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ORIGINAL ARTICLE

Network-Based Perceptions and Relational Outcomes: An Actor-partner Interdependence Modeled Approach

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Abstract

Myriad research has explored the ways in which people in close relationships communicate with and about their social networks. Scant, but emerging work has documented the ways in which such perceptions/communication alter dyadic perceptions/communication between couples. The present study used dyadic data ($N = 80$ couples) to explore the actor and partner effects of network based perceptions on dyadic perceptions, relational communication, and network-based relational communication. Results revealed several actor and partner effects between multiple predictor and outcome variables. Specifically measures of network uncertainty and network interdependence/facilitation shared a variety of significant associations with measures of relationship satisfaction, intimacy, relational talk, and network-based relational talk. Results are discussed in terms of their theoretical, methodological, and applied contributions.

Extant research has sought to parse the mechanisms through which the outcomes of and perceptions within romantic relationships are altered by couples' egocentric and duocentric networks (So et al., 2022; Stein et al., 2020) This literature has built on the long-studied connection between the behaviors/perceptions of the network members surrounding romantic relationships, and tIhe interactions/cognitions within those relationships (see Parks et al., 1983; Sprecher, 2011). Importantly, scant research has unpacked the dyad-network communication phenomenon (i.e., the way couples perceive network-based interactions and how those perceptions alter relational outcomes). There is a pressing need to understand this dynamic, given that both the social network members surrounding a couple (Sprecher, 2011) and the couple themselves (Felmlee, 2001) acknowledge that social networks hold sway over relational development. Existing communication theories offer differing perspectives on how

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dyad-network communication patterns might work. Relational turbulence theory (RTT; Solomon et al., 2016) would argue that a couple's relational uncertainty levels could affect their relationship and network-based cognitions. Such cognitions might then lead to altered communication episodes either with or about the network that, over time, could result in relational turbulence (Stein, 2021). Alternatively, communication accommodation theory (CAT; Zhang & Giles, 2018) would contend that as each partner ingratiates themselves within the other's network(s), they alter their communication to better fit the needs of that group. Finally, the theory of motivated information malmanagement (TMIM; Afifi & Tikkanen, 2021) would assert that each partner may assess the potential outcomes of dyad-network interaction as well as their (partner's) efficacy in navigating such communication episodes prior to deciding whether to engage in meta-talk. These theories offer useful starting points; however, they all ultimately view the network as an afterthought of relationship formation and maintenance. A truly dyad-network based approach considers the possibility that communication episodes and relational milestones are a product of both a couple's intimate interactions as well as integration and/or deviation from network norms. This study made use of dyadic data to see how a person's (or their partner's) network-based perceptions related to relational perceptions, relational communication, and network-based relational communication. To aid in both the establishment of a dyad-network theoretical approach, as well as account for the deviation from traditional interpersonal theories, a review of both classical and contemporary dyad-network research is offered below.

Social Networks and Romantic Relationships

Before exploring the ways in which social network(s) infiltrate, assist, and influence romantic relationships, a formal definition of the construct is needed. Shinn and colleagues (1984) defined a social network member as someone whom a person has a general affinity for as well as a desire for future interaction with. Surra (1988) offered further specifications, explaining that social networks can be defined by their size, reachability, clustering, density, and overlap. Although a solid foundation, it is worth noting that scholars define the network differently across various disciplines (see Hill & Dunbar, 2003).

Alternatively, the network can be defined by the members (most likely to be) in them. For example, Stein and Moliterno (2022) used hierarchical mapping technique to probe which relationship types typically appear in a person's inner network circle. Unsurprisingly, parents, best friends, siblings (both biological and step), and roommates were identified at the inner-most level. Friends, extended family (e.g., cousins, aunts/uncles, grandparents), and in-laws appeared at the next tier. Finally, patrons, peers, neighbors, and coworkers were present in the outer-most circle. Importantly, these are examples of egocentric networks (i.e., belonging to one person). At the duocentric (i.e., a couple's shared network) level, network makeup changes. For example, couples are quite likely to identify parents, siblings, niece/nephews, and their own children (step or otherwise) as members of their duocentered network; however, aunts/uncles, coworkers, and, surprisingly, friends, were identified more

commonly as belonging to one partner's egocentered network (Stein & Rios, 2025). To sum, social networks consist of numerous relationships, each with varying levels of interdependence. This dynamism is even more pronounced when distinguishing between egocentric and duocentric networks.

The fluidity of social networks is relevant to discussing relational trajectory and communication for several reasons. First, it has been documented that people in romantic relationships understand that the extent to which their network likes/accepts their partner (and vise-versa) is integral to relationship success (Knobloch & Donovan-Kicken, 2006). Indeed, concerns of acceptance, third party threats, and balancing network/partner time all contribute to a person's sense of network-based relational uncertainty (i.e., network uncertainty, Stein et al., 2020). Perceptions of network uncertainty are longitudinally related to negative relational cognitions even when controlling for levels of self, partner, and relationship uncertainty (Stein, 2021). Said differently, people in romantic relationships are aware of and concerned about dyad-network interplay, and re-evaluate their relationships, in part, based on such evaluations.

Second, network members have agency in the trajectory of romantic relationships. For example, network members are known to purposefully interfere with relationships that they disapprove of (Sprecher, 2011). People in romantic relationships are aware that such network-based interruptions are likely. This helps explain why there are consistent associations between perceptions of network interdependence (see Stein, 2018) and factors such as negative emotions (Stein & Davidson, 2019) and anxious/avoidant attachment tendencies (Stein et al., 2022). To sum, not only do couples worry at times about dyad-network interactions, these concerns are informed by real-world communication episodes and the subsequent evaluations of those exchanges.

Extant literature is clear that people change their communication patterns based on the sorts of assessments noted above. For example, RTT proposes that uncertainties and perceptions of interdependence result in both cognitive and emotional reappraisals that influence the amount and engagement of communication episodes (Solomon et al., 2016). The TMIM similarly asserts that acts of information seeking, avoidance, and/or reappraisal stem from assessments of efficacy and predicted outcomes (Afifi, & Tikkanen, 2021). These evaluations are considered wholly interpersonal in nature and are thus lacking the extra-dyadic complexities detailed above. Alternatively, communication accommodation theory (Zhang & Giles, 2018) provides a bridge between dyadic and network-based communication. Thus, a detailed exploration of that theory's tenants is warranted.

