication as outcomes of relational turbulence, controlling for the effects of the relationship mechanisms. We constructed multilevel models in which severity of irritations, aggressiveness, and openness were the dependent variable. The predictors were identical to those described above, except we added relational turbulence as a Level 2 between-persons predictor on the intercept and a Level 1 within-persons predictor in the slopes.

In the model predicting severity of irritations, between-persons effects on the intercept showed that relational turbulence, relational uncertainty, and partner interference were positively associated with irritation severity, whereas partner facilitation was negatively associated with severity (see Table 4). The within-person effects revealed that in weeks where individuals experienced above average levels of relational turbulence (*H4a*), relational uncertainty (*H4b*), and interference from partners (*H4c*), they perceived irritations as more severe; whereas irritations were rated as less severe in weeks when partner facilitation was heightened (*H4d*).

Table 3. Relationship mechanisms predicting relational turbulence.

	Relational Turbulence Model				
	Self uncertainty Model	Partner uncertainty model	Relationship uncertainty model	Interference model	Facilitation model
Intercept	1.58***	1.57***	1.58***	1.58***	1.58***
Self uncertainty	.53***				
Partner uncertainty		.49***			
Relationship uncertainty			.53***		
Interference				.50***	
Facilitation					−.27***
Slopes					
Wave	−.05**	−.04**	−.03*	−.04**	−.05**
Self uncertainty	.37***				
Partner uncertainty		.35***			
Relationship uncertainty			.37***		
Interference				.23***	
Facilitation					−.11*
Residuals					
Intercept (1)	.16***	.20***	.17***	.19***	.22***
Self uncertainty	.27***				
Partner uncertainty		.21***			
Relationship uncertainty			.17***		
Interference				.14***	
Facilitation					.10***
Intercept (2)	.20***	.10***	.14***	.16***	.20***

*$p < .05$. **$p < .01$. ***$p < .001$.

In the models predicting aggressive communication, between-person effects showed that relational turbulence, relational uncertainty, and partner interference were all positively associated with aggressiveness, but facilitation from partners was not significantly associated with aggression (see Table 5). Turning to within-person effects, results indicated that relational turbulence was positively associated with aggressiveness across all models (*H5a*). In addition, partner uncertainty and relationship uncertainty, but not self uncertainty, were positively associated with aggressiveness (*H5b*). Interference from partners was positively associated with aggressiveness (*H5c*),

Table 4. Relationship mechanisms and relational turbulence predicting irritations.

	Severity of Irritations Model				
	Self uncertainty model	Partner uncertainty model	Relationship uncertainty model	Interference model	Facilitation model
Intercept	2.70***	2.70***	2.70***	2.70***	2.70***
Turbulence	.45***	.40**	.35**	.57***	.54***
Self uncertainty	.81***				
Partner-uncertainty		.64***			
Relationship uncertainty			.78***		
Interference				.50***	
Facilitation					−.51***
Slopes					
Wave	−.14***	−.13***	−.13***	−.13***	−.13***
Turbulence	.29***	.33***	.30**	.37***	.43***
Self uncertainty	.54***				
Partner uncertainty		.44***			
Relationship uncertainty			.50***		
Interference				.28**	
Facilitation					−.18**
Residuals					
Intercept (1)	.48***	.44***	.47***	.52***	.34***
Turbulence	.09**	.13*	.14**	.25***	.23**
Self uncertainty	.55***				
Partner uncertainty		.14			
Relationship uncertainty			.30*		
Interference				.28***	
Facilitation					.06*
Intercept (2)	.05	.10*	.03	.15**	.22***

*$p < .05$. **$p < .01$. ***$p < .001$.

but facilitation from partners was not significantly associated with aggressive communication (*H5d*).

In the models predicting open communication, between-persons effects on the intercept revealed that relational turbulence, all sources of relational uncertainty, and partner interference decreased the value of the intercept for openness, whereas partner facilitation increased open communication (see Table 6). Turning to the slopes for the

Table 5. Relationship mechanisms and relational turbulence predicting aggressiveness.

