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## The impact of relationship stressors on trust and pro-relationship behavior within adolescent romantic relationships: A systems approach

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### Abstract

**Purpose:** Trust is an essential component of romantic relationships. It is not understood how youth respond to a relationship stressor which may impact trust, such as perceiving to be at risk for a sexually transmitted infection (STI) or their partner has other sex partners. We used a system science approach to examine feedback between trust and pro-relationship behaviors within adolescent relationships.

**Methods:** A prospective cohort of clinic-recruited young women (N=122), aged 16-19, completed daily questionnaires on partner-specific feelings and risk perceptions for 18 months. Relationship stressor defined as either perceiving risk of STI from a partner or partner had other sex partners. Pro-relationship behaviors were: more time spent with partner, sex with partner, and/or gift from partner. Time-lagged generalized estimating equation models were used to examine whether a relationship stressor is associated with a decrease in trust and whether pro-relationship behaviors changed following the stressor.

**Results:** Experiencing a stressor was associated with 3-fold increased odds of having a decrease in trust in the same week (OR=3.30, 95%CI: 2.30, 4.72). Trust increased significantly the week following the stressor (OR=2.09, 95%CI: 1.54, 2.85). An increase in trust relative to the week of the stressor was associated with a 65% increase in pro-relationship behavior in the week following the stressor (OR=1.65, 95%CI: 1.20, 2.26).

**Conclusions:** Data uniquely show that trust is impacted following a relationship stressor and that youth increase pro-relationship behaviors following a drop in trust. Findings suggest that

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adolescents prioritize maintaining trust, which may impact engagement in protective health behaviors.

### Keywords

systems science; romantic relationships; risk perception; concurrency; trust; pro-relationship behaviors; intensive longitudinal data

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Trust is a fundamental component of adolescents' interpersonal romantic relationships. While many adolescent relationships are short-lived compared to adult relationships, adolescents are highly invested in their main partner relationships.<sup>1,2</sup> The term main partner captures a variety of partner labels (e.g. hubby, boyfriend) that signal a high level of importance, commitment, and trust, which both young men and women believe are key elements of a monogamous relationship.<sup>3,4</sup> Feelings of trust, and not perceptions of a main partner having other sex partners, drive risk perception and determine behavior, such as condom use.<sup>5</sup>

Intimacy in relationships is often conceptualized as a static quality.<sup>6</sup> However, we found significant variability within adolescent main relationships for both feelings of emotional intimacy (i.e. trust, closeness and commitment) and risk behavior (i.e., condom use), providing evidence of the dynamic nature of adolescent relationships.<sup>7</sup> Further, a decrease in feelings of trust for a main partner predicted incident bacterial sexual transmitted infection (STI) underscoring the importance of the dynamic attributes of adolescent relationships.<sup>8</sup> Adolescent and adult women report that partner non-monogamy is a display of disrespect, and perceived as a stressor or an affront to their expectations of their relationship with their main partner.<sup>9-11</sup> The observed drops in intimacy suggest adolescents have experienced a negative relationship event such as perceiving partner concurrency – thinking or learning that your partner has other sex partners - or acquired an STI. There is evidence that adolescents will disregard partner behaviors that should weaken trust and consequently the stability of the relationship in order to maintain intimacy.<sup>12,13</sup> Adolescents report that once their relationship is established, perceptions of risk for an STI is based on the amount they trust their partner to use condoms with other partners.<sup>9</sup> Thus, rather than perceived concurrency weakening trust, trust in their partner extends to a belief that their partner will practice safe sex with other partners.