Communication Accommodation

It is at the intersection of network-based relational dynamics and communication accommodation that this project resides. Briefly, CAT proposes that people alter their communication patterns to accommodate the needs of their social circumstances through acts of convergence (altering one's communication to seem more similar to the group/context in question) or divergence (shifting one's communication as a means of distinguishing one's self among group members; Zhang & Giles, 2018). Historically, acts of convergence/divergence were explored by observing accent use

in bilingual interactions (Giles, 1973) and cross-cultural communication (Ayoko et al., 2002).

Over time, the applicability of CAT has expanded. One such evolution involves the ways that people in romantic relationships converge/diverge with both their partners and networks as a reflexive process. Bernhold and Giles (2020) recently observed that couples use accommodating tactics to broaden duocentric group membership. This, likely for the purpose of solidifying the relationship and establishing commonality with their partner. Similarly, young adults tend to lean on group identities (primarily through means of convergence) as they navigate their emerging romantic relationships and simultaneously alter their network makeup as a result of relational progression (see Barry et al., 2016). Together, these findings suggest that there is a dyadic process through which romantic couples merge, discuss, and interact with their egocentric and duocentric (i.e., shared) networks. Moreover, the above evidence indicates that the network itself plays a role in this dyadic process. That notion informs the aims of this study.

Dyad-Network Accommodation

Given that romantic relationships develop, in part, due to the interruptions of network members (Parks et al., 1983; Sprecher, 2011), it is important to explore which perceptions and behaviors accelerate and/or inhibit this development. Milardo and colleagues (1983) provide a foundational understanding of this process by noting that both shared network sizes and pro-social network behaviors fluctuate throughout the chronology of a romantic partnership. Contemporary literature has further clarified these associations. For example, Halpern and Katz (2017) noted that couples who frequently engage in *phubbing* (interrupting a conversation to check one's phone) predicts levels of intimacy (-) and phone-related conflict (+), which both proceed to affect relational quality. In their study, the act of phubbing was often the result of attending to third-party conversations through text. In other words, network-based communication, even when enacted through simple phone use mid-conversation, can contribute to a pattern of dyad-network perception that alters relational parameters.

On the other hand, longitudinal data show that there is a strong tie between a cohabitating couple's closeness and their ability to form new social networks (Stadfield & Pentland, 2015). Similarly, *network thinking* (joint conversations regarding ego/duocentric network members) has been noted as an important factor in romantic relationship maintenance (Ogolski et al., 2017). Thus, we may view the process of ebbing and flowing communication between a couple and the network(s) that surround them as one of dyad-network accommodation. At the cornerstone of this construct are the two variables central to this investigation: network uncertainty and network interdependence.

Network Uncertainty

The first factor most likely to influence dyad-network accommodation network uncertainty (Stein et al., 2020). Network uncertainty is defined as "relational part-

ners' degree of confidence in their networks' acceptance and support of their relationship's development." (Stein et al., 2020 p. 494). Perceptions of network uncertainty correlate negatively with factors like relationship satisfaction, intimacy, and commitment (Stein et al, 2020; Stein & Bennett, 2021), and positively with perceptions of relational talk as threatening, anxious attachment tendencies within one's own network, and relational uncertainty (Stein, 2021; Stein et al., 2022). These studies, while robust, do not account for dyadic effects, nor do they properly elucidate the potential relationship(s) between network uncertainty and levels of communication. These factors are at the forefront of the current study.

Network Interdependence

Like intimate dyadic relationships, people in social networks are interdependent. As noted earlier, Surra (1988) initially proposed a categorical and qualitative assessment of network interdependence. As a measured variable, Stein (2018) drew from relational turbulence theory (Solomon et al., 2016) to develop a measure of network interdependence as defined by the interruptions that facilitate and/or interfere with a person's daily goal completion. Network interference, for example, shares a positive longitudinal indirect relationship with negative emotions, through levels of dyadic interference (Stein & Davidson, 2019). Network facilitation tends to share smaller, inverse relationships with these variables. To sum, romantic couples are interdependent with each other as well as with the network(s) that surround their relationships. That interdependence is the second major competent of the present study.

Proposed Hypotheses

The current study aimed to use dyadic data to explore how, if at all network uncertainty and network interdependence share actor/partner effects with three primary outcomes: dyadic perceptions, relational communication, and network-based relational communication. Each of these outcomes are discussed in greater detail below.

Dyadic perceptions: Relationship satisfaction and intimacy

Previous studies have uncovered that there are modest-to-strong correlations between levels of network uncertainty/interdependence with several dyadic perceptions (see Stein, 2018; So et al., 2022; Stein et al., 2020) These studies, though informative, are based strictly on self-reports. Relationship satisfaction and intimacy have long been gauges of relational status and are thus useful for an exploration of the actor and/or partner effects that network uncertainty/interdependence have on relational cognitions. For example, Knobloch and Knobloch-Fedders (2010) used the actor-partner interdependence model (APIM) to illustrate dyadic associations between relational uncertainty and relational quality. Qualitatively, perceptions of interference from partners adversely contribute to relationship satisfaction among married couples (Steuber & Solomon, 2008). It is likely that network-based measures will share similar actor and partner effects.

H1a: Levels of network uncertainty will negatively correlate with levels of relationship satisfaction.
H1b: A partner's levels of network uncertainty will negatively correlate with levels of relationship satisfaction.
H2a: Levels of perceived network interference (-) and facilitation (+) will correlate with levels of relationship satisfaction.
H2b: A partner's levels of perceived network interference (-) and facilitation (+) will correlate with levels of relationship satisfaction.

Related, but ultimately distinct from relationship satisfaction is intimacy. Self, partner, and relationship uncertainty, as well as levels of a partner's interference, all share actor and partner relationships with levels of perceived intimacy (Theiss & Knobloch, 2009). Given that both network uncertainty (Stein et al., 2020) and network interdependence measures (Stein & Davidson, 2019) hold predictive power independent of relational uncertainty measures, it is reasonable to inquire about how these network-based variables relate to intimacy levels at both the actor and partner level.

H3a: Levels of network uncertainty will negatively correlate with levels of perceived intimacy.
H3b: A partner's levels of network uncertainty will negatively correlate with levels of perceived intimacy.
H4a: Levels of perceived network interference (-) and facilitation (+) will correlate with levels of perceived intimacy.
H4b: A partner's levels of perceived network interference (-) and facilitation (+) will correlate with levels of perceived intimacy.

