

Associations between language style matching and relationship commitment and satisfaction: An integrative data analysis

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Abstract

Language style matching (LSM) refers to similarity in function word use between two people during a conversation. Previous research has shown that LSM predicts romantic relationship stability, but it remains unknown *why* LSM is associated with stability. Across five studies from five different labs, we aimed to identify links between LSM and two relationship perceptions strongly associated with stability: commitment and satisfaction. Based on prior work, we hypothesized that LSM would be associated with commitment but not satisfaction. This hypothesis was supported in Study 1 ($N = 82$) but was not supported in Study 2 ($N = 158$). Preregistered analyses of three additional data sets ($N =$

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198, 190, 138) were then conducted to attempt to replicate the effect between commitment and LSM. The predicted associations between LSM and commitment/satisfaction, measured concurrently and longitudinally, were not observed in Studies 3–5. Moreover, a meta-analysis across all 766 individuals ($N = 383$ couples) revealed that although the association between LSM and satisfaction was marginal ($M r = .10$, $Z = 1.92$, $p = .05$, confidence interval (CI) = $-.002, .203$), there was no link between LSM and commitment ($M r = .05$, $Z = 0.97$, $p = .33$, CI = $-.052, .154$). Across conflict discussions (i.e., in Studies 1 and 3–5), there were no associations between conflict LSM and satisfaction ($M r = .09$, $Z = 1.49$, $p = .14$, CI = $-.028, .203$) or commitment ($M r = .03$, $Z = 0.50$, $p = .62$, CI = $-.087, .145$). These findings suggest that if true associations between LSM and commitment and satisfaction exist, they are very small effects. They also emphasize the importance of replicating one's own findings and illustrate a fruitful approach to replicating findings from high-investment studies through collaborating with researchers with similar data sets to increase statistical power and, in turn, reproducibility.

Keywords

Close relationships, commitment, conflict, language style matching, satisfaction, reproducibility

Behavioral matching plays a fundamental social role by promoting positive social dynamics. When an individual imitates another's behavior, feelings of interpersonal similarity, connectedness, and liking increase (Cannava & Bodie, 2017; Giles & Coupland, 1991). It is not surprising, then, that there are numerous ways in which individuals can exhibit similarity via behavior matching. For instance, behavior matching can occur in nonverbal forms such as posture, peripheral physiology, gaze, movements, and gestures, (Bernieri, 1988; Bernieri & Rosenthal, 1991; Chartrand & Bargh, 1999; Condon & Ogston, 1966; LaFrance, 1985; Levenson & Gottman, 1983) and in verbal forms such as language use and intonation (McFarland, 2001; Niederhoffer & Pennebaker, 2002). Behavior matching is ubiquitous, often automatic in nature, and ultimately serves the primary purpose of strengthening social ties (Chartrand & van Baaren, 2009).

Within the realm of verbal communication, interaction partners frequently “match” one another across characteristics like syntax, accent, rate of speech, and vocabulary level (Giles et al., 1991; Levelt & Kelter, 1982). This is not only due to people choosing to interact with others who have similar verbal characteristics to them; studies show that individuals mimic the linguistic style of previously unknown individuals (Ireland et al., 2011), and that individuals even mimic the language style of written questions via their written responses (Ireland & Pennebaker, 2010).

Language style matching (LSM) is a measure of verbal matching of function word use (e.g., articles, prepositions) during dyadic conversations. Unlike content words, function words essentially lack meaning without context and are processed quickly and unconsciously (Bell et al., 2009). Therefore, function words reflect the similarity between *how*

conversational partners say something versus *what* they say (Ireland & Pennebaker, 2010). Accordingly, LSM has been theorized to be a linguistic indicator of one's engagement and attention in a conversation (Ireland & Pennebaker, 2010) such that those who match their conversational partner's language style must be actively engaged in the conversation at a fundamental and structural level (Cannava & Bodie, 2017). The coordination–engagement hypothesis suggests that LSM indicates social engagement rather than merely reflecting interaction quality, and indeed, studies have shown that high LSM can occur regardless of the interaction quality as perceived by the individual or judged by others (Niederhoffer & Pennebaker, 2002).

Because high LSM is indicative of a heightened level of attunement between conversational partners (Tausczik & Pennebaker, 2013), it follows that LSM should be associated with perceived relationship quality. Indeed, Ireland and Pennebaker (2010) found that couples' LSM in their professional written work (e.g., poetry and letters by Elizabeth Barrett and Robert Browning) was higher during times in which their relationship quality was greater. Moreover, Ireland et al. (2011) observed links between relationship stability and LSM, such that greater LSM in couples' instant messages predicted their stability 3 months later. Notably, however, Ireland et al. (2011) did *not* find LSM to be associated with relationship satisfaction, and Bowen et al. (2017) found that greater LSM during conflict interactions was associated with *lower* perceptions of responsiveness during that interaction. These findings suggest that LSM is tied to the continuation of a romantic relationship (i.e., stability) specifically, but not necessarily other components of relationship quality. Thus, the purpose of the current study was to investigate *why* LSM is associated with relationship stability. We sought to address this question by examining links between LSM and two components of relationship quality that are associated with stability: commitment and satisfaction.

Because very few studies have investigated LSM within romantic relationships and its links to components of relationship quality, we know little about why LSM should be associated with stability. Two major predictors of stability are satisfaction and commitment (Rusbult, 1980). Whereas satisfaction encompasses the degree of positive affect one feels toward a relationship, commitment reflects the degree to which one feels psychologically attached to the relationship and the likelihood of leaving the relationship (Rusbult, 1980). Because commitment represents long-term orientation with and engagement in a romantic relationship more than satisfaction does, and previous work has shown null associations between LSM and satisfaction, it follows that LSM should be associated more closely with relationship commitment than with satisfaction.