It is unclear how adolescents may adapt to a relationship stressor. By stressor, we are referring to a negative relationship event (such as perceiving risk of STI from a partner or perceiving partner concurrency) that is viewed as an affront to their hopes and beliefs about their relationship. Given the importance of maintaining trust, adolescent partners may respond to relationship stressors with increases in pro-relationship behaviors intended to restore levels of trust. Pro-relationship behaviors, such as spending time together, can be used strategically to effect relationship change.<sup>14,15</sup> Adults use strategic behaviors as evidence of investment in the relationship and to maintain relationship strength and trust as well as for monogamy maintenance.<sup>15-17</sup> Strategic adjustments of pro-relationship behaviors are consistent with loyalty strategies employed by adolescents to resolve relationship conflict, reacting positively with the hope of improvement of the relationship.<sup>18</sup> However,

the outcomes of modification of pro-relationship behaviors in adolescent romantic relationships are not well understood.

Systems science approaches promote the development of dynamic conceptual frameworks, which incorporate feedback and dependencies, and use existing data to enhance our understanding of fundamental processes.<sup>19</sup> A critical feature of dynamic processes is the feedback loops, variables connected into circular chains, that regulate system performance.<sup>20</sup> Complex behaviors of systems often arise as the relative strengths of feedback loops shift over time.<sup>21</sup> A common example of a feedback loop is a thermostat. When an office thermostat detects a temperature drop, it engages the furnace to produce more heat. When the goal temperature is achieved, the furnace resumes a resting state. A complex system has multiple interconnected feedback loops of interpretations and responses stimulated by the initial process. To continue this analogy, the temperature drop is connected to and impacts the behaviors of people in the office, so while the furnace is activated, individuals may retreat, reducing productivity until there is a sufficiently comfortable ambient temperature.

This study used a systems science approach to examine how adolescents adapt to a relationship stressor. Specifically, we examined one feedback loop between trust and pro-relationship behavior (e.g. time spent with partner) to begin to understand how pro-relationship behaviors change in response to the variability in feelings and perceptions within adolescent romantic relationships. Feedback loops can be balancing or reinforcing. A *balancing* loop is when a change in any variable feeds back to counteract the initial change, analogous to the thermostat, where each force triggers a counterforce to maintain a steady state. In contrast, a *reinforcing* loop occurs when change in any variable feeds back to magnify the initial change. Reinforcing loops are often thought of as vicious/virtuous cycles. In this study, we examine two contrasting explanations to see whether data is more consistent with a balancing or a reinforcing loop.

One hypothesis is that a relationship stressor would lead to fewer pro-relationship behaviors, consistent with a reinforcing loop (figure 1a). Over time in a relationship, one might expect that pro-relationship behaviors lead to more trust, which then leads to more pro-relationship behaviors.<sup>22</sup> Pro-relationship behaviors would reinforce trust exponentially to some natural ceiling. Because trust and pro-relationship behaviors move in the same direction, if trust were to drop in response to a stressor then we would expect to see a drop in pro-relationship behaviors and the relationship would dissolve.

An alternative hypothesis is that the feedback between trust and pro-relationship behaviors is a balancing loop – that the goal of the feedback is to maintain a steady-state of trust. A balancing loop suggests that trust and pro-relationship behaviors move in opposite directions (figure 1b). In response to a stressor, trust diminishes, and pro-relationship behaviors then increase with the goal of restoring trust. Using a systems science approach and daily data from young women, we examined whether a relationship stressor is associated with a decrease in trust and subsequently whether adolescents increase their pro-relationship behaviors following the stressor. Our sample is predominantly young Black women from economically disadvantaged communities, thus, filling a gap in the current literature. Few research studies address the romantic relationships of young Black women outside of a risk

framework.<sup>23</sup> This study aims to deepen our understanding of young Black women's relationship dynamics in a developmental context.

## Methods

### Study design and sample

Data were drawn from a prospective cohort study, which recruited young women (N=122), aged 16-19 at baseline, from an adolescent medicine and STD clinics in Baltimore, MD. This age group is underrepresented in literature, which tends to focus on young adults. The study design and sample have been described previously.<sup>7</sup> Eligibility criteria were the same for all participants and in addition to age included being sexually active, defined as having vaginal or anal intercourse with a male partner in the preceding 3 months, English-speaking, and residence in the Baltimore metropolitan area. Informed consent was obtained from eligible participants 18 and older. CFR 46 Subpart D allows for participants under 18 recruited from clinical settings to provide consent for themselves when the research is no more than minimal risk. The Johns Hopkins Institutional Review Board approved this study.