Communication: Relational and network-based

The association between network-based perceptions and relational communication has received modest attention throughout the years. Several classic studies inform the current project. First, Parks and colleagues (1983) found that network-based perceptions (e.g., support from one/both networks) precedes episodes of dyadic communication. Cupach (2000) compliments this work by articulating that conflict episodes are sometimes spurred by negative perceptions of network members (e.g., friends, family). Due and colleagues (1999) reinforce this notion in a study that indicated social networks (and the members in them) can produced strained interactions between partners. Finally, Klein and Milardo (2000) illustrated that the extent to which a couple's network is duocentered (i.e., shared) informs that couple's conflict management strategies.

Contemporary literature echoes these suggestions. Fox and colleagues (2014) noted that the activity of one or both partners on social networking sites (e.g., Facebook) can produce negative relational communication. Obversely, social networks can play a pivotal role in pressuring each other to enter initiate romantic relationships (i.e., spurring initial interactions; Sprecher & Felmlee, 2021). Barzeva and colleagues (2021) use dyadic data to note that romantic relationship development can be heavily informed, over time, by involvement in and withdrawal from the social

network. In short, perceptions related to the network (ego or duocentric) can produce meaningful relational communication.

Currently, there is little research on the extent to which perceptions of network uncertainty and/or network interdependence influence relational communication. Historically, perceptions of uncertainty do not directly predict communication episodes (see Solomon et al., 2016); however, that is only pertaining to relational uncertainty. Given the associations noted above between network perceptions and dyadic communication, coupled with the emerging literature tying network uncertainty to various dyadic perceptions, there is reason to explore the potential association(s) between network uncertainty and levels of enacted communication, both at the actor and partner levels.

H5a: Levels of network uncertainty will positively correlate with perceived levels of relational talk.
H5b: A partner's levels of network uncertainty will positively correlate with perceived levels of relational talk.

Related, the literature linking network interdependence to dyadic communication is scant. That said, issues such as network closeness/withdrawal (Barzeva et al., 2021), intentional relational interruptions from network members (Sprecher, 2011), and the link between network involvement and conflict (Cupach, 2000; Due et al., 1999) suggest potential associations between perceived interference/facilitation from network members and conversations with one's partner about the relationship. Given the associations between positive feelings toward the network and relational involvement (e.g., Barzeva et al.; Parks et al., 1983), perceived facilitation from the network may spark increased relational talk, whereas perceived network interference may hinder the frequency of such conversations. These hypotheses are formally articulated below at both the actor and partner level.

H6a: Levels of perceived network interference (-) and facilitation (+) will correlate with levels of relational talk.
H6b: A partner's levels of perceived network interference (-) and facilitation (+) will correlate with levels of relational talk.

A final important element of the dyad-network accommodation process involves the locus of communication. Specifically, CAT articulates that accommodative acts are usually taken in response to in-group needs (Zhang & Giles, 2018). Thus, both perceptions of network uncertainty and network interdependence may serve as indicators that network accommodation is necessary/occurring. Initial evidence of this phenomenon was presented by Stein et al. (2022), who found that network uncertainty was a partial mediator between anxious network attachment tendencies and measures of both trust and depressive symptoms.

At the dyadic level, this means that romantic partners likely forge conversations with and about network members to better accommodate, as a couple, to the needs of those groups. Such conversations may be partially inspired by (a) the amount of uncertainty that partners hold regarding their networks' involvement in their rela-

tionships and (b) the extent to which they perceive themselves as interdependent with those networks. The final pair of hypotheses reflect the potential associations between network-based perceptions and network-based relational communication, both at the actor and partner levels.

H7a: Levels of network uncertainty will positively correlate with perceived levels of network-based relational talk.
H7b: A partner's levels of network uncertainty will positively correlate with perceived levels of network-based relational talkH8a: Levels of perceived network interference (-) and facilitation (+) will correlate with levels of network-based relational talk.
H8b: A partner's levels of perceived network interference (-) and facilitation (+) will correlate with levels of network-based relational talk.

Method

A-Priori Power Analysis

Prior to data collection, a simple a-priori power analysis was performed to ensure that the sample size was adequate for the current project using SPSS (v.28). Specifically, a univariate linear regression power analysis was performed. The single power value for this analysis was 0.80, the population multiple population correlation value was set at 0.30, and the significant level was set to 0.05. Results indicated that a sample of $N = 82$ would be sufficient for a regression analysis. Thus data collection began.

Participants and Procedures

Following IRB approval, data were collected between March of 2022 and April of 2024 at a medium-sized university in the Southwest of the United States. Eighty couples ($N = 160$) made up of university students as well as non-student community members attended a lab session where they were eventually separated to answer questions individually. To compensate for their time, couples were entered into a raffle in which one of every 20 received a cash prize of $100. Importantly, prior to questioning, participants were provided with a definition of the social network that read as follows; "…the social network is consisted of people who you see or interact with fairly regularly, and generally enjoy the company of. Network members can include friends, family, co-workers, neighbors, peers, and even patrons/customers. Importantly, we are NOT asking questions about your social media use. We want to know about the human beings who surround you and your relationship."

Together, couples estimated their approximate relationship length (M_{months} = 67.86; SD = 107.69). This distribution was positively skewed, with a median relationship of 28 months. Couples identified as exclusively dating ($n = 43$), engaged/married/legally bonded ($n = 34$), or in a nonmonogamous, committed relationship ($n = 3$). Following several questions that couples answered together, they were then sepa-

rated[1] to report on a series of questions via Qualtrics surveys. The average age was 27.32 years (SD = 12.58), with a mild positive skew (median age was 24). Reported ethnicities included Caucasian (n = 133), followed by Latino (n = 12) Asian (n = 8), mixed race (n = 5) and Black/African American (n = 2). Finally, the religious affiliation was predominantly Christian (n = 94), followed by "other" (n = 47), a-theistic (n = 13), Buddhist (n = 4), or "no affiliation (n = 2). There were 17 people who identified as non-heterosexual, and the gendered distribution included men (n = 76), women (n = 80), non-binary (n = 3), and "other" (n = 1).

Measures[2]

Dyadic Perceptions

Three measures of dyad-based perceptions were gauged in this study. First, Rusbult et al.'s (1998) measure of relationship satisfaction was used (M = 6.17; SD = 0.80; α = 0.86) in which participants indicated their agreement with several prompts (e.g., "My relationship is close to ideal; our relationship makes me happy). These authors found both internal consistency (α =.94) as well as test-retest validity for this measure (r values ranging from.35 to.55 across three-wave longitudinal collections at two-to-five months apart). Convergent and divergent validity have been assessed in subsequent studies (e.g., Gable et al., 2018 with divergent values ranging from −.29 to −.34 and convergent values ranging from.33 to.40).