	Aggressive Communication Model				
	Self uncertainty model	Partner uncertainty model	Relationship uncertainty model	Interference model	Facilitation model
Intercept	2.62***	2.62***	2.62***	2.62***	2.62***
Turbulence	.40***	.29**	.37***	.40***	.49***
Self uncertainty	.28**				
Partner uncertainty		.35***			
Relationship uncertainty			.27**		
Interference				.31**	
Facilitation					−.14
Slopes					
Wave	−.15***	−.14***	−.15***	−.14***	−.15***
Turbulence	.43***	.36***	.40***	.43***	.44***
Self uncertainty	.15				
Partner uncertainty		.24**			
Relationship uncertainty			.16*		
Interference				.15*	
Facilitation					−.05
Residuals					
Intercept (1)	.58***	.53***	.56***	.59***	.57***
Turbulence	.21**	.19	.20*	.16**	.15*
Self uncertainty	.37**				
Partner uncertainty		.05			
Relationship Uncertainty			.14*		
Interference				.22***	
Facilitation					.02
Intercept (2)	.30***	.31***	.31***	.28***	.31***

*$p < .05$. **$p < .01$. ***$p < .001$.

model, facilitation from partners was the only variable to emerge as a significant predictor of openness (*H6d*), indicating that in weeks when individuals reported above average levels of facilitation they reported increased openness. Relational turbulence (*H6a*), relational uncertainty (*H6b*), and partner interference (*H6c*) were not significantly associated with open communication. Thus, the hypothesis was fully supported as a between-persons effect, but only partially supported as a within-person effect.

Table 6. Relationship mechanisms and relational turbulence predicting openness.

	Open Communication Model				
	Self uncertainty model	Partner uncertainty model	Relationship uncertainty model	Interference model	Facilitation model
Intercept	5.56***	5.56***	5.56***	5.56***	5.56***
Turbulence	−.23*	−.27*	−.10	−.22*	−.28*
Self uncertainty	−.53***				
Partner uncertainty		−.31**			
Relationship uncertainty			−.60***		
Interference				−.49***	
Facilitation					.41***
Slopes					
Wave	−.01	−.01	−.00	−.00	−.00
Turbulence	−.16*	−.16*	−.18**	−.15*	−.17**
Self uncertainty	−.13				
Partner uncertainty		−.06			
Relationship uncertainty			−.05		
Interference				−.11	
Facilitation					.13**
Residuals					
Intercept (1)	.52***	.57***	.51***	.55***	.53***
Turbulence	.22***	.14	.15	.20***	.10
Self uncertainty	.42***				
Partner Uncertainty		.16***			
Relationship Uncertainty			.20**		
Interference				.18***	
Facilitation					.07*
Intercept (2)	.25***	.23***	.20***	.21***	.17***

*$p < .05$. **$p < .01$. ***$p < .001$.

Reciprocal effects of turbulent outcomes on relationship characteristics

Our final set of hypotheses explored the reciprocal effects of relational turbulence, severity of irritations, and communication behavior in one week on relational uncertainty and interdependence patterns in subsequent weeks. To test these assumptions, we configured our data so that relationship characteristics in Week *t* were

combined with relational turbulence, severity of irritations, aggressiveness, and openness from the previous week (Week *t*-1). We constructed multilevel models in which each relationship mechanism in Week *t* was the dependent variable. On the intercept, we included the corresponding relationship mechanism from Week *t*-1 to account for variability in the dependent variable that is attributable to their previous levels of the same variable. As Level 1 slopes, we entered relational turbulence, severity of irritations, aggressiveness, and openness in Week *t*-1 as uncentered predictors in the model. The intercepts were estimated as random effects and slopes were estimated as fixed effects.