Participants completed a baseline interview using audio computer-assisted self-interview (ACASI) software. Following the baseline interview, participants were asked to use their cell phone to complete daily questionnaires over an 18-month follow-up period. Participants completed daily questionnaires on their feelings, behaviors, and risk perceptions about each current sex partner. Participants could report on both same and opposite gender partners during prospective data collection. In the questionnaire, main partner was defined as "When I say a main sex partner, I mean a main partner is someone that you have sex with, and you consider this person to be the person that you are serious about". Partner initials were confirmed regularly to ensure the same partner was followed over time.

### Measures

**Trust.**—Participants were asked to report daily on partner-specific feelings of trust. Specifically, "How much do you trust him today" with response options: trust completely, trust somewhat, do not trust completely, do not trust at all, quantified on an ordinal scale from 1 (low) to 4 (high). Daily reports were averaged over the week. As overall means for trust were high, data were coded to indicate any decrease in trust from the previous week. The mean level of trust for the current week was subtracted from the mean in the week before the stressor occurred to determine a change in trust. Weeks were dichotomized to indicate either a decrease in trust from the week before the stressor versus no change or an increase in trust from the previous week.

**Relationship stressor.**—Participants were asked daily, "If you were to have sex with him today without using a condom, how likely are you to get an STD from him?" with response options: not at all likely, not very likely, very likely, extremely likely, quantified on an ordinal scale from 1 (low) to 4 (high). Participants were asked "Do you believe that he currently has other sex partners?" with response options of yes or no. A relationship stressor was defined as either perceiving partner put her at risk for an STD, by responding very or extremely likely, or perception that partner had other sex partners in a week.

**Pro-relationship behaviors.**—Participants were asked daily, “Has this partner given you any money or material gifts like clothes, jewelry, etc. today?” with response options of yes or no. Participants were asked, “Did you have vaginal or anal sex with him today?” with response options of yes or no. Participants were asked, “How much time did you spend with him in person today?” with response options: less than 1 hour, 1 to 3 hours, 3 to 5 hours, more than 5 hours. Pro-relationship behaviors were coded as any of the following in the week: more time spent with partner than previous week, sex with partner, or gift from partner. More time with partner was calculated similarly to trust with a binary indicator of an increase relative to the average from the previous week.

## Analysis

Participant daily reports were summarized to the week and then dichotomized. Descriptive statistics were calculated first within relationships and reported across relationships. The proposed feedback loop was tested using a series of time-lagged logistic regression models to examine the temporal associations between experiencing a relationship stressor on trust and subsequent pro-relationship behaviors. Time was anchored at the week of the stressor. For participants who reported data on more than one main partner, we restricted the analysis to the partner with the most observations. Generalized estimating equations (GEE) was used in all analyses to account for correlation among repeated measures within relationships. Mediation was assessed according to Baron and Kenny.<sup>24</sup> All analyses were performed using SAS v9.2 (Carey, NC).

## Results

### Participant characteristics

Table 1 presents characteristics of the ninety-eight participants who contributed daily data on their main partner relationships. Participants were on average (SD) 18.0 (0.9) years at baseline and 94% were African American, with 67% having mothers with a high school education, or less. The mean age at first sex was 14.7 (1.6) years, median lifetime sexual partners was 5, and 55% reported a lifetime history of an STI. At baseline, 23% of participants reported perceiving their partner had other sex partners and 9% reported it was extremely or very likely they would get an STI from their partner if they were to have sex with him without using a condom. Excluded participants included two who reported only same gender partners on daily diaries and 24 who completed fewer than 7 days of diary entries. There were no differences at baseline between those participants who were and were not included in the analysis. More participants recruited from the STD clinic (N=45 (46%)) reported perceived partner concurrency (37.5% vs. 6.3%,  $p=0.01$ ) and had history of an STI (80.0% vs. 34.0%,  $p<0.001$ ) than participants recruited from the adolescent medicine clinic (N=53 (54%)).