Second, Rubin's (1970) measure of intimacy was used (M = 5.88; SD = 0.84; α = 0.80) containing prompts such as "one of my primary concerns is [my partner's] welfare" and "if I couldn't be with [my partner] I'd feel miserable." Rubin's analysis reported internal consistency (α = 0.84–0.86), and Scholars such as Simpson (1990) have found evidence of concurrent validity for this measure (with significant r values between 0.21 and 0.30 with similar measured variables).

Lastly, Knobloch and Theiss' (2011) measure of relationship talk was used in this study (M = 6.03; SD = 0.90; α = 0.82), containing the prompt "in the past week, my partner and I have discussed…" followed by three subsequent options ("our view of this relationship; our feelings for each other; the future of the relationship"). These authors found internal consistency across six one-week interval data collections (α ranging from 0.84 to 0.94), as well as valid tests of divergent (r values ranging from-0.19 to −0.37) and convergent (r values ranging from 0.31 to 0.42).

Network Perceptions

An additional three measures gauged network-based perceptions in this study. First, Stein et al.'s (2020) network uncertainty measure (NUM) was used (M = 2.73; SD = 1.14; α = 0.91). This 18-item measure included several prompts regarding par-

[1] Note that participants completed all substantive measures in separate rooms in order to preserve the assumption of independence.

[2] All measures in this study included Likert-style measures ranging from one through seven where "1" represented "strong disagreement" and "7" represented "strong agreement

ticipants' confidence in their own and their partners' network involvement vis-à-vis their romantic relationships (e.g., "I worry if [my partner's] network accepts me as their friend/family member's significant other; I worry that I may have to choose between my network and [my partner]"). Stein's measure was shown to have internal consistency (α = 0.92) divergent (β values ranging from −0.14 to −0.18) and convergent (β values ranging from 0.57 to 0.64).

Second, Stein's (2018) measure of network interdependence assessed both levels of network interference (M = 2.66; SD = 1.23; α = 0.85) and network facilitation (M = 4.71; SD = 1.25; α = 0.87). Each subscale contained five items to assess interruptions from one's own network (e.g., "my social network interferes with the amount of time I spend with [my partner]; my social network helps me to use my time well"). Subsequent studies (e.g., Stein, 2020; 2024; Stein et al., 2022) have demonstrated internal consistency for measures of network interference (α = 0.89) and network facilitation (α = 0.92). Moreover, there was test-retest value for both network interference (r =.73) and network facilitation (r =.69) at six-week intervals.

Lastly, Knobloch and Theiss' (2011) measure of relationship talk was modified to assess network-based relational communication (M = 3.29; SD = 0.95; α = 0.79). Like Knobloch and Theiss' scale, this prompt began with the phrase "in the past week, my partner and I have discussed…" followed by three prompts ("how our network members view our relationship; how our friends and family influence our relationship; future plans with network members). Means, standard deviations, and alpha values for all variables are displayed in Table 1.

Analysis Plan

Following preliminary analyses (discussed below), the methods for answering H1-H8 involved several distinct hierarchical structural equation models (SEM). Data were analyzed using SPSS (v. 28) and AMOS (v. 29). To assess dyadic effects, Cook and Kenny's (2005) APIM was used. This method involves the creation of two distinct variables for each measure, coded by actor (1) and partner (2), and then flipped to create a second variable that sports an identical mean, but shares distinct correlations

Table 1 Means and standard deviations for all variables used in this study

Variable	M (SD)	α
Rel. Satisfaction	6.17 (0.80)	0.88
Intimacy	5.88 (0.84)	0.80
Rel. Talk	6.503 (0.90)	0.82
Net. Uncertainty	2.73 (1.14)	0.91
Net. Interference	2.66 (1.23)	0.85
Net. Facilitation	4.71 (1.25)	0.87
Net.-Based Rel. Talk	3.29 (0.95)	0.79
Rel. Length	67.86 (107.69)	N/A
Network Overlap	47.43 (N/A)	N/A

Network Uncertainty, as displayed here, is a composite variable of all 18 measured items, whereas in substantive analyses network uncertainty is represented by a latent, third-order, unidimensional variable. Relationship length was measured in months. Network overlap was measured using Kennedy et al.'s (2015) duocentric measure and is displayed as a percentage

with other variables. This method allows for researchers to see the unique effects of an actor's perceptions on outcome variables while controlling for their partner's perceptions, and vise-versa. Results are presented below.

Results

Preliminary analyses

Two preliminary analyses occurred prior to hypothesis testing. The first involved an exploratory factor analysis (EFA) for the measure of network-based relational talk. The EFA was performed with a maximum likelihood extraction and a varimax rotation due to the high likelihood of correlation between items. The results displayed one factor with an Eigenvalue above one, accounting for 62% of explained variance. Loadings for each item were 0.67, 0.87, and 0.54, respectively. It was thus deemed acceptable to use the variable in substantive analyses.

Second, bivariate correlations were run. These correlations were run for two reasons – first to assess the convergent/divergent validity of the network-based relational talk measure, and second to test for potential covariates. The two variables considered possible covariates in this study were relationship length and perceived network overlap[3]. As shown in Table 2, neither relationship length nor network overlap shared a significant correlation with any independent variables. Relationship length did share a significant association with relationship talk, as did network overlap with network-based relationship talk. Therefore, each was considered as a covariate in models involving relationship talk and network-based relationship talk, respectively. Table 2 shows the full bivariate correlations.

Substantive Analyses

To test the substantive relationships outlined in H1-H8, eight distinct hierarchical models were run. To test for model fit, several indices were used: the $\chi 2/df$, with values under 3.0 indicating excellent fit and values under 5.0 indicating acceptable fit (Schumacker & Lomax, 2004); the comparative fit index (CFI) with values at or above 0.95 indicating excellent fit and values at or above 0.90 indicating acceptable fit (Hu & Bentler, 1995, 1999); the root mean square error of approximation (RMSEA) with values under 0.06 indicating excellent fit and values under 0.10 indicating acceptable fit (Browne & Cudek, 1993; Hu & Bentler, 1999); and the standardized root mean square residual with values under 0.08 indicating good fit (Hu & Bentler, 1999). Standardized regression weights (i.e., β) tested strength of relationships. Importantly, prior to each hierarchical analysis, measurement models were first performed. In all cases, measurement models demonstrated good-to-excellent fit[4]. Reports of analyses

[3] In this study, couples assessed network overlap together using a douentric model of assessment. See Kennedy et al., 2015.