Not only are the linkages between LSM and broad components of relationship quality largely unknown, but the directionality of these potential associations has remained unexplored. It is unclear, should this association exist, whether relationship commitment influences LSM or whether LSM influences commitment. Although some researchers posit that LSM is an effective index for predicting change in social psychological factors (Gonzales et al., 2010), other researchers posit that LSM may be a measure of existing relationship quality (Borelli et al., 2017). One reason LSM might predict changes in relationship commitment over time is because similarity (i.e., LSM) promotes liking (Gonzales et al., 2010), which in turn promotes greater self-disclosure and intimacy (Collins & Miller, 1994). This process should result in individuals feeling closer and

experiencing increases in commitment over time. However, commitment could also be predictive of changes in LSM. In line with the coordination–engagement hypothesis, those who are committed to their partners should find themselves engaged in discussions with their partner and consequently experience high LSM.

In the current research, we aimed to investigate the role of LSM in romantic relationships by testing associations between LSM and two components of relationship quality: commitment and satisfaction. Because findings on LSM and relationship quality have been largely unexplored, we took a particularly rigorous approach to testing the associations between LSM and commitment/satisfaction. We explored the robustness of these associations by assessing them in a variety of samples (including couples of various ages, ethnicities, and relationship lengths) and examining them across different conversation contexts (e.g., conflict, support). Additionally, we pooled the results across studies in a small, internal meta-analysis to investigate overall strength of the associations.

Recruiting large samples of couples and transcribing their interactions are costly and time-consuming. Thus, in lieu of conducting a standard self-replication, the five studies included here use secondary archival data. The Study 1 investigators initially observed the predicted associations and then reached out to researchers with similar data to attempt to replicate the effect (Study 2). The results were highly variable, so the Study 1 researchers subsequently conducted a broader search for available data to attempt to replicate the findings in Studies 3–5, which were preregistered on the Open Science Framework (OSF) at <https://osf.io/9387c/>. Last, we conducted a meta-analysis across all samples to get an estimate of the true effect.

We predicted that (1) commitment would be positively associated with LSM, and (2) satisfaction would not be associated with LSM (Studies 1–5). Though null hypotheses are uncommon, our goal in this study was to be transparent in obtaining a complete understanding of how LSM in the current contexts was linked to relationship quality. We recognize that some researchers might predict a positive association between LSM and satisfaction based on prior evidence linking LSM and liking (e.g., Gonzales et al., 2010; Ireland, 2011); however, we did not expect all positive aspects of a relationship to be associated with LSM, but commitment specifically because it has been found to be the strongest self-report predictor of stability (Le et al., 2010). To be clear, commitment is correlated with, but is not the same as, the behavioral measure of relationship stability in Ireland et al. (2011). We also explored the directionality of the links between LSM and relationship quality by testing LSM as a predictor of change in relationship commitment/satisfaction across time (Studies 2 and 5) and commitment/satisfaction as a predictor of change in LSM across time (Study 5). Ancillary analyses exploring the directionality of the links between LSM and commitment/satisfaction with SEM models and testing gender as a moderator of associations between LSM and commitment/satisfaction were also conducted and can be found in the Online Supplemental Materials.

Study 1

Study 1 tested for associations between commitment, satisfaction, and LSM in both support and conflict interactions among a sample of married couples. As described

above, we hypothesized that commitment (H1), but not satisfaction (H2), would be positively associated with LSM.

Method

Participants

Forty-one married or cohabitating couples with young children were recruited through daycares and craigslist.com. See Table 1 for descriptive statistics and demographics; see the Online Supplemental Materials for additional participant information.

Procedure

Participants first completed an online survey with measures of satisfaction and commitment. Afterward, couples came into the lab to participate in four videotaped interactions: two conflict discussions followed by two support discussions. The procedure for the conflict interactions was based on methods developed by Levenson and Gottman (1983) and Roberts (2005). Each partner independently rated the top 3 areas of current, unresolved disagreement in their relationship. The interviewer then selected one area of disagreement for each conflict discussion, to be led by one partner (Christensen & Heavey, 1990). The highest rated area of conflict was discussed first, followed by the partner's highest rated and not yet discussed topic; the order of who led the discussion first was randomly assigned. Couples were instructed to engage in the conversations, try to work out their differences, and let the conversation flow as it normally would at home. The experimenter then left the couples alone to discuss the first ranked topic and notified them when 10 min had elapsed. The same procedure was followed for the second conflict discussion, which the other partner then led.

Next, couples engaged in two videotaped support interactions; the general procedure was based on methods developed by Pasch and Bradbury (1998). Participants first listed things they would like to work on/change about themselves (e.g., career, appearance, relationships). The topic had to be personal; it could not be something that was a problem in their relationship (i.e., *not* a source of conflict). The experimenter then instructed one (randomly chosen) partner to share their most desired change first. The partner who was not discussing their personal desired change was asked to respond however they wanted to, but to be involved in the discussion in some way. After 10 min, the partners switched roles, this time discussing the other person's most desired personal change for 10 min. Following the laboratory session, each couple was debriefed, thanked, and paid US\$250 for their participation in the study.

Measures

Commitment. The moral commitment subscale of the tripartite measure of commitment (Johnson et al., 1999) was used to assess commitment because of its focus on intentions to stay in the relationship, the key aspect of commitment (Rusbult, 1980) and an important distinction between commitment and satisfaction in the present study. Participants rated 13 items such as, "You would feel bad about getting a divorce because you

Table 1. Descriptive statistics and demographics for Studies 1–5.

	Study 1	Study 2	Study 3	Study 4	Study 5
Number of couples	41	79	99	95	69
Gender, % male	50	50	47	50	50
Age, <i>M</i> (<i>SD</i>)	34.8 (5.1)	21.8 (2.8)	16.5 (1.0)	32.1 (10.2)	32.8 (5.2)
Race, % White	70.2	40.6	41.9	70.0	52.9
Relationship length, <i>M</i> (<i>SD</i>)	7.1 (4.1) years	25.1 (22.1) months	12.9 (5.1) months	5.8 (4.2) years	—
Relationship type, % married	99	0	0	100	83.2
Eligibility criteria	Married/cohabitating for 2+ years; child between age 3 and 5	Exclusive dating relationship for 6+ months	Adolescent; involved in dating relationship	Married between 1 year and 15 years	Pregnant with first child; cohabitating; plans to continue cohabitating after childbirth

Note. *SD* = standard deviation.

promised [partner's name] you would stay with [him/her] forever" from 1 (*strongly disagree*) to 9 (*strongly agree*). The scale had good reliability ($\alpha = .81$); the average commitment score was 6.46 (standard deviation (SD) = 1.24).