Participants contributed a mean (sd) of 16 (16) weeks of daily data on their main relationship. The mean (sd) length of relationships was 24 (22) weeks. Partner-specific behaviors are also presented in Table 1. On average, participants reported sex with a partner on 47% of weeks, receiving gifts from partner on average 72% of weeks, and having an increase in the amount of time spent with a partner compared to average on 12% of weeks.

Across all relationships, participants reported a relationship stressor 44% of weeks, ranging from 0 to 100%. Eighty-nine percent of participants experienced a relationship stressor over follow-up.

### Impact of stressor on trust

The bars in figure 2 display the levels of trust over time stratified by relationships with a stressor and those without a stressor. Figure 2a illustrates the mean level of trust within relationships in weeks following a stressor. Figure 2b illustrates the average of mean level of trust for four consecutive weeks within relationships without a stressor. While there was no difference between mean levels of trust in the week before the stressor (3.20 vs. 3.37,  $p=0.99$ ) between the two groups, mean level of trust was significantly lower in the week with a stressor (3.03 vs. 3.42,  $p<0.001$ ) and the week following the stressor (3.08 vs. 3.39,  $p=0.005$ ) compared to weeks without a stressor. However, no statistically significant difference in mean level of trust was observed two weeks following the stressor (3.14 vs. 3.36,  $p=0.25$ ). Table 2 presents odds ratios (OR) and 95% confidence intervals (CI) for time-lagged models examining the association between relationship stressor and changes in feelings of trust. Experiencing a relationship stressor was associated with a 3-fold increased odds of having a decrease in trust in the same week (OR=3.30, 95%CI: 2.30, 4.72). For ease of interpretation, we subsequently coded the change in trust as an increase relative to the previous week. Experiencing a stressor was associated with a two-fold increased odds of trust increasing in the week following the stressor (OR=2.09, 95%CI: 1.54, 2.85) and two weeks following the stressor (OR=2.31, 95%CI: 1.66, 3.21). Odds ratios and confidence intervals in table 2 were unchanged when controlling for length of observation on the main partner and recruitment site (data not shown).

### Effect of trust on pro-relationship behaviors

Overlaid on the mean levels of trust presented in figure 2, the lines indicate the mean proportion of pro-relationship behaviors in those weeks for relationships that experienced and did not experience a stressor. Figure 2a shows the mean proportion of pro-relationship behaviors within relationships in weeks following a stressor. Figure 2b illustrates the percent of pro-relationship behaviors for four consecutive weeks within relationships without a stressor. There were no statistically significant differences in the frequency of pro-relationship behaviors from week to week in relationships with a stressor compared to relationships without a stressor, with the exception of the week following the stressor. Relationships that experienced a stressor had significantly higher pro-relationship behaviors in the week following the stressor compared to relationships that did not experience a stressor (62% vs. 55%,  $p=0.016$ ). Table 3 presents the odds ratios and 95% confidence intervals for time-lagged models examining association between stressor and pro-relationship behaviors through the pathway of an increase in trust. Having a stressor was associated with a 37% increase in pro-relationship behaviors in the week following the stressor (OR=1.37, 95%CI: 1.06, 1.76). An increase in trust relative to the week of the stressor was associated with a 65% increase in pro-relationship behavior in the week following the stressor (OR=1.65, 95%CI: 1.20, 2.26). The association between stressor and pro-relationship behaviors was no longer statistically significant when testing the mediation pathway through an increase in trust (OR=1.25, 95%CI: 0.96, 1.62); however, the association

between an increase in trust and pro-relationship behaviors in the week following the stressor remained similar in magnitude (OR=1.57, 95%CI: 1.15, 2.16). Odds ratios and confidence intervals in table 3 were unchanged when controlling for length of observation on the main partner and for recruitment site (data not shown).

