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Partner Support and Connection Protect Couples during Pregnancy: A Daily Diary Investigation

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Abstract

Objective: The objective of the current study was to examine associations between daily subjective stress and relationship satisfaction as a function of two protective factors—partner support and connection (i.e., intimacy, passion, and commitment)—among couples during pregnancy. *Background:* Stress brought into the intimate relationship by each partner is often associated with relational dissatisfaction and discord, referred to as stress spillover. Although much research has focused on risk for poor relational outcomes associated with partner stress, it is equally important to focus on resilience. *Method:* We examined this phenomenon among 154 couples navigating pregnancy. Couples attended an initial laboratory session and then completed daily diary measures from home across 14 days. *Results:* Multilevel modeling techniques revealed that higher daily subjective stress than usual was negatively associated with relationship satisfaction that day for fathers and mothers, and partner support and connection attenuated this link to a significant degree. As these protective factors increased, the strength of the negative association between daily stress and relationship satisfaction decreased for both parents. Exploratory analyses showed no significant within-person associations between daily stress and next-day relationship satisfaction at any level of support or connection. *Conclusion:* These findings add innovative components to the investigation of the spillover process, including the examination of this process among couples during pregnancy, utilization of daily diary methods to study this phenomenon on a micro-level over time, and identification of protective factors mitigating daily stress spillover.

Keywords: commitment, couples, intimacy, pregnancy, stress, support

Abbreviations: MLM, multilevel modeling; PSS, Perceived Stress Scale; QMI, Quality of Marriage Index; SIRRS-R, Support in Intimate Relationships Scale-Revised; STLS, Sternberg Triangular Love Scale

Introduction

For decades, stress was conceptualized as an individual phenomenon (Randall & Bodenmann, 2017); however, researchers increasingly acknowledge the destructive effects of stress on intimate relationships (e.g., Brock & Lawrence, 2008; Randall & Bodenmann, 2009). Specifically, individual stressors experienced by each partner have the potential to "spill over" into the relationship, leading to poor relational outcomes including less satisfaction and stability (Buck & Neff, 2012). In light of these findings, there is a need for research investigating spillover processes, especially during normative transitions that are associated with elevated levels of stress, such as pregnancy. The primary goal of the present study was to investigate the dynamic association between subjective stress levels and intimate relationship satisfaction as it unfolds on a daily basis during pregnancy and, importantly, identify protective factors within the intimate relationship that mitigate this link.

The stress spillover model

Stress spillover has been well documented and demonstrates that external sources of stress experienced by one partner can spill over into their intimate relationship and cause harm (Falconier et al., 2015). Researchers have defined external stressors as those that originate outside of the close relationship (e.g., workplace stress, financial stress, social stress; Randall & Bodenmann, 2009). Within couples, there is generally an interplay between partners and their social environment that influences the relationship, such that individual external stress spills over to the dyad and triggers maladaptive responses (e.g., arguments and conflicts; Randall & Bodenmann, 2009). Randall and Bodenmann (2017) report this can occur through several mechanisms, including decreased time partners spend together, which in turn weakens partners' feelings of mutuality; decreased effective communication; increased likelihood that partners' problematic traits (e.g., anxiety, dominance) will be expressed; and increased risk of negative health outcomes, such as mood or sleep disorders (p. 96). The implications for these findings are wide, as partners' inability to cope with external stress is linked to lowered relationship satisfaction (Randall & Bodenmann, 2017), and this in turn is associated with relationship dissolution (Le et al., 2010) and poor health (Brock et al., 2016).

Understanding stress spillover on a daily basis

The association between stress and relationship satisfaction among couples has been examined through a number of methodologies, including quantitative and qualitative designs, cross-sectional and longitudinal designs, and daily diary studies; however, the majority of work has relied on cross-sectional methodology (see Randall & Bodenmann, 2017 for a review). Increasingly, researchers are implementing longitudinal designs in their work, which allows for the exploration of the stress spillover process as it unfolds over time. With that said, most longitudinal research has examined associations between stress and

relationship satisfaction over long time intervals (e.g., years), whereas studies examining daily dynamics are lacking in comparison. The progressive use of daily diary designs allows researchers to reduce recall bias and mental heuristics that individuals often use in trying to evaluate their relationship over extended time periods (Brock et al., 2019) as well as capture the dynamic nature of stress as it unfolds day-to-day to examine how short-term fluctuations in stress relate to changes in the relationship that might otherwise go unnoticed. For example, Buck and Neff (2012) found that on days when couples reported greater levels of stress, they also reported decreases in positive marital appraisals. Neff and Karney (2004) also reported that partners were more likely to perceive daily relationship experiences as negative when external stress was high. According to Randall and Bodenmann's (2017) review, only two other relevant studies at that time had utilized the daily diary methodology and found similar results (i.e., Totenhagen et al., 2012, 2013). Given the implications of these findings for couples and families, there is a need to replicate and extend research linking daily experiences with stress to intimate relationship functioning.

Understanding stress spillover during pregnancy

A crucial time to study stress spillover among couples is during pregnancy. Not only have researchers found that pregnancy is a context in which general stress might be more elevated (Schetter & Tanner, 2012) but there also exists an added layer of stress that originates from a variety of pregnancy-specific issues, such as physical symptoms, parenting concerns, bodily changes, anxiety about labor and delivery, and concerns about the baby's health (Lobel et al., 2008). Higher levels of subjective stress are expected to impact the couple relationship given that this is such a demanding period of time, and previous research has found support for the association between increased global stress and decreased relationship satisfaction in early pregnancy (Røsand et al., 2011).

The potential for stress spillover during pregnancy is concerning because a healthy intimate relationship during this time sets the stage for adaptive family dynamics when the baby is born. Family systems theory emphasizes that familial relationships play multiple roles, given that changes in one relationship may influence other functioning in other relationships and impact all individuals in the system (Davies & Sturge-Apple, 2014). In this case, as parents expecting the birth of a child negotiate new or evolving coparenting roles, having a strong intimate relationship may help them successfully consolidate this new role and ease the transition (Van Egeren, 2004). However, if a healthy intimate relationship is not established, this can undermine parenting and have negative effects on the child (Krishnakumar & Buehler, 2000). Therefore, discovering ways to protect couples from the effects of stress spillover during pregnancy is of paramount importance.

Factors protecting couples from stress spillover

One factor that might buffer couples against the adverse effects of daily stressors is having a high-quality intimate relationship. In particular, if partners receive adequate support from one another and share a sense of closeness and connectedness in their relationship, this has the potential to protect against the consequences of naturally occurring stressors that tend to appear in daily living—including stress arising during pregnancy—and set the stage for healthy childbirth and the evolving family environment. It is critical to

conceptualize these naturally occurring stressors in a resiliency framework, as doing so may allow us to not only uncover protective factors that mitigate poor relational outcomes but also inform targeted clinical efforts to minimize the effects of stress within couples.