[4] Full results for all measurement models are available upon request.

Table 2 Correlations for all substantive variables

Variable	1	2	3	4	5	6	7	8	9
1. Net. Uncertainty	1 0.30*** 0.30*** 1	0.43*** 0.11 0.16 0.41***	−0.12 0.01 0.03 −11	−0.20* −0.11 −0.12 −0.20*	−0.04 −0.05 −0.05 −0.04	−0.02 −0.01 −0.03 <0.01	0.41*** 0.14 0.13 0.41***	--- −0.17 −0.17 ---	--- 0.01 0.10 ---
2. Net. Interference	--- 	1 0.18* 0.18* 1	−0.16* 0.01 −0.01 −0.16	0.01 −0.02 −0.02 0.01	0.02 0.09 0.08 0.01	−0.04 −0.10 −0.11 −0.05	0.39*** 0.15 0.15 −0.05	--- 0.06 0.07 ---	--- 0.13 0.10 ---
3. Net. Facilitation	--- 	--- 	--- 0.11 0.15* ---	0.10 0.10 0.10 0.11	−0.01 0.12 0.11 0.13	0.07 0.13 0.13 0.07	−0.09 <0.01 −0.01 −0.08	--- 0.12 0.19* ---	--- 0.09 0.02 ---
4. Rel. Satisfaction	--- 	--- 	--- 	1 0.59*** 0.59*** 1	0.57*** 0.33*** 0.33*** 0.56***	0.42*** 0.27** 0.27** 0.42***	−0.13 −0.04 −0.05 −0.13	--- −0.18* −0.18* ---	--- −0.01 0.04 ---
5. Rel. Intimacy	--- 	--- 	--- 	--- 	1 0.37*** 0.37*** 1	0.25** 0.24** 0.23** 0.25**	−0.01 0.06 0.06 −0.02	--- 0.09 −0.05 ---	--- −0.03 −0.03 ---
6. Rel. Talk	--- 	--- 	--- 	--- 	--- 	1 0.44*** 0.44*** 1	−0.08 −0.04 −0.04 −0.09	--- <0.01 0.05 ---	--- 0.41*** 0.41*** ---
Variable	1	2	3	4	5	6	7	8	9
7. Net. Talk	--- 	--- 	--- 	--- 	--- 	--- 	1 0.19* 0.21** 1	--- 0.03 0.01 ---	--- −0.07 −0.07 --- ---
8. Net. Overlap	--- 	--- 	--- 	--- 	--- 	--- 	--- 	1 	−0.08 −0.06 ---
9. Rel. Length	---	---	---	---	---	---	---	---	1

Each cell contains four correlations. From top to bottom those correlations illustrate: actor reports vis-à-vis actor reports; actor reports vis-à-vis partner reports; partner reports vis-à-vis actor reports, and partner reports vis-à-vis partner reports. In several cases, correlations slightly differed at the thousandth level decimal place; however, rounding to the hundredth gives the illusion of identical correlation. Measure of network overlap and relationship length were gauged dyadically and therefor do not have actor-partner or partner-actor correlations

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

will be categorized in terms of outcome variable, such that H1/H2, H3/H4, H5/H6, and H7/H8 are covered together. Results will be articulated in that order, below.

Relationship Satisfaction (H1 & H2)

The first hypothesis suggested that both an actor and a partner's levels of network uncertainty would negatively predict perceived levels of relationship satisfaction. The model testing this hypothesis displayed good-to-excellent fit, $\chi 2/df = 1.41$; CFI

= 0.91; RMSEA = 0.051; SRMR = 0.072. Both actor levels of network uncertainty (β = −0.15. p =.04) and partner levels of network uncertainty (β = −0.18. p =.02) negatively predicted levels of an actor's relationship satisfaction. Neither an actor nor a partner's levels of network uncertainty predicted partner levels of relationship satisfaction (β = −0.05. p =.14, and β = −0.03. p =.17, respectively). The full results of this model are displayed in Fig. 1. These results display partial support for H1.

The second hypothesis contended that levels of network interference (-) and facilitation (+) at both the actor and partner levels would predict levels of relationship satisfaction for both actors and partners. The model testing this hypothesis displayed good-to-excellent fit, $\chi 2/df = 1.49$; CFI = 0.92; RMSEA = 0.051; SRMR = 0.092. This model produced no statistically significant results; however, several relationships approached significance. An actor's levels of perceived network facilitation shared a positive, but nonsignificant relationship with both actor and partner levels of relationship satisfaction (β = 0.13. p =.08, and β = 0.12. p =.08, respectively). Similarly, a partner's levels of perceived network facilitation shared a positive but nonsignificant relationship with an actor's levels of relationship satisfaction (β = 0.11. p =.09). Although this demonstrates a lack of support for H2, these modest effect sizes warrant reporting.

Intimacy (H3 & H4)

Hypothesis three asserted that network uncertainty would share a negative relationship with perceived levels of intimacy. The model testing this hypothesis displayed good-to-excellent fit, $\chi 2/df = 1.46$; CFI = 0.91; RMSEA = 0.054; SRMR = 0.066. This model produced no statistically significant results; however, partner levels of network uncertainty shared negative relationships with both an actor's and a partner's reported intimacy that approached significance (β = 0.11, p =.10, and β = 0.13, p =.07, respectively). Thus, H3 was not supported, but the findings remain noteworthy.