## Discussion

This study provides evidence that adolescents engage in pro-relationship behaviors in order to restore trust during the weeks following a relationship stressor. Pro-relationship, trust-restoring responses included spending time together, having sex, or receiving a gift from a partner. This suggests that pro-relationship behaviors were initiated to restore trust in the relationship. These data provide critical insights into the importance of trust and intimacy in romantic/sexual relationships of young Black women. These observations add to an emerging literature on the importance of these relationships for young Black women,<sup>25</sup> as well as its role in mitigating the effects of experienced discrimination and systemic racism.<sup>26</sup>

Examining the feedback between trust and pro-relationship behaviors provides valuable insights into how adolescents adapt to relationship stressors. Bi-directional relationships are hallmarks of complex and dynamic systems.<sup>21</sup> Systems approaches are specifically geared toward identifying, understanding, and quantifying these bi-directional relationships. We have seen that while trust is variable within relationships, overall levels of trust remain high over time in main relationships.<sup>7</sup> The current study illustrates that the feedback between trust and pro-relationship behaviors is consistent with a balancing loop, where the goal of the system is to maintain a steady state of high trust. This finding is in contrast to a reinforcing loop where a decrease in trust leads to a subsequent decrease in pro-relationship behaviors and ultimately dissolution of the relationship.<sup>22</sup> These findings are consistent with previous research examining the equilibrium of relationship maintenance within adult relationships.<sup>27</sup> A longitudinal study found that newlyweds responded to a decline in relationship well-being with relationship-maintaining behaviors, which subsequently increased relationship well-being.<sup>28</sup> Adolescents and young adults highly value trust in intimate relationships although conflicts over partner fidelity are often associated with relationship dissolution.<sup>1,29,30</sup> This study captures how relationship dynamics affect STI risk through relationship degradation, concurrency, and relationship restoration.

These findings have implications on how adolescents respond/react to information about their partner that may impact their health. This dynamic conceptual framework provides valuable new insights into adolescent romantic relationships and has important implications on health behavior, such as condom use. Qualitative research with young women has demonstrated that condoms represent challenges to fidelity, intimacy and commitment.<sup>12</sup> In this light, forgoing condom use could be viewed as a pro-relationship behavior intended to achieve a young woman's goal of maintaining trust in her relationship if she perceives it is in decline. Decisions about health behavior are made in the context of how behavior impacts feelings of intimacy. Preserving intimacy in the relationship may surpass concerns for STI risk.<sup>31</sup> This suggests that clinicians could improve counseling for STI risk reduction by inquiring about relationship dynamics rather than focusing on number of sex partners.<sup>32</sup> Most sexual health curricula include discussion and exercises around STI prevention.<sup>33</sup>

Research to date supports the need for these activities to account for the nature of the sexual relationship. Adolescents take different precautions with sexual partners with whom they feel more intimacy, i.e., main sex partners, than other partners. The findings of this study imply that the discussion of STI prevention related to intimate sex partners may need to be broadened to include the various ways their peers are managing their sex partner's infidelity. The hope is that armed with this information, adolescent women would be more aware of the trade-offs they might make between protecting a stressed intimate sexual relationship and their sexual health.

While there are numerous strengths to the current study, there are limitations that argue for further research. There are certainly individual differences that may account for differences in responses to relationship stressors.<sup>34,35</sup> While these were not explored in the current analysis, individual characteristics will build on the current findings. Development of trust is a process of uncertainty reduction.<sup>35</sup> This may have implications on our findings as confirmed versus suspected partner infidelity may have different impacts on the bi-directional feedback between trust and pro-relationship behaviors. Further, the feedback between pro-relationship behaviors and other aspects of intimacy and commitment should be considered in future work. Third, while the current analysis was focused on acute stressors, the distribution of the data indicate that some relationships experience chronic stressors. These will be important subgroups to explore in future studies. In addition, some of these relationships may not have expectations of exclusivity, in which case perceiving partner concurrency may not be considered a stressor in these relationships. Our measure of relationship stressor also included perceiving a partner's behavior as leading to STI risk, which may still apply to nonexclusive relationships. Future work is needed to understand the potential influence of consensual non-monogamy as it pertains to adolescents, particularly for youth who perceive limited partner availability in their communities.<sup>36</sup> Finally, the social and economic context of relationships in socially disadvantaged communities, such as the setting for the current study, may exert unique forces on adolescent relationships not observed among adolescents in more advantaged communities.<sup>37-39</sup> This too argues for more comprehensive research on adolescent romantic relationships.