Partner support, typically conceptualized as encouraging responses by one's significant other in the context of distress (e.g., listening, providing guidance), not only accounts for a notable amount of the variance in couple outcomes above and beyond that of conflict but also predicts relationship satisfaction up to 10 years later (Brock et al., 2016). Researchers have also found that partner support within day-to-day life yields positive outcomes; for example, Gleason et al. (2008) found positive associations among partner support in response to a worry, problem, or difficulty and next-day ratings of closeness and intimacy with the partner as well as overall relationship quality. Moreover, a number of reviews outline several positive aspects of support in intimate relationships (e.g., Cutrona, 2012; Rafaeli & Gleason, 2009), one of which touches on partner support and its positive influence within a cross-cultural context (see Sullivan & Davila, 2010). Committed dyadic relationships appear to be a vital source from which individuals draw strength and resilience when coping with external hardship (Rafaeli & Gleason, 2009).

From these reviews and other work, there is growing evidence that partner support adequacy—the degree to which the frequency of support behaviors provided by one's partner matches individual preferences for support—is associated with greater relationship satisfaction. This specific aspect of support appears to have particular importance because support that meets the unique needs of the recipient is more likely to facilitate adaptive coping efforts (Brock et al., 2016). For example, more adequate support in the intimate relationship has been directly linked to greater martial satisfaction (Lawrence et al., 2008) and also interacts with stress to promote relationship satisfaction (Brock & Lawrence, 2008). Similar constructs to partner support adequacy have likewise demonstrated effectiveness in facilitating efforts to adapt to stress. For example, Rini et al. (2006, 2011) found in several studies that effective partner support (i.e., the perceived quality and quantity of support attempts by partners and the extent to which attempted support met the recipients' needs) resulted in a reduction of stress during stages of life that are inherently challenging. Thus, there is reason to believe that more adequate partner support might lessen the effects of stress on relationship satisfaction, even during a relatively stressful time when family dynamics are starting to shift.

Closely related to support, but also a distinct dimension of intimate relationships, a close *connection* between partners in the couple relationship—encompassing intimacy, passion, and commitment (Sternberg, 1997)—might also directly impact relationship satisfaction. To note, Sternberg (1997) collectively refers to these dimensions as *love*; however, we use the term *connection* as we believe it is more representative of the measured constructs as they are conceptualized within a resiliency framework. Separate from global sentiment or happiness with the relationship (i.e., satisfaction; Lawrence et al., 2011), connection refers to feelings and behaviors related to closeness and a desire to maintain love (Sternberg, 1997). Researchers have found that relationship satisfaction is enhanced when individuals experience greater emotional intimacy in their relationships and feel interdependence with their partners (Sanderson & Evans, 2001). Similarly, passion has been linked to relationship satisfaction (De Andrade et al., 2015), as has commitment in maintaining love and

connection (Madey & Rodgers, 2009). Relationships characterized by a high degree of connection allow individuals to develop confidence in their partners' abilities to provide a safe haven when faced with stressors, and, in turn, they are likely to derive more satisfaction from the relationship (Duemmler & Kobak, 2001). Relatedly, researchers have found a close connection with one's partner also has the potential to protect against daily stress that naturally occurs during stages of life that tend to be more demanding, as closeness is linked to improved stress responses (Ditzen et al., 2019). For example, Totenhagen et al. (2012) found partner closeness buffered the negative association between daily stress and relationship satisfaction, although they relied on single-item measures of these constructs; thus, the current study aims to address this limitation. Based on this work, a high degree of connection between partners is also expected to serve a protective role in the context of stress spillover during pregnancy.

The present study

The primary aim of the present study was to examine the dynamic association between daily subjective stress and corresponding relationship satisfaction across 14 days during pregnancy as well as identify protective factors within the intimate relationship that weaken this maladaptive process. We hypothesized, for both fathers and mothers: (H1) higher levels of daily stress than usual would be associated with lower relationship satisfaction on the same day, controlling for time; (H2) the strength of the association between subjective stress and relationship satisfaction would be reduced for those who reported generally receiving more adequate partner support at baseline; and (H3) the strength of the association between subjective stress and relationship satisfaction would be reduced for those who generally experience a greater degree of connection (i.e., intimacy, passion, and commitment at baseline). We conceptualized support and a sense of connection in the relationship as moderating actor paths (e.g., one's own sense of connection with one's partner weakens the association between one's subjective experience of stress and one's own relationship satisfaction); we had no theoretical reason to anticipate moderation of partner paths, although identification of resiliency factors that interrupt partner pathways represents an important direction for future research. To further investigate the potential for a pervasive impact of daily stress on relationship satisfaction, we also tested a parallel set of post hoc exploratory models that introduced a time lag such that stress on one day was linked to relationship satisfaction on *the next day*.

The present study is innovative in its (a) application of stress spillover model during pregnancy, an inherently stressful, yet significant stage in the family lifecycle, (b) utilization of daily diary methods to examine daily links between stress and relationship satisfaction, and (c) identification of key protective factors within the intimate relationship that mitigate the link between stress and relationship discord during pregnancy to set the family on a healthy trajectory after childbirth.

Method

Participants and procedures

All procedures were approved by the University of Nebraska–Lincoln Institutional Review Board and took place from 2016 to 2017. Flyers and brochures were broadly distributed to businesses and clinics frequented by pregnant women (e.g., obstetric clinics) in Lincoln, Nebraska, and surrounding communities. We established cooperative arrangements with multiple agencies in the community. If an establishment permitted, members of the research team approached potential participants and provided a five-minute overview of the study along with a brochure. Eligibility criteria included: (a) 19 years of age or older (legal age of adulthood where the research was conducted); (b) English speaking; (c) pregnant at the time of the initial appointment (but not necessarily the first pregnancy to increase generalizability of results); (d) both partners are biological parents of the child; (e) singleton pregnancy; and (f) in a committed intimate relationship and cohabiting. One hundred sixty-two couples enrolled. Three couples were excluded from the final sample, due to either ineligibility or invalid data, for a final sample of 159 couples (159 women and 159 men).

Participants were primarily White (89.3% of females; 87.4% of males); 9.4% of females and 6.4% of males identified as Hispanic or Latino/a. On average, women were 28.67 years of age (SD = 4.27) and men were 30.56 years of age (SD = 4.52). Couples had dated an average of 81.90 months (SD = 49.59) and cohabited an average of 61.00 months (SD = 41.80). The majority of couples were married (84.9%). Most women were in the second (38.4%) or third (58.5%) trimester of pregnancy. On average, couples had one child living at home (SD = 1.18); 57.9% reported that they had no children and, therefore, were experiencing the transition into parenthood for the first time. Annual joint income ranged from less than $9,999 to more than $90,000 with a median joint income of $60,000–$69,999, and most participants were employed at least 16 hours per week (74.2% of females; 91.8% of males). Modal education was a bachelor's degree (46.5% of females; 34.6% of males).