As expected, the corresponding relationship characteristics from Week *t*-1 accounted for significant variance in the intercept for all models (see Table 7). The slopes reveal that relational turbulence in Week *t*-1 was positively associated with partner interference (*H6b*) and negatively associated partner facilitation (*H6c*) in Week *t*. In addition, the severity of irritations in Week *t*-1 was positively associated with self uncertainty and relationship uncertainty in Week *t* (*H7a*), positively associated with partner interference in Week *t* (*H7b*), and negatively associated with partner facilitation in Week *t* (*H7c*). Aggressiveness in Week *t*-1 was positively associated with partner interference in Week *t* (*H8b*). Finally, openness in Week *t*-1 was associated with decreased relational uncertainty in Week *t* (*H9a*), decreased partner interference in Week *t* (*H9b*), and increased partner facilitation in Week *t* (*H9c*).

Discussion

The COVID-19 pandemic has presented countless challenges for individuals and their relationships. We applied relational turbulence theory to demonstrate that relational uncertainty and changes to interdependence during this transition are associated with increased turmoil and tension in romantic relationships. Findings suggest that relational turbulence is associated with more severe irritations and more aggressive and less open relational communication. Moreover, results indicate that relational turbulence and dysfunctional communication have reciprocal effects on the very relationship characteristics that give rise to them, thereby contributing to a cycle of turmoil that can deteriorate relationship quality over time. These findings have practical implications for helping couples manage relational turbulence during this unique and stressful transition, as well as theoretical implications for extending relational turbulence theory to understand interpersonal challenges arising amid a major health crisis.

Practical implications for managing relational turbulence during COVID-19

The stressors of the pandemic placed considerable strain on people's romantic relationships. Couples struggled with conflict, intimate behavior (Luetke et al., 2020), and dyadic processing (Pietromonaco & Overall, 2020). Our study adds relational turbulence, irritating partner behavior, and aggressive or avoidant relational communication as relationship outcomes heightened in the pandemic. We offer relational turbulence theory as an explanatory framework that helps illuminate why this transition has been particularly

Table 7. Over-time effects of irritations and relational communication on relationship mechanisms.

	Time Effects Model				
	Self uncertainty model	Partner uncertainty model	Relationship uncertainty model	Interference model	Facilitation model
Intercept	.32***	.28***	.32***	.54***	1.50***
Slopes					
t-1 self uncertainty	.78***				
t-1 partner uncertainty		.82***			
t-1 relationship uncertainty			.79***		
t-1 interference				.69***	
t-1 facilitation					.66***
Turbulence					
Intercept	.29***	.27***	.30***	.44***	1.93***
Slope	.04	.01	.02	.12**	−.16**
Residuals: Intercept (1)	.00	.00	.00	.00	.00
Residuals: Intercept (2)	.00	.00	.00	.01*	.03
Severity of irritations					
Intercept	.25***	.23***	.26***	.43***	2.08***
Slope	.05*	.04	.05**	.05**	−.10***
Residuals: Intercept (1)	.00	.00	.00	.00	.00
Residuals: Intercept (2)	.00	.00	.00	.01*	.04*
Aggressive communication					
Intercept	.29***	.22***	.27***	.43***	1.57***
Slope	.01	.03	.02	.04*	−.02
Residuals: Intercept (1)	.00	.00	.00	.00	.00
Residuals: Intercept (2)	.00	.00	.00	.01*	.02
Open communication					
Intercept	.81***	.75***	.94***	1.13***	.96***
Slope	−.08**	−.08**	−.10***	−.10***	.16***
Residuals: Intercept (1)	.00	.00	.00	.00	.00
Residuals: Intercept (2)	.00	.00	.00	.01*	.04**

*$p < .05$. **$p < .01$. ***$p < .001$.

stressful for relationships (Solomon et al., 2016). In particular, the theory nominates relational uncertainty and disrupted patterns of interdependence as two features of relationships that are vulnerable to the interpersonal changes brought on by the conditions of the pandemic. As couples have been forced to reconsider their relational roles and recalibrate their interpersonal routines, questions about relationship involvement and uncoordinated patterns of behavior are the natural byproduct of these unexpected and abrupt changes. Increasing people's awareness that relational uncertainty, disrupted interdependence, and relational turbulence are typical and widespread experiences in close relationships during these stressful circumstances may buffer some of the negative consequences of these relationship conditions.