Commitment was also assessed with a single item measuring individuals' perceived likelihood of staying in their marital relationship. Participants rated how likely they were to stay together from 1 (*not at all likely*) to 9 (*extremely likely*). The average stay likelihood commitment score was 8.49 (SD = 0.90).

Satisfaction. Satisfaction was measured with the marital satisfaction component of the personal commitment subscale from the tripartite measure of commitment (Johnson et al., 1999). Participants rated their marriage on the following 7-point scales: miserable–enjoyable, hopeful–discouraging, empty–full, interesting–boring, rewarding–disappointing, doesn't give me much chance–brings out the best in me, lonely–friendly, and worthwhile–useless. Additionally, participants rated their marital satisfaction over the previous 2 months from 1 (*completely satisfied*) to 7 (*completely dissatisfied*). The items were averaged, and the scale had very good reliability ($\alpha = .96$). The average satisfaction score was 5.39 (SD = 1.38).

Language style matching. Trained research assistants transcribed the videotaped interactions. The transcriptions were analyzed with the Linguistic Inquiry Word Count (LIWC) program, which provides a percentage output for over 80 categories of words (e.g., overall affect, nonfluencies; Pennebaker et al., 2015). Couples' LSM scores were calculated using the output for nine function word categories: auxiliary verbs, articles, common adverbs, indefinite pronouns, personal pronouns, prepositions, conjunctions, negations, and quantifiers. A dyad LSM score was calculated following the method used by Ireland et al. (2011). First, the absolute value of the difference between each partners' function word score for a given category was divided by the sum of both partners' function word scores for that category. Next, this value was subtracted from 1 and the formula was repeated for the next function word category until all nine categories had values. Last, the LSM score was calculated as an average composite score of the nine categories ranging from 0 (*low synchrony*) to 1 (*high synchrony*). Three LSM scores were derived for each couple: (1) an overall LSM score across all laboratory interactions ($M = .91$, $SD = 0.03$), (2) a conflict LSM score from the two conflict interactions ($M = .91$, $SD = 0.04$), and (3) a support LSM score from the two support interactions ($M = .91$, $SD = 0.03$).

Analysis plan

Prior to analysis, variables were standardized, and outliers were winsorized to ± 3 SDs from the mean. In total, three participants' stay likelihood scores, four overall LSM scores, and two conflict and support LSM scores were winsorized. The data were analyzed accounting for shared variance between relationship partners. Linear mixed models in SPSS (version 26) were used to test whether LSM was associated with commitment (H1) and satisfaction (H2). Analyses were run testing associations between overall LSM (i.e., LSM across discussion contexts) and commitment and satisfaction. To

explore differences between contexts, associations between conflict LSM and commitment/satisfaction, as well as between support LSM and commitment/satisfaction were tested. Significance tests were two-tailed with robust estimation parameters.

Results

The results of the mixed models showed that overall LSM was positively associated with moral commitment ($b = .33, SE = .13, p = .02$) but associations between overall LSM and stay likelihood ($b = .20, SE = .13, p = .15$) and satisfaction ($b = .20, SE = .23, p = .38$) were not significant. When analyses were run for LSM in conflict and support discussions separately, there were links between LSM and moral commitment in the conflict discussion and between LSM and stay likelihood in the support discussion. Conflict LSM predicted moral commitment ($b = .35, SE = .11, p = .002$) but did not predict stay likelihood ($b = .18, SE = .13, p = .17$) or satisfaction ($b = .29, SE = .23, p = .22$). Support LSM predicted stay likelihood ($b = .21, SE = .08, p = .01$), but effects on moral commitment ($b = .20, SE = .18, p = .29$), and satisfaction ($b = -.05, SE = .20, p = .80$) were not significant.

In summary, results indicated that there were significant associations between overall and conflict LSM with moral commitment and between support LSM and stay likelihood. Moreover, there were no significant associations between overall/conflict/support LSM and satisfaction, providing at least partial support for hypotheses 1 and 2. The effect sizes across all LSM and commitment measures were small to moderate; effect sizes were miniscule to small among overall/conflict/support LSM and satisfaction.

Study 2

Given the limitations of the relatively small and specific sample for Study 1, we aimed to replicate and extend Study 1 findings in a larger, more generalizable sample. The PI from Study 1 (Slatcher) reached out on social media in the spring of 2017 inquiring whether other researchers had transcribed couples' interactions in studies with commitment and satisfaction measures. Three researchers responded and shared their data. Given that one primary goal was to pool results across studies, however, we wanted to ensure that the methods from studies we included were similar to our initial sample (e.g., conflict/support paradigms). From this initial call, one sample in which couples had engaged in both a personal positive and personal negative event laboratory discussion met the criterion and was included.

Study 2 functioned to (a) replicate the cross-sectional associations between LSM and commitment, but not satisfaction, in Study 1, and (b) extend Study 1 by including a longitudinal component to test the direction of effects between LSM and commitment/satisfaction. In Study 2, we tested associations between LSM and commitment and satisfaction in personal positive and negative event discussions, and we tested whether Time 1 (T1) LSM predicted the change in relationship commitment/satisfaction from T1 to Time 2 (T2).

Method

Participants

Seventy-nine couples in exclusive relationships were recruited from a large public university using flyers posted throughout campus and advertisements in the campus newspaper. See Table 1 for descriptive statistics and demographics; see the Online Supplemental Materials for additional participant information.