Both partners attended a three-hour laboratory appointment at the University of Nebraska–Lincoln during which they completed questionnaires, simultaneously and separately, in addition to other procedures beyond the scope of the present study. Participants were compensated with $50 (for a total of $100 per couple) for attending the appointment. Following the laboratory visit, participants completed 10–15 minutes of questionnaires from home for 14 consecutive days either on the internet (82%) or by mailing a paper version of the survey to the laboratory if the participant did not have daily access to the internet or access to a laptop or desktop computer at home. If a participant requested a paper survey, they were instructed to (a) record the date and time at both the beginning and the end of the survey for validation and (b) mail the survey that same day using a prepaid envelope. Notably, no meaningful differences in psychometric properties have been observed when administering surveys on the internet versus paper-and-pencil (Brock et al., 2012).

Partners were instructed to complete the surveys separately from one another (alone and in private). An interval-contingent design (Affleck et al., 1999) was used such that participants were asked to record their experiences and perceptions at predetermined intervals (i.e., before bedtime). Furthermore, participants were told not to complete a survey

for past days (e.g., yesterday's report today), and to only report on experiences that had happened on the same day they completed the survey. They were given a customized checklist with the dates of each survey to increase compliance, and we suggested that they post the checklist in a location where they would see it on a daily basis (e.g., the refrigerator). They were also encouraged to set reminders on their phone or other devices to prompt them to complete the survey each evening. The survey completion rate for fathers was 85% and for mothers 88%. On average, participants completed 12.23 days of surveys (*SD* = 3.23) across the assessment period of 14 days.

Participants were paid up to $50 for completing the daily home surveys (for a total of $100 per couple); payment was prorated based on how many daily surveys were completed. Only five couples declined participation in the daily survey; thus, a total of 154 couples completed both the laboratory visit and the daily surveys. Accordingly, the final nested structure of the data was 14 repeated daily measures nested within the 154 couples.

Measures

Demographics
Participants completed a demographics measure including questions regarding their age, race/ethnicity, educational attainment, average yearly income, characteristics of the relationship (e.g., length of relationship), and characteristics of the pregnancy (e.g., first-time parent status).

Daily subjective stress
The *Perceived Stress Scale* (PSS; Cohen et al., 1983) is a self-report questionnaire designed to assess the degree to which situations in one's life are considered stressful, comprising events that may cause strain. In addition to assessing perceptions of stressors, the PSS also assesses how often individuals feel they were able to handle irritations, or that things were going smoothly, offering insight into perceptions that are counter to stress. Given that lengthier daily diaries predict decreased participant compliance (Morren et al., 2009), we selected four items from the original PSS that represent key features of subjective stress (i.e., generalized upset; nervousness and stress; a lack of feeling in control; and an inability to cope). Across 14 days, participants indicated the extent to which they agree or disagree with the four items (e.g., "I felt like things were out of my control") using a scale from 0 (*not at all*) to 3 (*to a great extent*). Items were summed to create an overall score of subjective stress each day, and this score was modeled as a Level 1 (within-person) predictor. In the present sample, the PSS for fathers showed adequate between-person reliability (R_{KF} = .978) and within-person reliability (R_C = .762). The PSS for mothers also showed adequate between-person reliability (R_{KF} = .970) and within-person reliability (R_C = .801). Reliability coefficients were calculated with regard to recommendations by Shrout and Lane (2012).

Daily relationship satisfaction
The *Quality of Marriage Index* (QMI; Norton, 1983) is a six-item self-report questionnaire designed to assess the essential goodness of a relationship. Items on the QMI were modified for the present study, which was composed of couples who were not necessarily married,

to refer to one's "relationship with my partner." Across 14 days, participants indicated the extent to which they agree or disagree with five items (e.g., "Our relationship is strong" and "We have a good relationship") using a scale from 1 (*very strong disagreement*) to 7 (*very strong agreement*). Participants also rated their global relationship "happiness" on a scale ranging from 1 (*very unhappy*) to 10 (*perfectly happy*) for the item "All things considered, how happy are you in your relationship?" Items were summed to create an overall score of relationship satisfaction, and this score was modeled as the Level 1 (within-person) outcome variable. In the present sample, the QMI for fathers showed adequate between-person reliability (R_{KF} = .994) and within-person reliability (R_C = .886). The QMI for mothers also showed adequate between-person reliability (R_{KF} = .996) and within-person reliability (R_C = .905; Shrout & Lane, 2012).

Baseline adequacy of partner support
To measure the protective factor partner support, the *Support in Intimate Relationships Scale-Revised* (SIRRS-R; Barry et al., 2009) was utilized, which measures global perceptions of support over extended periods of time (e.g., weeks to months). The SIRRS-R is an adapted version of the original 48-item measure (Dehle et al., 2001), consisting of 25 items that were factor analytically derived across dating and marital relationships, across men and women, and across time, and demonstrates strong reliability and validity (convergent, divergent, and incremental predictive utility). Items capture a wide range of support behaviors; focus on support from partners in intimate relationships; both frequency and adequacy of support; and are anchored in behaviorally specific indicators. During the laboratory visit, participants were asked to report the frequencies of specific support behaviors from partners over the past month (*never*, *rarely*, *sometimes*, *often*, *almost always*) and indicate a preferred frequency for each behavior (*more*, *less*, or *the same*). For the purpose of the current study, only scores related to support adequacy were examined, given that research has shown that a match between desired and received levels of support largely contributes to relationship satisfaction (Brock & Lawrence, 2010). Support adequacy scores were obtained by coding responses for the preferred frequency of support behaviors such that 0 = *inadequate* (would like more or less of that support) and 1 = *adequate* (would like the same amount of that support). A sum score was obtained where scores can range from 0 to 25, and this score was modeled as a Level 2 (between-person) predictor. In the present sample, the internal consistency of this scale was excellent (Cronbach's α = .92).

Baseline degree of connection in the intimate relationship
To measure the protective factor connection between partners, the *Sternberg Triangular Love Scale* (STLS; Sternberg, 1997) was utilized, which assesses intimacy, passion, and commitment in the couple relationship. Intimacy refers to feelings of closeness, connectedness, and bondedness in loving relationships; passion refers to the drives that lead to romance, physical attraction, sexual consummation, and related phenomena in loving relationships; and commitment refers, in the short-term, to the decision that one loves a certain other, and in the long-term, to one's commitment to maintain that love. Each subscale is composed of 15 items. During the laboratory visit, participants indicated the extent to which they agreed or disagreed with the items (e.g., "I feel close to my partner") using a scale

from 1 (*not at all*) to 9 (*extremely*). Items were summed across subscales to create an overall score of "connection" (i.e., intimacy, passion, and commitment) in the couple relationship, and this score was modeled as a Level 2 (between-person) predictor. The decision to combine items across all subscales was supported by high correlations among the subscales (*rs* > .70) and is consistent with other work demonstrating a higher-order factor structure of the STLS (see Graham, 2011). In the present sample, the internal consistency of this total scale score was excellent (Cronbach's α = .95).