Romantic and sexual relationships are important for adolescent development, and intimate relationships in particular are associated with adolescent well-being. Nonetheless, relationships also confer risk to physical and mental health.<sup>40</sup> The current study improves our understanding of the complex dynamics between trust and behavior that may provide insight on the balance between the gesture of trust brought about by abandoning condom use within a main relationship and the awareness that a partner has other sex partners. Understanding adolescents' goals for their relationships and observed dynamics are necessary to design effective interventions.

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## Abbreviations:

<b>STI</b>	sexually transmitted infection
<b>ACASI</b>	audio computer-assisted self-interview
<b>OR</b>	odds ratio
<b>CI</b>	confidence interval
<b>sd</b>	standard deviation

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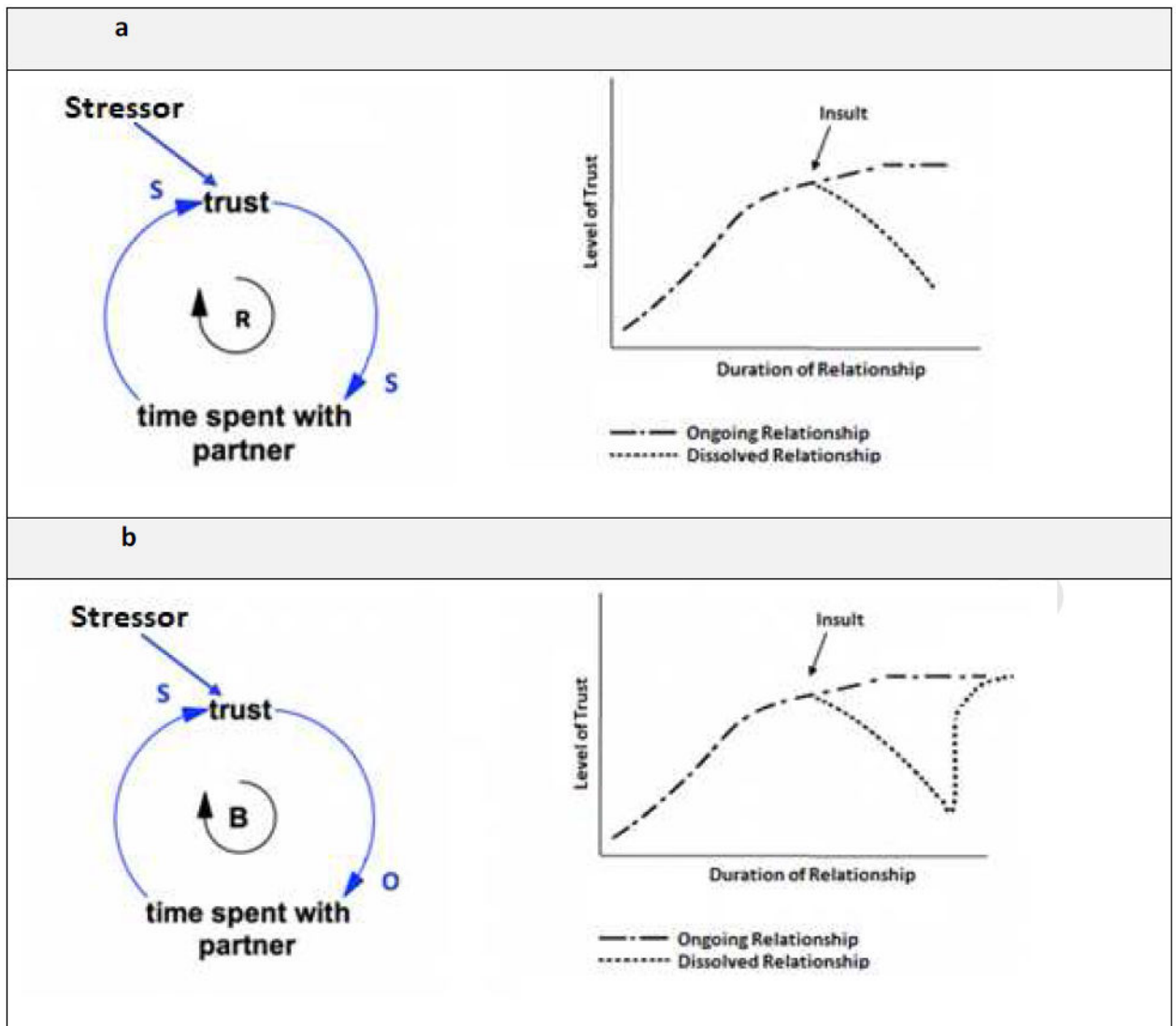
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**Implications and Contribution:**