Procedure

Upon arrival to the lab, partners independently completed a packet of questionnaires, including measures of commitment and satisfaction. Afterward, the members of each couple were reunited in a room where they sat facing each other and engaged in seven consecutive videotaped interactions with each other, each of which lasted 5 min. In total, the laboratory session lasted for approximately 1.5 hr. The four interactions relevant for this study consisted of two positive event and two negative event interactions, in which each partner took turns discussing a recent personal positive and negative event (e.g., sudden financial gains/losses, receiving/losing a job, internship, or scholarship). Participants were also told to respond to, add to, or talk about as much or as little as they would under normal circumstances when it was their partner's turn to lead the discussion. This procedure was repeated until both partners had discussed their positive and negative events for 5 min. The first discussion of interest was always followed by the other partner discussing their personal event in the same category (i.e., positive or negative). For the third and fourth discussions of interest, partners kept the same order of discussing (i.e., whoever led the second discussion also led the fourth discussion) but focused on the category that had not yet been discussed (positive or negative). There were no significant differences in key variables due to order of discussion (all $ps > .05$). When couples completed the lab visit, they were thanked and paid US\$50 for their participation.

The follow-up questionnaires included measures of commitment and satisfaction and were mailed to participants approximately 2 months later. Responses to the follow-up measures were collected from 88 (56% women) of the original 158 participants. Those who completed and returned the follow-up assessment were mailed a US\$5.00 gift certificate to the campus store for their continued participation in the study. See the Online Supplemental Materials for additional information regarding the procedure for personal event discussions and regarding participants who did not complete the follow-up questionnaires.

Measures

Commitment. Participants completed the commitment measure from the Investment Model Scale (Rusbult et al., 1998). The measure consisted of 7 items (e.g., "I want our relationship to last for a very long time"), with each statement rated on a 7-point scale that ranged from 1 (*not at all true*) to 7 (*very true*). Reliabilities were good for men ($\alpha = .91$) and for women ($\alpha = .92$). The average commitment score was 5.94 ($SD = 1.16$).

Satisfaction. Participants also completed the Relationship Assessment Scale (Hendrick, 1988). This scale consisted of 7 items (e.g., “How good is your relationship compared with most?”), with each statement rated on a 7-point scale that ranged from 1 (*low satisfaction*) to 7 (*very high satisfaction*). Reliabilities were good for men ($\alpha = .90$) and for women ($\alpha = .92$). The average satisfaction score was 5.81 ($SD = 0.92$).

Language style matching. All laboratory interactions were video recorded, and LSM scores were calculated in the same way described in Study 1. Again, each couple had a total of three LSM scores: (1) overall LSM score across all laboratory interactions ($M = .72$, $SD = 0.12$), (2) negative event LSM score across negative event discussions ($M = .76$, $SD = 0.12$), and (3) positive event LSM score across positive event discussions ($M = .67$, $SD = 0.15$).

Analysis plan

As in Study 1, all variables were standardized, and outliers were winsorized to ± 3 SDs above and below the mean. In total, two participants' T1 commitment scores, four T1 satisfaction scores, one T2 satisfaction score, two overall LSM scores, four negative LSM scores, and two positive LSM scores were winsorized. The analysis plan largely followed that of Study 1, with one additional set of analyses. In Study 2, linear mixed models were used to test LSM as a predictor of the change in relationship commitment and satisfaction from T1 to T2. Residuals from regressing T2 relationship commitment and satisfaction on T1 relationship commitment and satisfaction, respectively, were used to represent the change in relationship commitment and satisfaction. These models predicting change in relationship commitment and satisfaction were run with change in commitment and change in satisfaction separately as the dependent variables, and overall LSM, LSM in the positive event disclosure discussion, and LSM in the negative event disclosure discussion as the independent variables.

Results

Mixed models showed that overall LSM ($b = .16$, $SE = .15$, $p = .28$), positive event LSM ($b = .13$, $SE = .15$, $p = .41$), and negative event LSM ($b = .20$, $SE = .16$, $p = .20$) did not significantly predict relationship satisfaction, and the effect sizes were similar in magnitude to those observed between LSM and stay likelihood/satisfaction in Study 1. Overall LSM ($b = .17$, $SE = .13$, $p = .19$), positive event LSM ($b = .10$, $SE = .14$, $p = .46$), and negative event LSM ($b = .25$, $SE = .14$, $p = .07$) also did not significantly predict relationship commitment, and the effects were generally smaller than those observed between LSM and moral commitment in Study 1 but similar in magnitude to those between LSM and satisfaction in Study 2.

Next, a series of linear mixed models were run to test whether LSM predicted a change in relationship commitment or satisfaction from T1 to T2. LSM did not significantly predict changes over time in commitment or satisfaction in any context. The effect sizes for links between overall LSM ($b = .17$, $SE = .12$, $p = .16$), negative event LSM ($b = .22$, $SE = .11$, $p = .05$), and positive event LSM ($b = .10$, $SE = .12$, $p = .45$)

with change in commitment were small. The effect sizes for links between overall LSM ($b = .01$, $SE = .11$, $p = .94$), negative event LSM ($b = .01$, $SE = .11$, $p = .94$), and positive event LSM ($b = -.01$, $SE = .12$, $p = .93$) with change in satisfaction were miniscule. Additional details regarding the full linear mixed models and structural equation model analyses testing commitment and satisfaction as predictors of LSM can be found in the Online Supplemental Materials.

Overall, Study 2 results indicated that, although not statistically significant, there were small effects for associations between LSM across contexts and concurrent assessments of commitment and satisfaction. Moreover, effects for links between LSM across contexts and changes in commitment over time were small and between LSM and changes in satisfaction over time were miniscule. Somewhat contrary to the hypotheses and Study 1 results, these results suggest that associations between LSM and concurrent relationship commitment and satisfaction may be similar in magnitude.

Studies 3–5

In Study 1, H1 and H2 were largely supported such that there appeared to be links between measures of LSM and commitment, whereas effect sizes for LSM and satisfaction were smaller and not significant. In Study 2, we observed different trends indicating that LSM may be similarly associated with both commitment and satisfaction, though these effects were not statistically significant. After seeing somewhat conflicting results regarding commitment, satisfaction, and LSM across Studies 1 and 2, the Study 1 researchers decided that it would be in the best interest of the project to include a greater number of samples with similar methods. Thus, a second, wider call for data went out. This call was posted on the International Association for Relationships Research monthly newsletter, the Society for Personality and Social Psychology open forum, the primary investigator's Twitter page, and on Study Swap (a website for researchers to post resources they have or need to develop multisite collaborations).

