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Putting Laughter in Context: Shared Laughter as Behavioral Indicator of Relationship Well-Being

Laura E. Kurtz and **Sara B. Algoe**

University of North Carolina at Chapel Hill

Abstract

Laughter is a pervasive human behavior that most frequently happens in a social context. However, data linking the behavior of laughter with psychological or social outcomes is exceptionally rare. Here, we draw attention to *shared laughter* as a useful objective marker of relationship well-being. Spontaneously-generated laughs of 71 heterosexual romantic couples were coded from a videorecorded conversation about how the couple first met. Multilevel models revealed that, while controlling for all other laughter present, the proportion of the conversation spent laughing simultaneously with the romantic partner was uniquely positively associated with global evaluations of relationship quality, closeness, and social support. Results are discussed with respect to methodological considerations and theoretical implications for relationships and behavioral research more broadly.

Keywords

Social interaction; interpersonal processes; closeness; social support

> "And in the sweetness of friendship let there be laughter, and sharing of pleasures. For in the dew of little things the heart finds its morning and is refreshed."
>
> Kahlil Gibran

The above quotation demonstrates a profoundly widespread notion—that laughter is instrumental in fostering social connections. Indeed, artists and scientists alike agree that laughter seems to play an important role for social relationships. It may therefore be surprising to learn that studies examining the behavior of laughter, especially as it occurs between social interaction partners, are exceptionally rare in the empirical literature. This empirical gap is interesting in part because it is precisely a topic about which relationships scientists, whose methods are well-suited to study dynamic social interactions, should have much to say. To begin to fill the gap, we used a novel method to measure what theory suggests is the most common and potentially most salubrious instantiation of laughter in everyday social life: the behavioral phenomenon of two people laughing simultaneously, here termed *shared laughter*.

Our focus on shared laughter was due to what is known about the behavior of laughter more generally (for a useful review, see Gervais & Wilson, 2005). In short, laughter is an

inherently social phenomenon: it happens most frequently in the presence of other people (Provine & Fischer, 1989), one person's laugh often elicits laughter in another (Grammer & Eibl-Eibesfeldt, 1990), and this is most likely to occur if the witness to the laughter is a friend rather than stranger (Smoski & Bachorowski, 2003).[1] These data present the intriguing possibility that laughter plays an important role in social life. Yet despite the careful work in documenting the behavior itself (e.g., frequency, acoustics, temporal patterning; e.g., Bachorowski, Smoski, & Owren, 2001; Grammer & Eibl-Eibesfeldt, 1990), we know very little about laughter's links to psychology.

In large part, this is likely due to the fact that psychologists *have* studied humor use—laughter's context-dependent cousin—as a relational strategy (e.g., Campbell, Martin, & Ward, 2008; Li et al., 2009). Researchers and readers of that work may assume that the behavior of laughter was present, yet its presence (or absence) was often either overlooked by the methods or even irrelevant to the research goals. This means that much of the humor literature has not addressed our current questions about the behavior itself. Interestingly, one well-known series of findings on humor use within romantic dyads did incorporate laughing behavior, by using an observed laugh from one partner as the criterion for whether the other partner used "humor" within a conflict conversation (Coan & Gottman, 2007; Carstensen, Gottman, & Levenson, 1995; Gottman & Levenson, 1992; 1999; Gottman, Coan, Carrere, & Swanson, 1998). Much of that work addressed non-social outcomes related to such laughter-eliciting humor use (e.g., its associations with physiology; Gottman et al., 1998), or lumped laughter-eliciting humor use into a broader category of "positive behavior" (e.g., Graber, Laurenceau, Miga, Chango, Coan, 2011). However, one study addressed psychological consequences by demonstrating that members of happy couples were more likely to use laughter-eliciting humor during a conflict than were members of unhappy couples (Carstensen et al., 1995).

Notably, these studies conceptualized humor attempts as a bid by one person to lighten the mood or demonstrate liking for the other individual. Yet, explicit humor attempts are only one way the behavior of laughter may arise. Laughter may also be caused by an external stimulus such as another person's behavior even if not intended to be humorous (e.g., schadenfreude; Smith, Powell, Combs, & Schurtz, 2009), or even another person's laugh itself (Grammer & Eibl-Eibesfeldt, 1990; Smoski & Bachorowski, 2003), to name a few possibilities. Moreover, while some explicit humor attempts may elicit laughter from another, the robust body of literature on self-reported or perceived humor use has differentiated among *types* of humor use (e.g., Campbell et al., 2008; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003), and has suggested that certain types – like aggressive humor -- may *not* cause laughter or may even cause hurt feelings. Our investigation focused on the potential social functions of laughing behavior in the context of dyadic interactions, regardless of its cause.

[1]Grammer and Eibl-Eibesfelt (1990) studied laughter "synchronization", which others have called "contagion" (Provine, 1992); Smoski and Bachorowski (2003) studied "antiphonal" laughter, which is "laughter that occurs during or immediately after a social partner's laugh" (p. 17); Rizzolatti and colleagues (1999) call laughter a "resonance behavior". All conceptualizations are relevant to but not the same as our current interest in the psychological consequences of the behavior of shared laughter.