The fourth hypothesis proposed that levels of perceived network interference (-) and network facilitation (+) would significantly relate to reported levels of intimacy at both the actor and partner levels. The model testing this hypothesis displayed

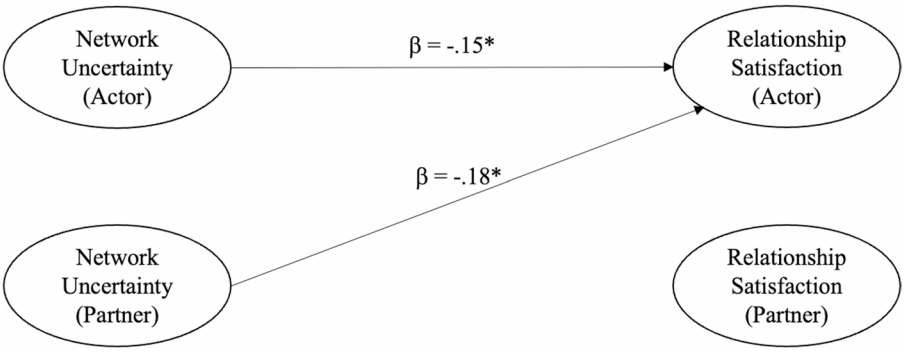

Fig. 1 Results displaying significant effects tested by H1. Note. *p<05. $\chi 2/df = 1.41$; CFI = 0.91; RMSEA = 0.051; SRMR = 0.072. Network uncertainty was gauged with a third order, unidimensional latent variable

good-to-excellent fit, $\chi 2/df = 1.47$; CFI = 0.90; RMSEA = 0.054; SRMR = 0.068. In this model, both an actor's perceptions of network interference ($\beta = -0.15$. p =.04) and network facilitation ($\beta = 0.14$. p =.04) predicted partner levels of intimacy. A partner's levels of network facilitation shared a positive relationship with partner levels of intimacy that approached significance ($\beta = 0.11$. p =.08). These results display partial support for H4 and are detailed in Fig. 2.

Relationship Talk (H5 & H6)

The fifth hypothesis posited that levels of network uncertainty would share a positive correlation with levels of relational talk at both actor and partner levels. This model displayed excellent fit; $\chi 2/df = 1.33$; CFI = 0.95; RMSEA = 0.046; SRMR = 0.061; however, there were no significant results for any of the predicted relationships. Moreover, no relationships approached significance. Thus, H5 was not supported.

Hypothesis six asserted that perceived interference (+) and facilitation (-) from the network would share significant associations with relational talk at both the actor and partner levels. This model displayed excellent fit; $\chi 2/df = 1.30$; CFI = 0.95; RMSEA = 0.043; SRMR = 0.059. Results showed that an actor's levels of perceived network facilitation significantly and negatively related to levels of relational talk at the actor level ($\beta = -0.18$. p =.04). No other significant or noteworthy effects were found and as such H6 was partially supported. These results are displayed in Fig. 3.

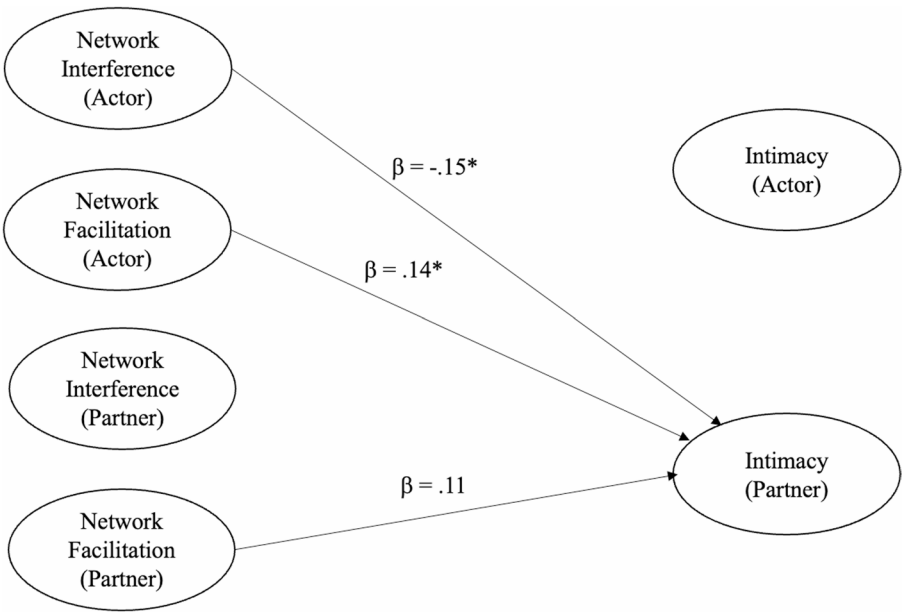

Fig. 2 Results displaying significant effects tested by H1. Note. *p <.05. $\chi 2/df = 1.47$; CFI = 0.90; RMSEA = 0.054; SRMR = 0.068

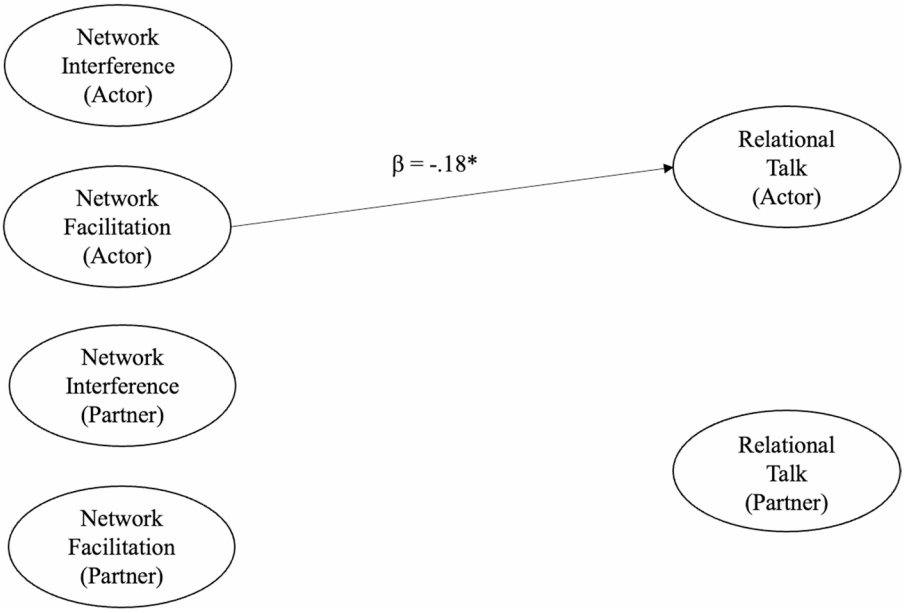

Fig. 3 Results displaying significant effects tested by H1. Note. *p <.05. $\chi 2/df$ = 1.30; CFI = 0.95; RMSEA = 0.043; SRMR = 0.059. Relationship length was controlled for, but not shown in this model

Network-based Relationship Talk (H7 & H8)

The final two hypotheses were identical to H5/H6, but instead explored network-based relational communication as an outcome variable. Hypothesis seven stated that levels of network uncertainty would positively correlate with levels of network-based relational talk at both the actor and partner levels. This model displayed good-to-excellent fit; $\chi 2/df = 1.40$; CFI = 0.93; RMSEA = 0.050; SRMR = 0.064. Strong, positive associations were found between levels of network uncertainty and levels of network-based relational talk at the actor level ($\beta = 0.41$. p <.001). Thus H7 received partial support. Figure 4 outlines the results of this hypothesis (Fig. 4).