To be included, data sets had to include already-transcribed in-person couples' Gottman-style conflict discussions (a well-known and frequently used paradigm in relationships research) along with measures of relationship commitment and satisfaction. In all, there were three new data sets that matched the inclusion criteria, which were used for Studies 3–5. Studies 3–5 were preregistered on the OSF prior to conducting any analyses. For some of the measures in Studies 3–5, select items were used rather than established subscales (e.g., satisfaction subscale) to reduce overlap in constructs. Additional study details along with a detailed description of how items were selected for the current studies can be found on the OSF webpage at <https://osf.io/9387c/> or in the Online Supplementary Materials.

Studies 3–5 tested for associations between LSM, commitment, and satisfaction in couples' conflict interactions. As in the previous studies, we hypothesized that commitment (H1), but not satisfaction (H2) would be positively associated with LSM. Moreover, Study 5 extended the previous studies by including a longitudinal assessment of satisfaction, commitment, and LSM to explore the direction of causality in the association between relationship commitment and satisfaction and LSM. Specifically, in Study 5, we tested whether T1 LSM predicted changes in commitment and satisfaction

from T1 to T2 (as in Study 2), as well as whether T1 relationship commitment and satisfaction predicted change in LSM from T1 to T2 (unique to this study).

Method

Participants

In Study 3, 99 adolescent couples were recruited from either (a) announcements in two high schools in a metropolitan area in the Southwest, (b) targeted Facebook ads, or (c) personal contact in shopping malls. In Study 4, 95 married couples were recruited with fliers and advertisements in a local newspaper. In Study 5, 69 pregnant, heterosexual couples were recruited from the greater Los Angeles area through advertising on social media (i.e., Facebook, neighborhood discussion boards, parenting websites), flyers, and word of mouth. See Table 1 for descriptive statistics and demographics; see the Online Supplemental Materials for additional participant information.

Procedure

The procedures for Studies 3–5 generally followed the format of the conflict paradigm described in Study 1. All couples were invited to the laboratory to engage in a videotaped conflict interaction with each other and independently completed self-report questionnaires assessing their marital commitment and satisfaction. In Study 5, the procedure was repeated approximately 9 months later (6 months postpartum).

Following the laboratory visits, videotaped discussions were transcribed and analyzed with LIWC, and LSM was calculated as described in the studies above. In Study 3, participants received US\$40 each for their participation in the laboratory session; participants were compensated US\$50 for their participation in Study 4; participants received US\$100 for the initial prenatal visit and US\$200 for the follow-up visit in Study 5. Additional details of the procedures for studies 3–5 can be found in the Online Supplemental Materials.

Measures

Commitment. An overview of commitment measures by study is detailed below and summarized in Table 2.

PRQC Inventory. In Study 3, participants rated one commitment item, “How committed are you to your relationship?,” from the Perceived Relationship Quality Components Inventory (PRQC; Fletcher et al., 2000). Response options ranged from 1 to 7; the average PRQC commitment score was 6.64 ($SD = 0.96$). In Study 4, participants completed the commitment subscale from the PRQC in which they rated 3 items including, “How committed/dedicated/devoted are you to your relationship?” Items were summed so that scores ranged from 3 to 21; the average PRQC commitment score was 19.79 ($SD = 2.20$).

Dyadic Adjustment Scale. In Studies 3 and 5, participants responded to the following item on the Dyadic Adjustment Scale (DAS; Spanier, 1976): “Which of the following

Table 2. Measures by study.

	Study 1	Study 2	Study 3	Study 4	Study 5
Discussion type(s)	Conflict and social support	Personal negative and positive event	Conflict	Conflict	Conflict
Commitment measure(s)	1. Johnson Tripartite Moral Commitment Subscale 2. Stay Likelihood Item	1. Rusbult Investment Model Scale	1. PRQC Inventory 2. DAS 3. EMA Commitment Item	1. PRQC Inventory 2. Lund Commitment Scale	1. DAS
Satisfaction measure(s)	1. Johnson Tripartite Marital Satisfaction Component of Personal Commitment Subscale	1. RAS	1. DAS 2. PRQC Inventory	1. RAS 2. PRQC Inventory	1. DAS
Follow-up measure(s)	No	Yes (satisfaction and commitment)	No	No	Yes (satisfaction, commitment, and LSM)

Note. DAS = Dyadic Adjustment Scale; RAS = Relationship Assessment Scale; PRQC = Perceived Relationship Quality Components; LSM = language style matching. Tripartite measure of commitment: Johnson et al. (1999); Rusbult Investment Model Scale: Rusbult et al. (1998); RAS: Hendrick (1988); PRQC Inventory: Fletcher et al. (2000); DAS: Spanier (1976); Lund Commitment Scale: Lund (1985).

statements best describes how you feel about the future of your relationship?" Answer choices ranged from 1 (I want desperately for my relationship to succeed and would go to almost any length to see that it does) to 6 (My relationship can never succeed, and there is no more that I can do to keep the relationship going); responses were reverse-scored. The average DAS commitment score in Study 3 was 4.18 ($SD = 0.94$); in Study 5, the average commitment score was 5.31 ($SD = 0.65$) at T1 and 5.35 ($SD = 0.62$) at T2.

Lund Commitment Scale. In Study 4, participants completed the Lund (1985) Commitment Scale in which they rated 9 items such as "How obligated do you feel to continue this relationship?" Items were rated from 1 to 7 and summed so that scores ranged from 9 to 63; the average Lund commitment score was 57.54 ($SD = 6.26$).

EMA of commitment. In Study 3, daily responses to an Ecological Momentary Assessment (EMA) item, "Within my relationship with my partner, I feel committed" were averaged. Participants were required to have completed a minimum of 8 from a total of 37 EMA commitment responses to be included; 17 participants did not meet this criterion, so their response was considered missing for this measure. The response options ranged from 1 to 7; the average EMA commitment score was 6.33 ($SD = 1.09$).