Our finding that these relationship qualities correlated with severe appraisals of a partner's irritating behaviors and more aggressive and less open relational communication patterns is also unsurprising in light of the fact that couples were forced to spend so much more time together with so few distractions and contend with new and unfamiliar stressors during the pandemic. Research has documented the spillover effect that stressful experiences can have on people's conflict behavior (e.g., Brisini & Solomon, 2021). Thus, it should come as no surprise that unprecedented stress associated with the pandemic would spill over into more severe tensions and dysfunctional communication processes between partners. Moreover, our results illustrate a cyclical relationship between these relationship outcomes and that relationship characteristics that give rise to turbulence, which suggest that a failure to address these circumstances can contribute to a downward spiral in relationships that further reinforces and perpetuates a climate of relational turbulence. Notably, finding ways to mitigate stress associated with the pandemic would go a long way in alleviating the relationship conditions that give rise to this cycle of turbulent relationship conditions.

One bright spot in our findings is that open communication in a relationship was subsequently associated with improved relationship characteristics one week later. Although we caution against the assumption that openness is always good for relationships, our findings are consistent with prior research suggesting that open communication about interpersonal issues may be better for relationships than suppressing or avoiding tense conversations (e.g., Afifi et al., 2012). Particularly in the context of the COVID-19 pandemic, where couples are frequently confined to the home together and irritations are bound to arise, encouraging couples to communicate openly may help maintain relationship quality during this transition.

Although our results offer practical implications for couples navigating the COVID-19 pandemic, it is also important to acknowledge all people were not equally strained by the pandemic. Systemic health disparities and social inequalities positioned racial and ethnic minorities at greater risk of contracting COVID-19, with a disproportionate number of hospitalizations and deaths from the virus falling on Black and Hispanic Americans (Rodriguez et al., 2020). Relatedly, the people who performed essential labor during the pandemic were vastly overrepresented by individuals from minority communities (Hammonds et al., 2020). The added stressors experienced by racial and ethnic minorities under these circumstances are not fully represented in these data, but they point to additional factors that may exacerbate tensions and relational turbulence for minority

couples (Li & Samp, 2021). In addition, conditions requiring couples to stay at home may have created unsafe circumstances for individuals experiencing domestic violence who were unable to remove themselves from danger (Kofman & Garfin, 2020). Our findings are unlikely to capture the most damaging and harmful relational circumstances that were present for some individuals during the pandemic.

Theoretical implications for advancing relational turbulence theory

This study also has theoretical implications for advancing relational turbulence theory. The theory suggests that transitions give rise to circumstances ripe for upheaval and relational turmoil (Solomon et al., 2016). Whereas many studies have considered how the relationship mechanisms in the theory are associated with emotional, cognitive, and communicative features of interpersonal episodes that coalesce into a climate of turbulence over time, relatively fewer studies have tested the theory's assumption that a climate of turbulence can shape broader dyadic processes. This study positions assessments of the severity of irritations and the openness or aggressiveness of relational communication as reflections of the inferences people make about the nature of their relationship. Our results point to relational turbulence as a robust proximal predictor of relationship outcomes, while showing mixed support for direct associations between the relationship mechanisms and relationship outcomes. These findings suggest that cognitive appraisals and features of communication behavior can be examined either as characteristics of specific interpersonal episodes, or as manifestations of the inferences people make about their relationship. Additional theorizing and empirical testing are needed to further parse the causal ordering among the relationship mechanisms, relational turbulence, and relationship outcomes.