Lastly, H8 proposed relationships between network interference (-) and facilitation (+) with levels of network-based relational talk at the actor and partner levels. This model displayed excellent fit; $\chi 2/df = 1.20$; CFI = 0.97; RMSEA = 0.036; SRMR = 0.051. Network interference shared a strong, positive relationship with levels of network-based relational talk at the actor level ($\beta = 0.38$. p <.001). Moreover, results approached significance for the relationship between actor levels of network inference and partner levels of network-based relational talk ($\beta = 0.12$. p <.10). These findings provide partial support for H8. Full results of this hypothesis are displayed in Fig. 5.

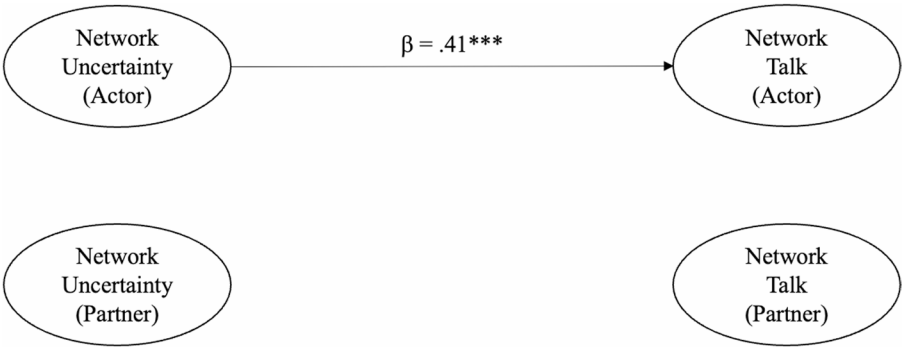

Fig. 4 Results displaying significant effects tested by H7. Note. ***$p < 001$. $\chi 2/df = 1.40$; CFI = 0.93; RMSEA = 0.050; SRMR = 0.064. Network uncertainty was gauged with a third order, unidimensional latent variable. Network overlap is controlled for, but not shown in this model

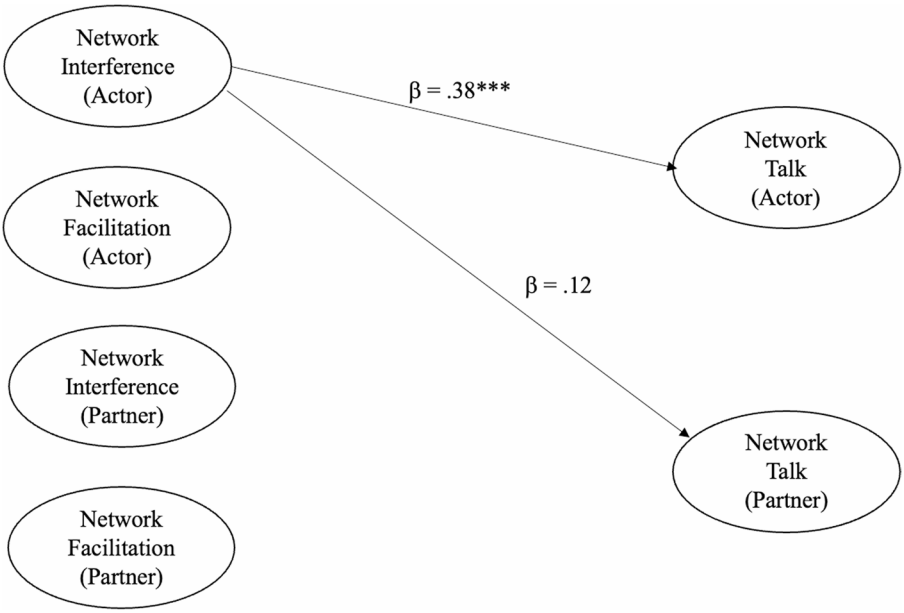

Fig. 5 Results displaying significant effects tested by H8. Note. ***$p < 001$. $\chi 2/df = 1.20$; CFI = 0.97; RMSEA = 0.036; SRMR = 0.051. Network uncertainty was gauged with a third order, unidimensional latent variable. Network overlap is controlled for, but not shown in this model

Discussion

Broadly, the goal of this study was to use the APIM to explore how, if at all, network-based perceptions relate to dyad-based perceptions, relational communication, and network-based relational communication. This goal was in service of expanding recent literature (e.g., Stein 2020; 2022; Stein et al., 2024) which suggests that a couple's perception of network involvement may predict relational outcomes. This

investigation reinforced previous findings and pointed to specific actor and partner effects that further specify the dyad-network accommodation phenomenon. Below is a discussion of the methodological, conceptual, and theoretical importance of this study's findings.

Observing Dyad-Network Accommodation

Arguably, the most salient finding from this study is not in the (dis)confirming of any one hypothesis, but rather the acknowledgement that the process of dyad-network accommodation can and does take many different observable forms. From network uncertainty mediating relationships in the investment model (Stein & Bennett, 2021), to levels of network interdependence predicting emotional responses above and beyond dyadic interdependence (Stein & Davidson, 2019), through attachment tendencies predicting network-based communication (Stein et al., 2022), there is a clear pattern of association between network-based relational measures and dyad-based relational measures. Our findings specify and extend these conclusions in two important ways: dyadic implications and locus of communication.

Frist, given that this investigation involved dyadic data, several important conclusions can be drawn. Hypotheses one through four demonstrated a variety of significant effects at both the actor and partner level, as well as several associations that approached significance with encouraging effect sizes. The finding that network-based perceptions correlate with relational measures is by no means novel (see Parks et al., 1983; Sprecher, 2011; Stein, 2024); however, the actor-partner effects uncovered in this study are the first of their kind. The network-based insecurities or interruptions that partner A perceives in a relationship may indeed alter the way they view their relationship. Moreover, those same perceptions can create conditions under which partner B's outlook on the partnership changes as well. This is an important amendment to the ways in which extra-dyadic forces alter relational quality. Given that network duocentrism (i.e., network overlap; see Kennedy et al., 2015) nonsignificantly correlated with every substantive variable, it is likely that the mere presence of one's (or a partner's) network is not what alters relational perceptions, but rather substantive, meaningful interactions with and assessments of that network and the members in it.