Data analytic strategy

Multilevel modeling (MLM) techniques were implemented with HLM v.8 software (Raudenbush et al., 2019), and a multivariate two-level model was used in which paternal and maternal parameters were modeled separately yet simultaneously (Raudenbush et al., 1995). MLM estimates within-person change for a variable (i.e., global relationship satisfaction) and allows for the examination of time-varying covariates of repeated measures. Furthermore, MLM allows for an examination of between-subject differences in the association between daily subjective stress and relationship satisfaction as a function of protective factors. There are multiple advantages of using MLM to analyze repeated assessments; most notably, repeated measures are nested within participants to account for interdependence, and cases are retained despite missing data across repeated assessments, which is customary in longitudinal research. Full information maximum likelihood was used, and estimates are reported with robust standard errors to account for any violations of normality. The multivariate two-level model is closely related to an actor-partner interdependence model (Kenny et al., 2006), allowing us to model within-couple (actor) and cross-couple (partner) effects and account for interdependence between fathers' and mothers' data. It also allows for the examination of effects separately for fathers and mothers.

As a part of the initial model building stage, all Level 1 variables were tested as random or fixed. Nested model comparisons were significant, and thus all Level 1 effects were modeled as random (range of χ^2 tests: 89.29–364.50, *ps* < .001). Due to missing data for several variables at Level 2, the final model for the SIRRS-R (i.e., adequacy of partner support) was tested with 143 couples, and the final model for the STLS (i.e., partner connection) was tested with 144 couples (see measurement details above). Before testing our hypotheses, we screened for demographic variables (i.e., partner age, income, minority status, marriage status, first-time parent status, and relationship duration) associated with mean relationship satisfaction. Each variable was entered as a Level 2 predictor of mean relationship satisfaction across the 14 days (Level 1 intercepts). Only first-time parent status (0 = *no children living in the home during pregnancy*, 1 = *children living in the home*; 57.9% were first-time parents) was significantly associated with mean relationship satisfaction among mothers (*B* = 1.57, *SE* = 0.75, *p* = .038) and was added to the model.

To examine whether daily subjective stress was associated with relationship satisfaction as a function of protective factors (i.e., partner support and connection), the following multilevel model was tested:

Level 1:

Relationship Satisfaction$_{ti}$ = π_{1i}* (Paternal Intercept$_{ti}$) + π_{2i}* (Maternal Intercept$_{ti}$) + π_{3i}* (Paternal Time$_{ti}$) + π_{4i}* (Maternal Time$_{ti}$) + π_{5i}* (Paternal Stress Actor Path$_{ti}$) + π_{6i}* (Maternal Stress Actor Path$_{ti}$) + π_{7i}* (Paternal Stress Partner Path$_{ti}$) + π_{8i}* (Maternal Stress Partner Path$_{ti}$) + e_{ti}

Level 2:

π_{1i} = β_{10} + β_{11}* (Paternal Protective Factor$_i$) + β_{12}* (Maternal Protective Factor$_i$) + β_{13}* (Paternal Average Stress$_i$) + β_{14}* (Maternal Average Stress$_i$) + β_{15}* (First-Time Parent Status$_i$) + r_{1i}

π_{2i} = β_{20} + β_{21}* (Paternal Protective Factor$_i$) + β_{22}* (Maternal Protective Factor$_i$) + β_{23}* (Paternal Average Stress$_i$) + β_{24}* (Maternal Average Stress$_i$) + β_{25}* (First-Time Parent Status$_i$) + r_{2i}

π_{3i} = β_{30} + β_{31}* (Paternal Protective Factor$_i$) + β_{32}* (Maternal Protective Factor$_i$) + r_{3i}

π_{4i} = β_{40} + β_{41}* (Paternal Protective Factor$_i$) + β_{42}* (Maternal Protective Factor$_i$) + r_{4i}

π_{5i} = β_{50} + β_{51}* (Paternal Protective Factor$_i$) + β_{52}* (Maternal Protective Factor$_i$) + r_{5i}

π_{6i} = β_{60} + β_{61}* (Paternal Protective Factor$_i$) + β_{62}* (Maternal Protective Factor$_i$) + r_{6i}

π_{7i} = β_{70} + r_{7i}

π_{8i} = β_{80} + r_{8i}

The time-varying covariate for both parents, subjective stress, was group-mean centered at Level 1 of the model to isolate within-person variability in stress. To also account for between-subject differences of stress on overall relationship satisfaction, we computed a mean stress score averaging across the 14 days and modeled this as a Level 2 (between-person) predictor of the Level 1 intercept parameters (π_{1i} and π_{2i}). Time for both parents (centered at Day 1) was included as a Level 1 covariate in all analyses. To account for the possibility that the protective factors of interest might also influence relationship satisfaction scores over time, we included the protective factors as predictors of the time effects (i.e., π_{3i}, π_{4i}), although we did not have hypotheses about the nature of these effects. Due to the nature of the dyadic data, partner paths were also included as group-mean centered Level 1 covariates in all analyses (i.e., π_{7i}, π_{8i}) to represent the degree to which subjective stress experienced by one partner on a given day was associated with relationship satisfaction of the other partner on the same day.

The primary parameters of interest were β_{51}, which provides a test of whether the association between paternal daily subjective stress and relationship satisfaction varied as a function of the protective factor reported by fathers, and β_{62}, which provides the same test for mothers. Both tests represent a cross-level interaction between daily subjective stress (Level 1) and a protective factor (partner support/connection; Level 2) in explaining relationship satisfaction. Partner support was entered uncentered at Level 2 given that zero was a meaningful score (scores can range from 0 to 25). Connection was grand-mean

centered at Level 2 given zero was not a meaningful score on this scale (scores can range from 45 to 405).

Results

Descriptive information and correlations for the primary study variables at the between-person level are reported in Table 1. At the within-person level, maternal relationship satisfaction was significantly correlated ($p < .001$) with paternal satisfaction, $r = .40$, maternal stress, $r = -.28$, and paternal stress, $r = -.12$. Paternal satisfaction was significantly correlated with maternal stress, $r = -.18$, and paternal stress, $r = -.20$. Maternal and paternal stress were significantly correlated, r = .20. Correlations among variables at each level did not exceed .70; thus, there were no concerns about multicollinearity (Tabachnick & Fidell, 1996).

Table 1. Between-person variables: means, standard deviations, ranges, and correlations

	1	2	3	4	5	6	7	8
1. *M* paternal relationship satisfaction	—	.43**	−.26**	−.27**	.08	.02	.05	.05
2. *M* maternal relationship satisfaction	—	—	−.16	−.28**	.15	.25**	.05	.17*
3. *M* paternal stress	—	—	—	.48**	.06	.08	.05	−.03
4. *M* maternal stress	—	—	—	—	.002	.11	.04	−.04
5. Paternal connection	—	—	—	—	—	.29**	.41**	.11
6. Maternal connection	—	—	—	—	—	—	.26**	.48**
7. Paternal adequacy of support	—	—	—	—	—	—	—	.22**
8. Maternal adequacy of support	—	—	—	—	—	—	—	—
Mean	40.40	40.05	1.46	1.78	373.18	372.30	19.37	17.94
SD	13.19	11.47	1.61	1.74	30.13	29.81	6.09	6.94
Range	20.89–45.00	16.00–45.00	0.00–7.64	0.00–8.43	172.84–405.00	216.00–405.00	1.00–25.00	1.00–25.00
N	147	149	147	149	154	154	153	154