Although the theory assumes that specific episodes accumulate over time to create a climate of turbulence and accounts for the reciprocal effects that turbulence can have on relationship quality over time, few studies have tested the theory's claims using longitudinal data (e.g., Knobloch & Theiss, 2010; Theiss & Knobloch, 2009; Theiss & Solomon, 2006a). This study extends the theory by documenting the over-time effects of relational turbulence during COVID-19, representing an ongoing, highly volatile relationship transition. Along these lines, one of the rarely tested elements of relational turbulence theory is the assumption that a state of relational turbulence can have reciprocal effects on relational uncertainty and interdependence processes (Solomon et al., 2016). The longitudinal data in this study allowed for a formal test of this logic. Our results indicate that interference and facilitation from partners are especially vulnerable to conditions of turbulence. Relational turbulence and the severity of irritations were both positively associated with subsequent partner interference and negatively associated with subsequent partner facilitation. In addition, aggressive communication was associated with increased interference from partners in the following week. These findings align with research suggesting that distributive communication patterns are associated with anger, blaming, pessimism, and negative attribution biases for a partner's behavior (e.g., Sillars et al., 2000), which may manifest in subsequent perceptions of a partner's actions as increasingly disruptive and unhelpful. In contrast, relational uncertainty was much less

susceptible to the reciprocal effects of turbulence, with only severity of irritations in one week increasing self and relationship uncertainty in the following week.

The perceived openness of communication, however, had widespread reciprocal associations with relationship mechanisms in the theory, decreasing relational uncertainty and partner interference and increasing perceptions of partner facilitation. This finding is significant because it highlights an aspect of relational dynamics that can be harnessed to mitigate relational turbulence, which is in stark contrast to the vast majority of studies highlighting the dysfunctional nature of turbulence in close relationships. Research indicates that functional communication between partners in the form of transition processing communication can buffer relationships from turbulence during transitions (e.g., Brisini & Solomon, 2018). Our findings complement this research by indicating that generally open communication between partners can help mitigate conditions that contribute to a climate of relational turbulence.

Limitations

This study has several strengths, including the dyadic sample and longitudinal data collected nationwide during an ongoing traumatic health transition, but it also has limitations. First, we collected data during the early stages of the pandemic. Given that the pandemic has dragged on for much longer than expected, in hindsight, it may have been better to evaluate relational turbulence later in the pandemic or over a longer period. A second limitation is that we only surveyed people for 4 weeks. Had we known that the pandemic would continue for well over a year, it would have been desirable to add additional time points for data collection to better understand how relational turbulence evolved during the pandemic. Finally, the sample was mostly white, cis-gender, and identified as being in a heterosexual relationship, which limits our ability to speak broadly to the experiences of racial and sexual minorities during the pandemic. Similarly, we did not ask participants to report their gender identity, sexual orientation, or any disability status, which limits our ability to address how these factors may have shaped people's experiences during the pandemic.

Conclusion

This study applied relational turbulence theory to the COVID-19 pandemic to document relationship characteristics associated with a climate of turbulence during this transition, the ways in which the severity of irritations and tenor of relational communication are shaped by conditions of relational turbulence, and the reciprocal influence that turbulent relationship outcomes can have on relationship characteristics over time. Our findings indicate that the COVID-19 pandemic has created circumstances ripe for relational turbulence and tensions between romantic partners. As couples continue to navigate this stressful relationship transition, recognizing the potential for relational turbulence and prioritizing open communication can help maintain relationship quality and forestall relational damage.

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Notes

1. The data for this manuscript have contributed to three other papers that have been presented at conferences and are in press or are being considered for publication.
2. We conducted post-hoc analyses to evaluate the trends of relational uncertainty, partner interference, and partner facilitation over the course of the study. To do this, we constructed multilevel models in which each relationship mechanism was treated as the dependent variable of a model in which Wave was a Level 1 predictor. Results indicated that partner uncertainty, relationship uncertainty, and interference from partners decreased over the 4 weeks of the study. Self uncertainty and facilitation from partners did not produce significant linear trends over time.
3. Additional analyses included the partner's corresponding relationship characteristic or relationship outcome as predictors in the model to test for partner effects in the data. Only three significant partner effects emerged. Specifically, partners' relationship uncertainty was positively associated with actors' relational turbulence, partners' self uncertainty was negatively associated with actors' aggressive communication, and partners' perceptions of interference from the actor was positively associated with actors' aggressive communication.

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