Second, the nature of the communication occurring between couples matters. Stein's (2024) exploration of network accommodation revealed that neither the NUM nor levels of network interference/facilitation relate to converging or diverging behaviors toward one's partner; however, those measures did significantly correlate with converging and diverging behaviors toward both one's own and a partner's network. Said differently, network-based perceptions predict network-based communication. This study's findings clearly support that trend, wherein only perceived network facilitation shared a modest relationship with an actor's reported levels of relational talk (H6). Alternatively, strong positive associations between network uncertainty and network interference were found with network-based relational communication. Coupled with the near-significant association between network facilitation and network-based relational talk, it seems clear that fluctuating network perceptions are

more likely to affect conversations about or with that network, as opposed to conversations about the partner or dyad.

Thus, these results clarify and specify the dyad-network accommodation process. Network-based perceptions (e.g., network uncertainty and network interdependence) can simultaneously encourage both actors and partners to reassess their relationship's quality (e.g., relationship satisfaction and intimacy) and produce conversations about the source(s) of those reassessments (i.e., the network). One important lingering question is if network perceptions and dyadic perceptions interact to predict dyad-focused and/or network-focused communication. Such an exploration is beyond this scope of this study, but would shed meaningful light on the theoretical implications of dyad-network accommodation.

Theorizing about Dyad-Network Accommodation

To date there is a litany of research tying network-based perceptions to a variety of communication and relational outcomes (e.g., Milardo et al., 1983; Due et al., 1999; Bernold & Giles, 2020). Often, such studies are nested within the confines of existing theory; however, a communication-based theory of dyad-network interaction is missing. Although this study did not set out to craft a theory of dyad-network accommodation, the findings do suggest that such a theory could advance in one of several directions.

Given that network-based relational talk was the outcome variable that was most strongly predicted by both network uncertainty and network interdependence measures, the next reasonable step in the exploration of dyad-network accommodation is to determine what role dyadic perceptions play. On one hand, it may be that network perceptions lead to dyadic perceptions (as originally posited by Parks et al., 1983), which in turn produce relational conversations. Alternatively, the obverse may be true, wherein dyadic perceptions lead to network perceptions which, finally, predict talk between couples (as Stein and Davidson suggested). Finally, it may be that network perceptions and dyadic perceptions interact to predict communication between dyads – be it about the relationship, the network, or both. Clarifying these relationships is necessary prior to making specific theoretical predictions. This study sought to explore the actor and/or partner effects of network-based measures on both cognitive and communication outcomes. Now that there is clear evidence indicating the presence of such relationships, these associations must be further parsed, ideally with longitudinal data. That said, the nature of the variable(s) selected likely matters more than the ordering of those variables.

Measuring Dyad-Network Accommodation

A final looming factor that researchers should consider is what the best operationalization for dyad-network accommodation is. The most recent attempt to gauge dyad-network accommodation used a modified version of Imamura et al.'s (2011) convergence/divergence measure (see Stein, 2024). Like the present study, those findings indicated strong associations between network-based measures and network-focused communication. However, the method of modifying existing self-reports of

dyadic communication to refer to the network, while statistically viable (see Stein, 2018) is not always the optimal choice.

One way in which a measure of dyad-network accommodation might be more accurately quantified would be to code open-ended responses from couples (i.e., dyadic reports) into themes and then use those themes to create a novel Likert-style measure, akin to Stein et al.'s (2020) NUM. Indeed, the couples in this study did provide such open-ended answers, which are currently being analyzed to craft such a measure. Once composed, the scale of dyad-network accommodation will be subjected to factor analyses across multiple waves of data collection. Like the NUM and the measure of network interdependence, the convergent, divergent, and construct validity of this future measure will be tested. Such efforts will ultimately contribute to the communicative substance of a dyad-network accommodation theory.

Limitations and Future Directions

This study, while robust, does have two primary limitations worth noting. First, although dyadic data allows for detailed statistical analyses, we were limited by the cross-sectional nature of this study. As the study of dyad-network accommodation approaches theoretical proposal, time-ordered studies will be necessary. Such efforts have already begun (see Stein, 2021; Stein & Davidson, 2019). That said, future work will need to better parse the mechanisms that exist between network perceptions (e.g., network uncertainty), network-based communication (i.e., dyad-network accommodation) and relational cognitions/outcomes. Longitudinal analyses are a necessary step toward that goal.

Second, the sample of this study was limited by homogeneity in several ways. Relationship length, racial makeup, and the exclusivity of couples present several potential skews worth noting. Additionally, because the data were collected from community members in a religiously homogenous culture (Latter-Day Saints), there are potential confounding religious and co-cultural components that make the dyad-network accommodation process different in this geographical space. Thus, future studies on dyad-network accommodation should involve a more heterogeneous sample.

Concluding Thoughts

This study used dyadic data to explore the actor and partner effects of network-based measures on relational perceptions, relational communication, and communication about the networks that surround those relationships. Results were encouraging, painting a clear path for future research and providing an encouraging platform from which a theory of dyad-network accommodation may emerge. The ultimate goal of this research program is to highlight a couple's social network(s) as causal actors in the relationship formation, maintenance, and termination process. This study meaningfully contributed to those ends.

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Author Contributions Conceptualization: Dr. James B. Stein; Methodology Dr. James B. Stein, Ms. Lucy Rios; Formal analysis and investigation: Dr. James B. Stein; Writing - original draft preparation: Dr. James B. Stein; Writing - review and editing: Dr. James B. Stein, Ms. Lucy Rios; Funding acquisition: N/A; Resources: Dr. James B. Stein, Ms. Lucy Rios; Supervision: Dr. James B. Stein.

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Data Availability The data collected for this project occurred between April of 2022 and March of 2024. The data are not publicly available; however, they are available upon reviewer or editors request, barring anonymization. The data are dyadic in nature, consisting of responses from 80 couples (N = 160). All participants provided informed consent.

Declarations

Ethics Approval This project was approved twice by Utah Tech University's IRB committee. Fist, it was approved in January of 2022, and then in April of 2023 it was renewed. This study was performed in accordance with the 1964 declaration of Helinsky and adheres to the guidelines stated in the Belmont report.

Informed Consent All participants in this study provided informed consent two times. First, when answering questions together as a couple they provided their combined consent. Then, when separated into distinct rooms, individuals once again provided consent prior to answering all questions.

Conflict of interest There are no conflicts of interest to report as it pertains to the construction of this project or manuscript.

Competing Interests There are no competing interests.

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