Daily data was used to examine the feedback between trust and pro-relationship behaviors within adolescent romantic relationships. Findings suggest that pro-relationship behaviors are initiated to restore trust in the relationship in response to a negative relationship event. Maintaining intimacy in the relationship may overshadow concerns for sexually transmitted infection risk.



**Figure 1. a: Reinforcing loop, b: Balancing loop**

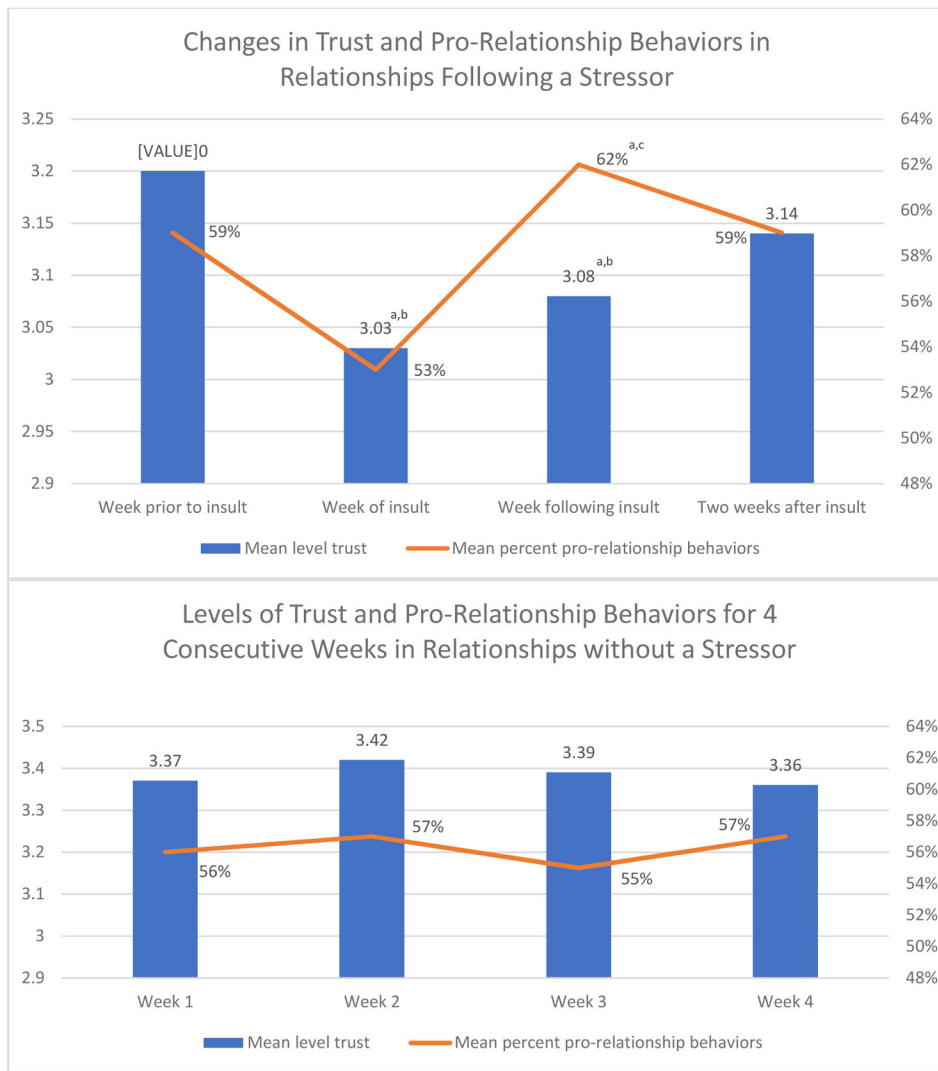
S = indicates variables move in same direction, so an increase in the first leads to an increase in the second