Satisfaction. An overview of satisfaction measures by study is detailed below and summarized in Table 2.

PRQC Inventory. In Study 3, participants rated the individual satisfaction item from the PRQC (Fletcher et al., 2000), "How satisfied are you with your relationship?" Response options ranged from 1 to 7; the average score was 6.46 ($SD = 1.09$). In Study 4, participants completed the satisfaction subscale from the PRQC which included 3 items such as "How happy are you with your relationship?" The items were rated from 1 to 7 and summed so that scores ranged from 3 to 21; the average score was 17.63 ($SD = 3.55$).

Dyadic Adjustment Scale. In Study 3, participants responded from 1 to 6 to 2 items on the DAS (Spanier, 1976): (1) "How often do you think that things between you and your partner are going well?" and (2) "How often do you and your partner 'get on each other's nerves'?" ($\alpha = .59$). The second item was reverse-scored, and responses were averaged; the mean satisfaction score was 4.09 ($SD = 0.65$). In Study 5, satisfaction was assessed with the 2 items described above and a third item: "Please fill in the circle which best describes the degree of happiness, all things considered, of your relationship." Participants responded with a 6-point scale on the first 2 items and a 7-point scale on the third item; the scale had adequate reliability (T1 $\alpha = .70$, T2 $\alpha = .65$). The response options were averaged; the mean satisfaction score was 5.01 ($SD = 0.74$) at T1 and 4.69 ($SD = 0.86$) at T2.

Relationship Assessment Scale. In Study 4, participants completed the Relationship Assessment Scale (RAS; Hendrick, 1988) in which they rated 7 items from 1 to 7 such as "In general, how satisfied are you with your relationship?" The items were summed so that scores ranged from 7 to 49; the average RAS satisfaction score was 41.03 ($SD = 6.95$).

Language style matching. LSM scores were calculated in the same way as in studies 1 and 2. Each couple had one conflict LSM score, which reflected their language matching from 0 (*low synchrony*) to 1 (*high synchrony*) across the laboratory conflict interactions. The average conflict LSM score was .85 ($SD = 0.05$) in Study 3, .89 ($SD = 0.04$) in Study 4, and .89 ($SD = 0.03$) in Study 5.

Analysis plan

The analysis plan for studies 3–5 largely followed that described in Study 1. In Study 3, 2 participants' LSM scores, 14 commitment scores, and 11 satisfaction scores were winsorized across the various measures; in Study 4, 2 participants' LSM scores, 10 commitment scores, and 7 satisfaction scores across the various measures were winsorized; in Study 5, 2 participants' commitment scores and 1 satisfaction score were winsorized.

Additional analyses were conducted for Study 5, which included T2 LSM, satisfaction and commitment scores. Multilevel modeling was used to test LSM as a predictor of the residualized change score from T1 to T2 in satisfaction and commitment; structural equation modeling was used to test commitment and satisfaction as the independent variables and the residualized LSM change score from T1 to T2 as the dependent variable.

Results

A series of linear mixed models revealed miniscule to small effects for relationship commitment (H1) and satisfaction (H2) across studies. In Study 3, conflict LSM did not significantly predict PRQC ($b = .05, SE = .09, p = .60$), EMA ($b = -.003, SE = .07, p = .96$), or DAS ($b = .00, SE = .10, p = .996$) commitment, and the effects were miniscule. The association between conflict LSM and the DAS satisfaction measure was small and significant ($b = .18, SE = .09, p = .047$) and between conflict LSM and the PRQC satisfaction measure was small but not significant ($b = .18, SE = .10, p = .08$). In Study 4, links between conflict LSM and both commitment measures (PRQC $b = -.15, SE = .07, p = .04$; Lund $b = -.17, SE = .08, p = .04$) were small but significant; however, these effects were not in the predicted direction. The links between conflict LSM on both satisfaction measures (RAS $b = -.08, SE = .09, p = .41$; PRQC $b = -.03, SE = .12, p = .78$) were minute. Last, in Study 5, conflict LSM did not significantly predict commitment at T1 ($b = -.04, SE = .13, p = .77$)¹ and T2 ($b = -.05, SE = .13, p = .69$) or satisfaction at T1 ($b = .06, SE = .13, p = .62$) and T2 ($b = -.08, SE = .12, p = .48$), and effect sizes were miniscule.

In Study 5, linear mixed models were used to test LSM as a predictor of the residualized change in relationship commitment and satisfaction from T1 to T2. Conflict LSM at T1 did not significantly predict changes in commitment ($b = -.01, SE = .09, p = .95$) or satisfaction ($b = -.01, SE = .10, p = .93$) from T1 to T2. Structural equation models were then used to test relationship commitment and satisfaction as predictors of the change in LSM from T1 to T2. Results indicated that commitment ($b = -.14, SE = .09, p = .13$) and satisfaction ($b = .01, SE = .07, p = .89$) were not significant predictors

of the change in LSM from T1 to T2. Across these cross-temporal analyses, the effects were, in general, miniscule.

Internal meta-analysis

Although Study 1 provided support for our hypotheses that LSM would be associated with commitment but not satisfaction, conflicting trends were observed in Studies 2–4, and we did not observe links between LSM and commitment or satisfaction in Study 5. To determine the strength and robustness of potential links between LSM and commitment/satisfaction across studies, we conducted an internal meta-analysis as per the recommendations of Goh et al. (2016).

Prior to conducting the meta-analysis, composite commitment/satisfaction scores were computed for studies that had multiple measures of relationship commitment and/or satisfaction. To do this, we standardized the values from each commitment/satisfaction measure within a study and then aggregated those values across measures to form one total commitment/satisfaction score per individual. Next, we conducted the meta-analysis using the most recent version of the meta-analysis Excel template by Goh et al. (2016), which was downloaded from their OSF webpage at <https://osf.io/msntb/>. We used fixed effects in which the mean effect size (e.g., mean correlation) was weighted by sample size. The sample size represented the number of couples rather than the number of participants in the sample to avoid inflating the effect size, as the interdependence between couple members was not taken into consideration in the correlational analyses. Effects were analyzed for commitment/satisfaction and conflict LSM and for commitment/satisfaction and overall LSM.