Note: Mean scores (*M*) of Level 1 variables were computed across the 14 days to examine between-person correlations.
*$p < .05$, **$p < .01$

We first examined parameters related to our Level 1 predictors (i.e., time and subjective stress) within the full multivariate model. As expected, on days that parents reported more subjective stress than was typical, both fathers (β_{50}, support model: $B = -0.73$, $SE = 0.19$, $p < .001$; connection model: $B = -0.27$, $SE = 0.05$, $p < .001$) and mothers (β_{60}, support model: $B = -1.35$, $SE = 0.36$, $p < .001$; connection model: $B = -0.47$, $SE = 0.08$, $p < .001$) also reported less relationship satisfaction on the same day, controlling for the passage of time (see Tables 2 and 3; H1). Note that these effects are conditional such that they represent effects when support equals zero or at average levels of connection. Interestingly, significant partner effects were also present: increases in stress reported by one partner were associated with decreases in relationship satisfaction reported by the other partner in the support model (β_{70}, paternal partner slope: $B = -0.15$, $SE = 0.07$, $p = .035$; β_{80}, maternal partner slope: $B = -0.18$, $SE = 0.05$, $p < .001$), although there was a trending pattern for the paternal partner

slope in the connection model (β_{70}, paternal partner slope: $B = -0.14$, $SE = 0.07$, $p = .055$; β_{80}, maternal partner slope: $B = -0.18$, $SE = 0.05$, $p < .001$; see Tables 2 and 3). Next, we examined whether the actor associations between daily subjective stress and relationship satisfaction varied as a function of partner support and connection (H2 and H3).

Table 2. Stress and relationship satisfaction as a function of adequacy of partner support

Fixed effect	Coefficient	SE	t-Ratio	df	p-Value
Paternal Level 1 intercept, π_1					
Level 2 intercept, β_{10}	36.88	1.63	22.60	137	< .001
Paternal support, β_{11}	0.24	0.07	3.52	137	< .001
Maternal support, β_{12}	0.04	0.03	1.37	137	.173
Paternal average stress, β_{13}	−0.21	0.15	−1.40	137	.164
Maternal average stress, β_{14}	−0.02	0.16	−0.11	137	.910
First-time parent status, β_{15}	0.83	0.43	1.94	137	.055
Maternal Level 1 intercept, π_2					
Level 2 intercept, β_{20}	32.40	2.00	16.18	137	< .001
Paternal support, β_{21}	0.24	0.08	3.08	137	.003
Maternal support, β_{22}	0.23	0.05	4.37	137	< .001
Paternal average stress, β_{23}	−0.11	0.22	−0.49	137	.623
Maternal average stress, β_{24}	0.20	0.18	1.12	137	.264
First-time parent status, β_{25}	0.80	0.56	1.43	137	.154
Paternal time slope, π_3					
Level 2 intercept, β_{30}	0.07	0.12	0.60	140	.550
Paternal support, β_{31}	−0.01	0.005	−1.19	140	.237
Maternal support, β_{32}	0.0001	0.003	0.02	140	.986
Maternal time slope, π_4					
Level 2 intercept, β_{40}	−0.05	0.14	−0.32	140	.747
Paternal support, β_{41}	0.002	0.005	0.47	140	.641
Maternal support, β_{42}	−0.003	0.005	−0.61	140	.543
Paternal stress actor slope, π_5					
Level 2 intercept, β_{50}	−0.73	0.19	−3.87	140	< .001
Paternal support, β_{51}	**0.03**	**0.01**	**3.52**	**140**	**< .001**
Maternal support, β_{52}	−0.01	0.01	−1.21	140	.227
Maternal stress actor slope, π_6					
Level 2 intercept, β_{60}	−1.35	0.36	−3.77	140	< .001
Paternal support, β_{61}	0.03	0.01	2.07	140	.040
Maternal support, β_{62}	**0.02**	**0.01**	**1.81**	**140**	**.072**
Paternal stress partner slope, π_7					
Level 2 intercept, β_{70}	−0.15	0.07	−2.13	142	.035
Maternal stress partner slope, π_8					
Level 2 intercept, β_{80}	−0.18	0.05	−3.72	142	< .001

Note: Coefficients are unstandardized for all fixed parameters. The focal parameters of interest, representing associations between daily subjective stress and relationship satisfaction as a function of adequacy of partner support, are bolded.

Table 3. Stress and relationship satisfaction as a function of partner connection

Fixed effect	Coefficient	SE	t-Ratio	df	p-Value
Paternal Level 1 intercept, π_1					
Level 2 intercept, β_{10}	42.69	0.40	105.94	138	< .001
Paternal connection, β_{11}	0.05	0.01	3.49	138	< .001
Maternal connection, β_{12}	0.02	0.01	1.56	138	.120
Paternal average stress, β_{13}	−0.19	0.13	−1.44	138	.151
Maternal average stress, β_{14}	−0.11	0.15	−0.75	138	.457
First-time parent status, β_{15}	0.47	0.43	1.09	138	.276
Maternal Level 1 intercept, π_2					
Level 2 intercept, β_{20}	41.97	0.49	85.13	138	< .001
Paternal connection, β_{21}	0.01	0.01	1.19	138	.236
Maternal connection, β_{22}	0.09	0.01	6.42	138	< .001
Paternal average stress, β_{23}	−0.06	0.13	−0.46	138	.650
Maternal average stress, β_{24}	−0.04	0.16	−0.24	138	.810
First-time parent status, β_{25}	0.09	0.50	0.19	138	.850
Paternal time slope, π_3					
Level 2 intercept, β_{30}	−0.04	0.03	−1.74	141	.084
Paternal connection, β_{31}	0.0005	0.001	0.40	141	.693
Maternal connection, β_{32}	−0.001	0.001	−1.68	141	.095
Maternal time slope, π_4					
Level 2 intercept, β_{40}	−0.06	0.03	−1.96	141	.053
Paternal connection, β_{41}	0.0001	0.0001	0.06	141	.953
Maternal connection, β_{42}	0.001	0.001	0.97	141	.335
Paternal stress actor slope, π_5					
Level 2 intercept, β_{50}	−0.27	0.05	−5.70	141	< .001
Paternal connection, β_{51}	**0.007**	**0.002**	**3.46**	**141**	**< .001**
Maternal connection, β_{52}	0.003	0.002	1.36	141	.177
Maternal stress actor slope, π_6					
Level 2 intercept, β_{60}	−0.47	0.08	−5.92	141	< .001
Paternal connection, β_{61}	0.005	0.003	1.94	141	.054
Maternal connection, β_{62}	**0.01**	**0.004**	**1.91**	**141**	**.058**
Paternal stress partner slope, π_7					
Level 2 intercept, β_{70}	−0.14	0.07	−1.94	143	.055
Maternal stress partner slope, π_8					
Level 2 intercept, β_{80}	−0.18	0.05	−3.94	143	< .001

Note: Coefficients are unstandardized for all fixed parameters. The focal parameters of interest, representing associations between daily subjective stress and relationship satisfaction as a function of connection, are bolded.