O = indicates variables move in the opposite direction, so an increase in the first leads to a decrease in the second

B = balancing loop

R = reinforcing loop

Graphs adapted from Sternberg, RJ Psych Rev, 1986



**Figure 2: Levels of Trust and Pro-Relationship Behaviors Over Time Stratified by Relationships With and Without a Stressor**

<sup>a</sup>  $p < 0.05$

<sup>b</sup> p-value represents significance associated with test for association between mean level of trust in weeks with stressor compared to weeks without stressor

<sup>c</sup> p-value represents significance associated with test of association between pro-relationship behaviors in weeks with stressor compared to weeks without stressor

**Table 1.**

Baseline Demographic Characteristics of 98 Female Participants and Partner-Specific Behaviors with their Main Partners

<b>Participants</b>	
Age in years, mean (sd)	18.0 (0.9)
African American race, %	94
Age at sexual debut, mean (sd)	14.7 (1.6)
Maternal education high school, %	67
Lifetime number of sexual partners, mean (sd), median	8.2 (12); 5
Perceived partner concurrency, %	23
Perceived risk for sexually transmitted diseases, %	9
STI history, %	55
Length of relationship, mean (sd); median weeks	24 (22); 19
Weeks of observation on main partner relationship, mean (sd); median weeks	16 (16); 13
<b>Partner-specific behaviors</b>	
More time spent with partner, % of weeks: mean (sd); median, range	12 (8); 12, 0-41
Sex with partner, % of weeks: mean (sd); median, range	47 (34); 56, 0-100
Gift from partner, % of weeks: mean (sd); median, range	72 (37); 98, 0-100
Stressors, % of weeks: mean (sd); median, range	44 (37); 35, 0-100

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**Table 2.**

Odds ratios and 95% confidence intervals for time-lagged models examining association between relationship stressor and increase in trust

	Change in trust relative to the previous week Odds Ratio (95% Confidence Interval)		
	Decrease in Trust	Increase in Trust	
	Week with stressor	Week following stressor	Two weeks after stressor
<b>Stressor</b>	3.30 (2.30, 4.72)	2.09 (1.54,2.85)	2.31 (1.66,3.21)

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**Table 3:**

Odds ratios (OR) and 95% confidence intervals (CI) for time-lagged models examining association between stressor and pro-relationship behaviors through the pathway of increase in trust the week following the stressor

Week of the stressor	Pro-Relationship Behaviors in Week Following the Stressor		
	OR (95% CI)	OR (95% CI)	AOR <sup>b</sup> (95% CI)
Stressor	1.37 (1.06,1.76)	--	1.25 (0.96,1.62)
Trust increase <sup>a</sup>	--	1.65 (1.20,2.26)	1.57 (1.15,2.16)

<sup>a</sup>Trust in the week following the **stressor** measured as an increase relative to the level of trust in the week of the **stressor**

<sup>b</sup>Adjusted odds ratios (AOR) are from the model that includes both the proposed causal and mediator variables in order to test for mediation per Baron and Kenny.<sup>24</sup>