Correlations were Fisher z -transformed for analyses, then converted back to Pearson correlations for presentation. Across all interactions in the five studies, LSM was not associated with commitment or satisfaction. See Figure 1 for the meta-analytic results of overall LSM and satisfaction/commitment and of conflict LSM and satisfaction/commitment. The effects for associations between overall LSM and satisfaction ($Mr = .10$, $Z = 1.92$, $p = .05$, $CI = -.002, .203$) and between overall LSM and commitment ($Mr = .05$, $Z = 0.97$, $p = .33$, $CI = -.052, .154$) were small. Across conflict discussions only (i.e., Studies 1 and 3–5), the effects for associations between conflict LSM and satisfaction ($Mr = .09$, $Z = 1.49$, $p = .14$, $CI = -.028, .203$) and commitment ($Mr = .03$, $Z = 0.50$, $p = .62$, $CI = -.087, .145$) were also very small. Thus, when effects were pooled and tested across samples, it became clear that there were no reliable associations between LSM and commitment or satisfaction.

General discussion

The present research investigated associations between LSM and relationship quality across five samples from multiple research teams. We predicted that LSM would be associated with commitment, but not satisfaction, because prior work has shown null links between LSM and satisfaction but a positive association between LSM and stability, and commitment represents long-term interest in continuing one's relationship.

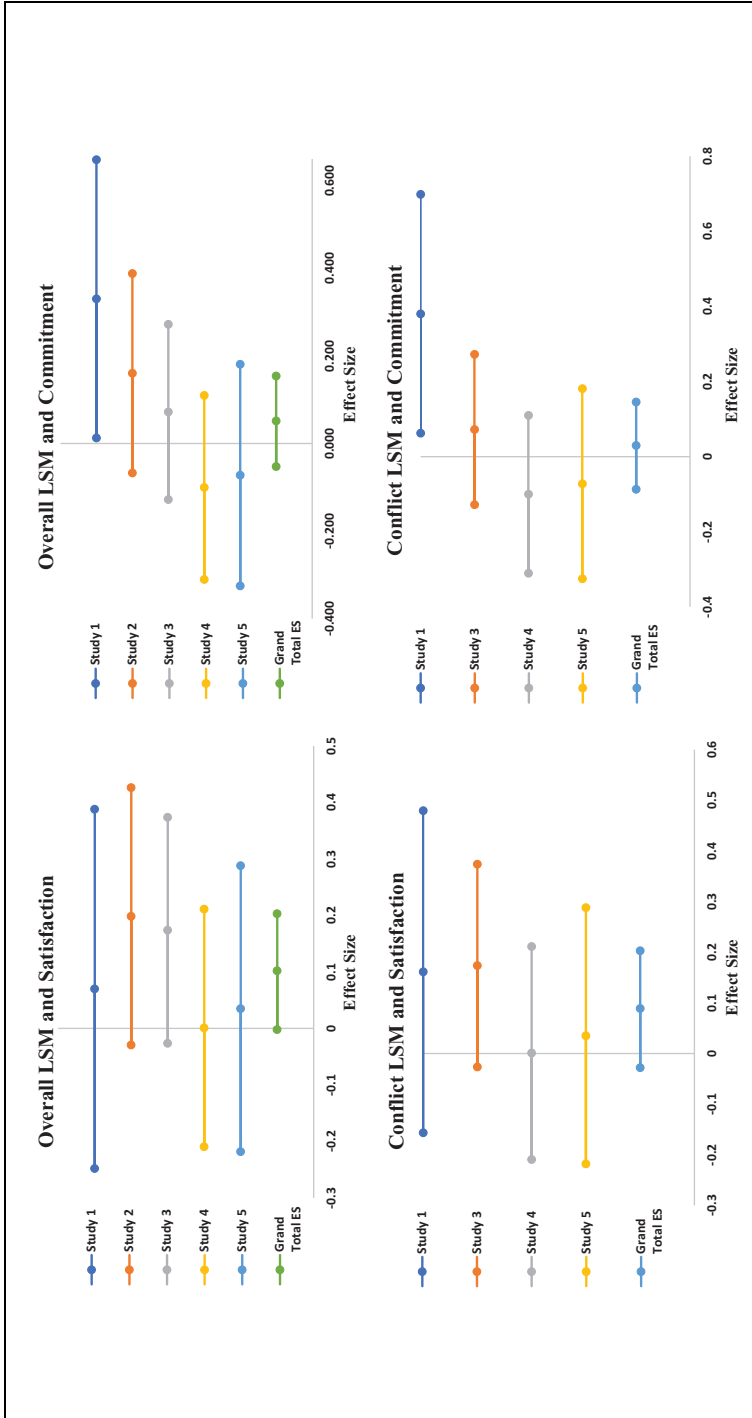


Figure 1. Forest plots depicting meta-analytic results for overall/conflict LSM and satisfaction/commitment. The location of the middle dot on the x-axis represents the effect size for that study. The 95% confidence interval extends out as lines from the dot; wider horizontal lines indicate smaller study sample sizes. The vertical no effect line extends from 0. The grand total ES represents the overall effect size taking the results of each study into account. LSM = language style matching; ES = Effect size.

We also tested the directionality of the effects and the overall effect size across samples in a meta-analysis.

Ultimately, the results were not in line with our predictions. We initially found support for the hypothesized association (Study 1), but we subsequently found that the association did not replicate (Study 2). To implement the emerging “best practice” for conducting research, particularly in light of ambiguous findings, we preregistered an integrative data analysis and recruited three additional studies with a similar paradigm and with already-transcribed language data. We hypothesized that there would be small (but significant) links between LSM and relationship commitment; the association failed to replicate across the three preregistered replication attempts. Moreover, when the samples were pooled in an internal meta-analysis, the results failed to show support for links between LSM and commitment or satisfaction, and effect sizes were all small.