Partner support

Associations between daily stress and relationship satisfaction varied as a function of adequacy of partner support for fathers (β_{51}), $B = 0.03$, $SE = 0.01$, $p < .001$, and a similar trend appeared for mothers (β_{62}), $B = 0.02$, $SE = 0.01$, $p = .072$ (see Table 2). We employed a regions of significance analysis (Hayes, 2017; Preacher et al., 2006) to further examine these patterns. The technique revealed support scores higher than 15.62 ($n = 116$; 75%) for fathers

completely buffered this association between stress and satisfaction (i.e., the association was no longer significant). Similarly, the negative association between daily stress and relationship satisfaction was weaker for mothers reporting more adequate support, though it remained significant at all observed levels of support (scores higher than 33.23 for mothers completely buffered this association; however, this value was outside of the observed range of scores). As such, we can infer that the negative association between daily stress and relationship satisfaction weakens as adequacy of support increases for mothers, but at no level of support is the effect nonsignificant. Taken together, results support our hypothesis that the negative association between daily stress and relationship satisfaction weakens as adequacy of support increases for both parents (H2). See Figures 1 and 2 for an illustration of these effects.
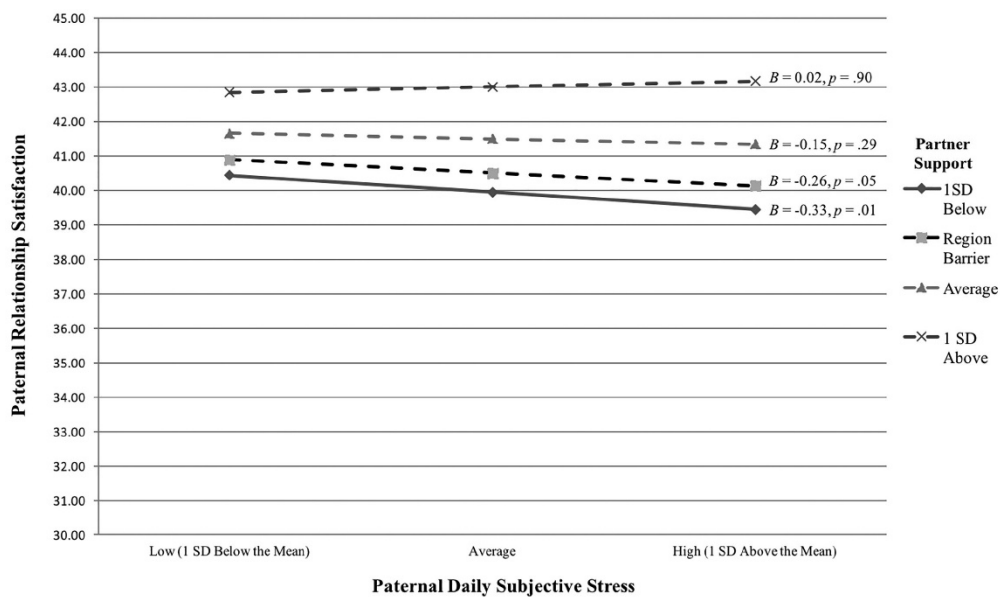
Figure 1. Conditional effects at levels of partner support for fathers. Nonsignificant effects are dashed, and significant effects are solid. Slope coefficients are unstandardized.
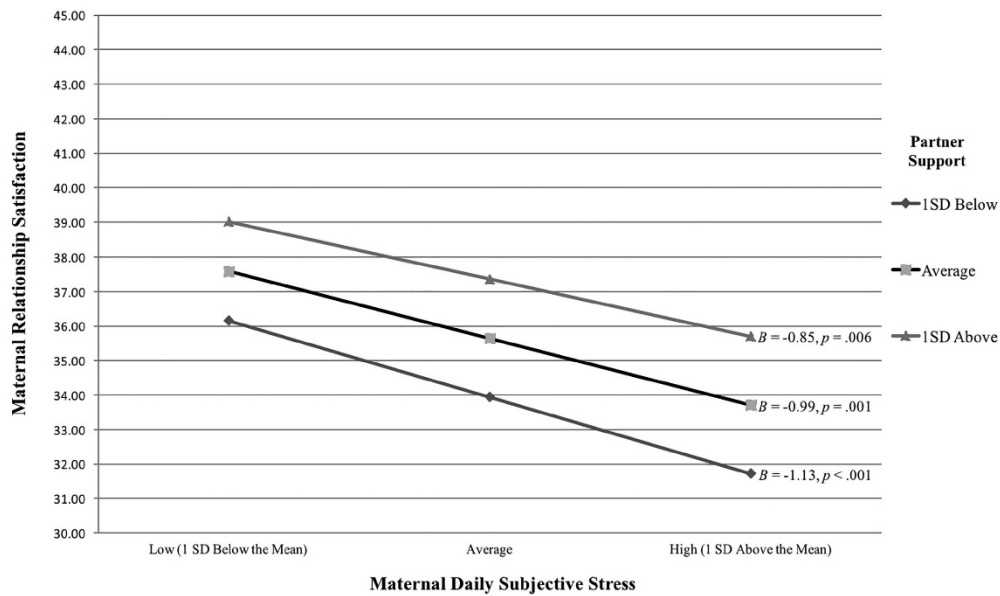
Figure 2. Conditional effects at levels of partner support for mothers. Significant effects are solid (all effects were significant at all observed levels of support). Slope coefficients are unstandardized. Regions of significance testing found the effect of stress on mothers' relationship satisfaction remained significant at all observed levels of partner support.

Connection

Associations between daily stress and relationship satisfaction varied as a function of connection in the relationship for fathers ($\beta51$), B = 0.007, SE = 0.002, p < .001, and a similar trend appeared for mothers ($\beta62$), B = 0.01, SE = 0.004, p = .058 (see Table 3). We employed a regions of significance analysis (Hayes, 2017; Preacher et al., 2006) to further examine these patterns. The technique revealed connection scores higher than 391.24 for fathers (n = 49; 32%) and scores higher than 400.27 for mothers (n = 23; 15%) completely buffered the negative association between subjective stress and relationship satisfaction. We can infer that the negative association between daily stress and relationship satisfaction significantly decreases as connection increases for both parents, and this relation is completely buffered for couples who report above average levels of connection to their partner, supporting our hypothesis (H3). See Figures 3 and 4 for an illustration of these effects.
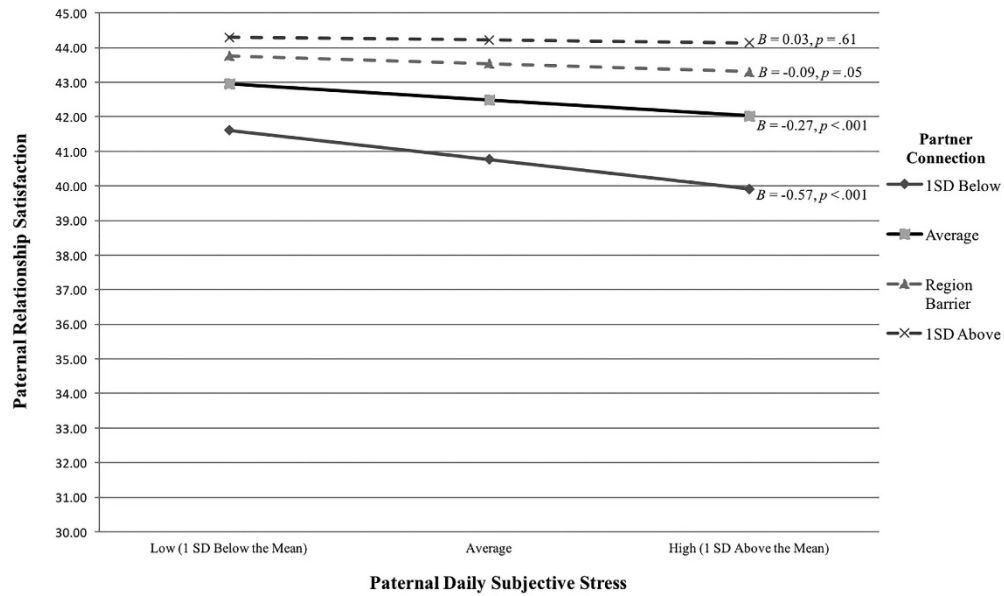
Figure 3. Conditional effects at levels of partner connection for fathers. Nonsignificant effects are dashed and significant effects are solid. Slope coefficients are unstandardized.
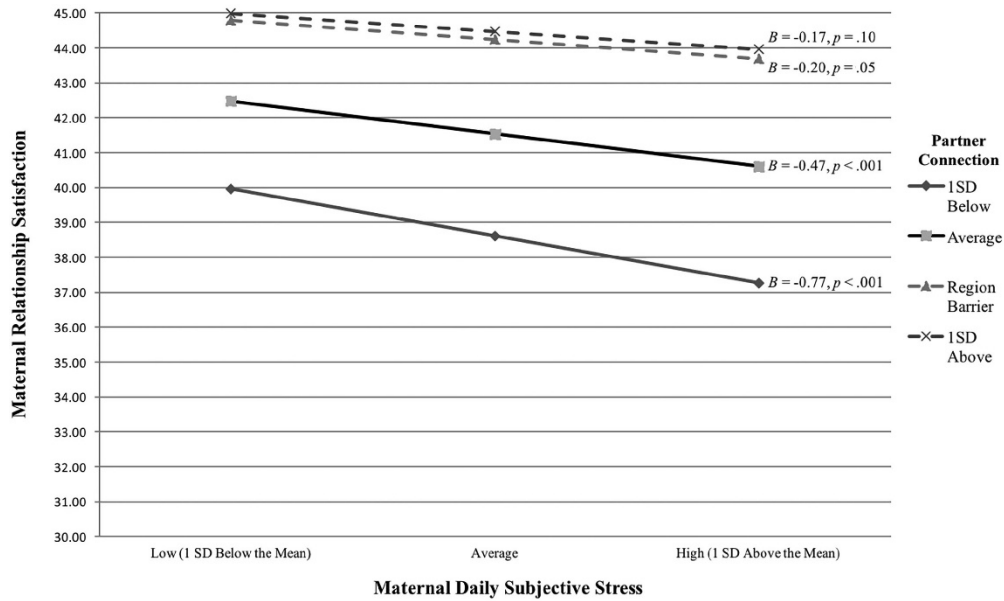

Figure 4. Conditional effects at levels of partner connection for mothers. Nonsignificant effects are dashed and significant effects are solid. Slope coefficients are unstandardized.

Effect sizes

We calculated pseudo R^2 values reflecting the proportion of variance explained at each level of the multilevel models. 41.90% of the Level 1 variance was explained in the partner support model, and 41.66% of the Level 1 variance was explained in the connection model, suggesting that the processes being modeled explained nearly half of the within-person variance over time. Furthermore, partner support explained 12.76% of the between-subject variance in the association between stress and relationship satisfaction for fathers and 18.05% of the variance for mothers. Connection explained 44.87% of the between-subject variance for fathers' association between stress and satisfaction and 9.43% of the variance for mothers.

Other parameters of interest

Although not central to our study hypotheses, there were other parameters of interest that warrant consideration. For example, as reported in Table 2, adequate support received by fathers was associated with higher levels of relationship satisfaction at baseline (Day 1; β_{11}), controlling for mean stress and first-time parenthood; however, support received by mothers was not associated with fathers' baseline satisfaction (β_{12}). In contrast, both maternal and paternal support were associated with greater relationship satisfaction reported by mothers at baseline (β_{21} and β_{22}). This suggests that mothers who were more satisfied at baseline were not only more likely to receive high quality support from fathers but also provide support to their partners. Only actor paths emerged for connection such that one's own sense of connection was associated with one's own relationship satisfaction at baseline (see Table 3).

It was also notable that overall (average) levels of stress across the 14 days were not associated with levels of relationship satisfaction (parameters β_{13}, β_{14}, β_{23}, β_{24}) when controlling for support/connection and first-time parenthood status. Only daily changes in stress were associated with daily changes in relationship satisfaction. Furthermore, despite support and connection moderating the association between daily stress and daily relationship satisfaction, and predicting baseline levels of satisfaction, neither support or connection was directly associated with rates of change in satisfaction (parameters β_{31}, β_{32}, β_{41}, β_{42}).

Time-lagged analyses

We also conducted a series of time-lagged analyses to examine whether daily stress had a pervasive effect on relationship satisfaction into the next day. Analysis steps were identical to the concurrent spillover models with two exceptions: (1) relationship satisfaction scores were shifted by one day in the data file so that stress scores on one day corresponded to satisfaction scores *on the next day* and (2) effects of stress on satisfaction at Level 1 were modeled as fixed to promote model fit (i.e., the model would not converge when these parameters were modeled as random). To further promote model parsimony, we did not include autoregressive controls for previous-day relationship satisfaction. In testing our parameters of interest, we found having higher than average stress on a given day was not associated with relationship satisfaction *the following day* for either fathers (β_{50}, support model: $B = -0.02$, $SE = 0.16$, $p = .925$; connection model: $B = -0.04$, $SE = 0.05$, $p = .341$) or mothers (β_{60}, support model: $B = 0.11$, $SE = 0.29$, $p = .691$; connection model: $B = 0.02$,

SE = 0.06, *p* = .725), and neither adequacy of partner support or connection moderated the effects for fathers (β_{51}, support model: *B* = –0.002, *SE* = 0.006, *p* = .768; connection model: *B* = –0.001, *SE* = 0.002, *p* = .675) or mothers (β_{62}, support model: *B* = –.008, *SE* = 0.01, *p* = .455; connection model: *B* = –0.002, *SE* = 0.004, *p* = .620). In sum, there did not appear to be a pervasive influence of stress on satisfaction—more stress on a given day was not associated with next-day relationship satisfaction at any level of support or connection.