Although the present results were somewhat inconsistent and ultimately did not lend support for associations between LSM and self-reported measures of global relationship quality, the role of LSM in romantic partner interactions could still be a fruitful avenue for research. For instance, studies have revealed links between LSM and more immediate outcomes, such as perceptions of support (Rains, 2016) and positive emotions following an interaction (Cannava & Bodie, 2017). Moreover, Bowen et al. (2017) found that greater LSM during an interaction may intensify the positive/negative tone of that interaction. Thus, it may be that studying LSM within romantic relationships can be informative for state-based measures assessed immediately before/after a discussion and that the present null findings may be due, in part, to lack of overlap between partners’ engagement (indexed by LSM) in a specific laboratory interaction and general outcomes like global measures of relationship quality.

In line with this idea, prior links between LSM and relationship stability were observed when assessing LSM in couples’ naturalistic instant messages (Ireland et al., 2011), rather than in verbal laboratory interactions. Thus, despite the current findings that suggest no reliable associations between global relationship quality and LSM from specific lab interactions, it is possible that LSM assessed across multiple naturalistic interactions might have stronger ties to relationship processes or to outcomes measured behaviorally. Considering again the engagement hypothesis, which suggests that LSM is an indicator of social engagement rather than interaction quality, another possibility is that measures of relationship quality are not associated with one’s engagement in interactions with their partner. Rather, it could be that LSM influences one’s perceptions of their partner’s engagement immediately following the interaction. However, the mechanisms underlying the potential link between LSM and relationship stability (if indeed robust) remain unknown.

The current work has some notable strengths. Finkel et al. (2015) argued that although recent shifts in psychology toward incorporating larger sample sizes and self-replication are generally beneficial, these approaches are often misguided and ill-advised for studies involving difficult/costly participant recruitment. The present set of studies serves as one example of how difficult, time-consuming, or costly methodological approaches can be replicated in a timely manner. Though we recognize that not all high-investment studies can be pragmatically replicated, this work demonstrates one way in which attempting to replicate results can be more feasible—by reaching out to fellow researchers, combining

resources, and being transparent with findings, which ultimately lends more credence to final results. Although this integrative data analysis required more time and energy than simply publishing Study 1, it took substantially less time, energy, and resources than conducting these replications within a single lab, and our results contribute more reliable information on the association (or lack thereof) between LSM and relationship quality. Thus, the current work has implications for future research on how to continue to promote open relationship science through collaborative efforts and how to pursue replications of findings for demanding and expensive research methods.

Additionally, the current studies include an internal meta-analysis. Meta-analyses are argued to encourage open science, reduce Type II errors, and enable researchers to report stronger and better understood series of related studies (Goh et al., 2016). The current meta-analysis did just that: Results across the individual studies were somewhat inconsistent, whereas the meta-analysis provided a clear takeaway message by weighting effects by sample size and pooling effects across studies.

These studies also have some important limitations. First, although Studies 2 and 5 enabled us to better infer causality between LSM and commitment/satisfaction with longitudinal components, the relevant predictor variables were not manipulated in any of the studies. Second, partners were either dating or tested relatively early in their marriages, and some of the samples were relatively small in size (i.e., Study 1 had 41 couples and the sample size for the Study 5 follow-up measures was 42 couples). However, by pooling the samples in the internal meta-analysis, this limitation was partially addressed. Third, there is a possibility that near-zero or spurious effects between LSM and commitment could be due to a ceiling effect in some of the key variables such as perceived stay likelihood in Study 1 and commitment measures in Studies 3–5. Fourth, similar to other studies of couples, several of the variables had little variance, which may have hampered our ability to sensitively detect differences. Fifth, another potential limitation was the use of a variety of commitment and satisfaction measures across the studies. However, we argue that the rigor with which we selected comparable measures and the concurrent increase in generalizability outweighs the potential cost of continuity. Sixth, it should be noted that a recent study conducted by Sun et al. (2019) showed no links between naturalistically observed emotion word use (as examined by LIWC) and self-reports of emotion, suggesting that measures of observational language use and self-reports may not share much overlap. Thus, future research may also benefit from utilizing non-self-report measures (e.g., implicit measures) when investigating relationship correlates of LSM.

Future research on LSM should begin by replicating findings regarding links between LSM and relationship stability. If that link is indeed robust, additional work should then seek to identify the mechanisms linking LSM and relationship stability. Knowing that self-report global measures of relationship quality, including satisfaction and commitment, are probably unrelated to lab-based LSM should drive future work to consider other relationship processes that may play a role in promoting relationship stability. Additionally, future work should measure these processes on both a global level and immediately following the interaction from which LSM is computed to determine whether LSM is a better indicator of more immediate outcomes, or whether there are links between LSM and global measures of relationship processes.

The present work serves as an example for the importance of replicating one's work and demonstrates one way to make replicating hard-to-conduct relationship study replications more feasible. We hope that work such as this will both clarify the true size and nature of effects in our field, help promote replicability, and prevent cross-lab inconsistencies that are observed among the same psychological phenomena. Taken together, the findings of this set of studies indicate that, although initial evidence suggested links between couples' LSM and their relationship commitment, subsequent replication attempts and an internal meta-analysis failed to confirm these links. If a true effect between LSM and self-reported commitment or satisfaction does exist, it is likely to be very small and undetectable in all but the largest of sample sizes.


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Open research statement

As part of IARR's encouragement of open research practices, the authors have provided the following information: This research was pre-registered. The aspects of the research that were pre-registered were the main question/hypotheses, the primary purpose, the key variables and specification of their measurement, and the data analysis plan. The registration was submitted to: <https://osf.io/9387c/>. The data used in the research are available. The data can be obtained at: <https://osf.io/9387c/> or by emailing s.bierstetel@wayne.edu. The materials used in the research are not available.

Supplemental material

Supplemental material for this article is available online.

Note

1. When using robust estimation parameters, SPSS indicated that the validity of the model fit was uncertain; running the model without robust estimation parameters did not produce the warning. Since the parameter estimates and the conclusions drawn from them were similar across models, the estimates from the model without robust estimation parameters were reported.

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