Discussion

The current study investigated the link between daily subjective stress and concurrent levels of relationship satisfaction across 14 days as a function of interpersonal protective factors within couples. As predicted, we found a negative within-person association between daily subjective stress and relationship satisfaction, controlling for time, for both fathers and mothers during pregnancy. Moreover, we found receiving adequate partner support and feeling a sense of connection with one's intimate partner weakened this link to a significant degree. As these protective factors increased in magnitude, the strength of the negative association between daily stress and relationship satisfaction decreased for both fathers and mothers. For parents who are expecting the birth of a child, it is possible that feeling supported and loved in their relationship allowed them to navigate daily stressors more skillfully, and this promoted higher levels of relationship satisfaction. Results also suggests that a stress spillover process might occur on a daily basis, but that this process appears to be time-limited such that stress on a given day is associated with relationship satisfaction on that same day, but not on the next day.

Stress spillover has been well documented by researchers investigating a variety of circumstances within the context of intimate relationships (Karney et al., 2005). Particularly, stressors external to the relationship have been associated with more negative attributions about partner behavior (Neff & Karney, 2004) and partner discord (Karney et al., 2005). Furthermore, chronic stressors have been associated with decreased relationship satisfaction and increased rates of dissolution (Carrere & Gottman, 1999). Results from the current study are consistent with this work, and we add to the literature by showing that to the extent subjective stress levels elevate from one day to the next, there are noticeable, corresponding decrements in relationship satisfaction for both partners during pregnancy. Stress spillover during pregnancy is particularly problematic, given individuals with lower relationship satisfaction prior to the child's arrival could be less prepared for navigating a coparenting role (Van Egeren, 2004) and the stress of having a child, which itself is associated with declines in relationship satisfaction (Mitnick et al., 2009). In other words, stress spillover during pregnancy may leave couples less equipped to handle this transition, and family systems theory implies that the inability to perform effectively in this role may negatively impact other roles and relationships in the family unit (Davies & Sturge-Apple, 2014). Taken together, it is important to consider both individual vulnerabilities and dyadic factors in the examination of couple functioning during stressful stages of life, as each factor may play a critical role in determining relational outcomes within family systems.

Fortunately, previous work and present findings identify a number of factors that might buffer against daily stress and lower relationship satisfaction among couples. For

example, in a sample of couples who were not navigating pregnancy, Totenhagen et al. (2012) previously found that individuals' own feelings of closeness toward their partners buffered the negative association between daily stress and relationship satisfaction; however, by only examining closeness through a one-item measure, they were not able to fully explore the moderating effect of partner connection as defined here. The current study supports and extends this previous work by identifying additional interpersonal factors that might also serve to mitigate the stress spillover process among couples expecting the birth of a child. To our knowledge, no previous studies have examined partner support and a sense of connection with one's partner as moderators of this relation during pregnancy, despite previous research indicating that these factors serve a protective function in intimate relationships more generally (e.g., Brock & Lawrence, 2010; Yoo et al., 2014). The current findings are novel and promising because they uncover qualities of the relationship that, even during a time of high individual and couple stress, might serve a protective role against decreased relationship satisfaction. Among fathers and mothers who feel that they have adequate support and who maintain a sense of connectedness with partners, individual stress might be less likely to spill over and manifest as lower relationship satisfaction. As such, we underscore the importance of fostering partner support and connection among couples navigating pregnancy.

Finally, it was notable that stress reported by one partner was associated with lower relationship satisfaction reported by the other partner (i.e., a partner effect). As such, future research might investigate the mechanisms that explain this link (e.g., increased conflict and expressed negative affect) and the factors that buffer partner spillover processes. For example, the degree to which one partner is able to effectively regulate emotions when coping with stress might determine whether that stress impacts the other partner through dyadic mechanisms.

Limitations and future directions

Several limitations and future directions deserve mention. First, these results were gathered as part of a larger study that aimed to examine the influence of family processes on child socioemotional development. Thus, one of the inclusion criteria was that both parents had to be the biological parents of the child to control for shared genetic influences. Although this increases the internal validity of the results, it also decreases generalizability; particularly, it is unclear whether our results generalize to partners who identify as a sexual minority or who are gender diverse. Similarly, participants in the current study were predominantly White and well educated, which is consistent with the demographic characteristics in the area where the research was conducted; however, this too reduces the generalizability of the results. Taken together, the examination of subjective stress, relationship satisfaction, and interpersonal protective factors should be pursued in a more diverse sample to determine whether these results replicate and to account for the possibility that certain resiliency factors might serve a more or less prominent protective function in different contexts.

Second, stress spillover during pregnancy may be especially severe due to the unique stressors originating during that period (e.g., physical discomfort experienced by mothers, parenting concerns, and apprehension). The present study did not distinguish between pregnancy-specific stressors and other stressors (e.g., financial stressors, environmental

stressors). Future work could test the possibility that risk for spillover is especially heightened when the couple is expecting a child due to new stressors brought on by pregnancy. Researchers could also test whether the proposed protective factors buffer pregnancy-specific stress and if there are additional protective factors that uniquely serve to mitigate these forms of stress, such as secure base attachment. Finally, with a larger sample size, researchers could examine the combined, incremental, or interactive effects of the proposed protective factors on stress spillover processes during pregnancy, as more connected couples might also experience more adequate partner support.

Third, as this was a daily diary study, we relied solely on the use of relatively brief self-report measures, and our measure of stress was subjective. Research would be enhanced by more objective measures of specific stressful experiences. Furthermore, stress and relationship satisfaction were reported in the same daily survey and, as such, it is unclear whether it was stress driving relationship satisfaction—consistent with stress spillover theory—or if feeling less satisfied with one's intimate relationship also feeds into someone's subjective experience of stress. Future researchers might consider testing this possibility. Nonetheless, the seminal finding from this study is that the daily association between stress and relationship discord is mitigated by receiving adequate support from one's partner and feeling a strong sense of closeness and intimacy in the relationship regardless of the direction of the effect. As such, promoting support and connection in the couple relationship during pregnancy remains critical.

Clinical implications and conclusion

Despite the limitations, this study contributes to the extant literature on couple relationships and functioning in the context of stressful life situations. It highlights new strengths that could promote resilience to stress spillover in intimate relationships and hold promise as targets in interventions, given that interpersonal factors such as those studied here are amenable to change (Brock & Lawrence, 2008). Our work also converges with evidence demonstrating partner support and a sense of connectedness within couples have the potential to enhance relationship satisfaction during times of elevated stress (e.g., Cramer, 2004; Vedes et al., 2016). Taken together with the findings in the current study, couple interventions centered around improving partner support and intimacy (e.g., Gottman Method Couples Therapy; Gottman & Gottman, 2008) may be particularly effective in improving the couple relationship. For instance, it may be useful in the context of couples therapy to process support expectations of each partner to successfully match support strategies to the needs of their significant other (Dehle et al., 2001). It might also be useful to provide couples with tools they can use on a daily basis to promote more intimacy and enhance a sense of connection, especially as they anticipate childbirth and changing family dynamics. Coaching couples on how to properly respond and care for one another could effectively decrease the impact of daily stressors on relationship satisfaction and may improve their connection during pregnancy and beyond, setting the stage for a healthy family environment.

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