Social Functions of Laughter

In fact, theorists have assumed for decades that the behavior itself, in humans, is useful for navigating the social world, and an array of potential social functions of laughter have been identified. Many of them, as reviewed in a theoretical piece on the evolution of laughter, are decidedly social (Gervais & Wilson, 2005). One notable example is the assumption that laughter signals cooperative intent (e.g., Davila-Ross, Owren, & Zimmermann, 2009). Most recently, perceptual experiments demonstrated that people have the ability to detect differences in the acoustic properties of spontaneous versus volitional laughter, the former of which are thought to represent the *sincere* signals of cooperative intent that are most important for human survival (Bryant & Aktipis, 2014). Still, despite such findings and obvious interest in the role of laughter in social life, very little data exist to link this behavior to psychological or social consequences.

A few key exceptions exist. Specifically, one pair of studies carefully documented laughter produced by bereaved widows while they spoke with a clinician about their deceased husband; this research established links between laughter and outside observers' interpersonal evaluations of the laugher as well as her future mental health (Bonanno & Keltner, 1997; Keltner & Bonanno, 1997). On the surface, these findings are consistent with the broader literature's focus on the possibility that laughter can be perceived as a prosocial signal and may be adaptive. Yet more recent research adds nuance that comes from taking a social psychological, contextual view (i.e., a broadened perspective that incorporates the behavior of interest as it unfolds in and interacts with the surrounding social context); we see this social-contextual approach as adding value. Specifically, an individual's genuine laughter differentially accounted for future social adjustment depending on the context in which it was originally displayed: laughter while discussing childhood sexual abuse with a clinician was predictive of later social problems, whereas laughter while discussing different types of distressing events was not (Bonanno et al., 2007).

In short, there exists little published data documenting the observed behavior of laughter and its links with psychology, and we see much room for contribution from relationship scientists. What has been published would require using humor as a proxy for laughter (e.g., Carstensen et al.,1995) or has instead focused on outside observers' perceptions or the overall psychological adjustment of only the individual who was laughing (e.g., Keltner & Bonanno, 1997). Here, we were particularly interested in laughter produced between two people in an ongoing relationship and how such laughter related to the interacting individuals' own evaluations of their relationship. Most specifically, the literature directed us to one particular manifestation of laughter produced in a social context that may have independent signal value regarding the quality of the relationship between the two people: when the two were laughing simultaneously. This specific manifestation of laughter side-stepped complexities associated with interpreting the cause of or intentions behind the laugh (e.g., did one person try to make the other laugh?), while retaining the valuable social information one can only observe when considering the complete dyad.

The proposition that shared laughter may signal relationship well-being can be partly derived from the argument that another's laughter *naturally and spontaneously* elicits

laughter in those who witness it (see review in Gervais & Wilson, 2005), coupled with the observation that this is actually more likely to happen between people who are in closer than more distant relationships (Smoski & Bachorowski, 2003). In contrast, when one person's laugh is *not* met by a social partner's, it may be an indicator that something else is going on (e.g., misunderstanding, status negotiation, perception of ill intent). Thus, variability in the extent to which dyad members laugh together simultaneously may prove to be a useful index of the well-being of the relationship.[2] Here, we provided the first test of this possibility, by coding spontaneously-generated laughter of couples during a naturalistic conversation about how they first met.

From Shared Laughter to Markers of Relationship Well-Being

It is an open empirical question as to how extensive the possible relational effects of shared laughter might be. It seems countless self-report and behaviorally-based measures fall under the broad umbrella construct of "relationship well-being." As such, at these early stages of inquiry, we took a conservative and theoretically-driven approach to examining shared laughter's relational import. Reis and Shaver's intimacy process model (1988) and Rusbult's Investment Model (1980) underscore this point, providing examples of how certain global evaluations of relationship well-being may be influenced by the accumulation of specific social behaviors and their immediate influence on relationship perceptions (e.g., increased intimacy via self-disclosure) and how multiple components of relationship well-being may be related to but not the same as one another (e.g., satisfaction might be presumed from commitment but commitment should not be presumed from satisfaction). And while it is not uncommon for researchers to combine multiple relationship constructs into an overall measure of "well-being," it is important to acknowledge that each construct was originally validated as theoretically and empirically distinct from others. As such, we looked closely at evidence and theory on the *behavior of laughter* from the comparative and evolutionary literature to target a few relational constructs that seemed especially worth testing. We identified being one with the other, having a social "safety net", and the affectively-laden evaluation of the relationship.

One with the other

As reviewed in Gervais and Wilson (2005), the contagiousness of laughter is thought to rest on the mirror neuron system—the same system responsible for collective yawns and the experience of empathy (see Rizzolatti & Craighero, 2004; Rizzolatti, Fadiga, Fogassi, & Gallese, 1999); the mirror neuron system, in turn, helps create a "shared manifold of intersubjectivity" between the two individuals (Gallese, 2003). We suspected that, in the case of shared laughter between people, this may be experienced consciously as a perception of being (metaphorically) one with the other. Thus, we tested associations between the behavior of shared laughter and a well-known scale that directly measures perceived overlap with a social partner, *inclusion of other in the self* (Aron, Aron, & Smollan, 1992). In keeping with the common label in the literature, hereafter we refer to this construct as closeness.

[2]It is also possible that shared laughter *causes* improvements in relationship well-being, though that novel empirical question is not the focus of the current investigation – our data cannot address this possibility.

Having a social "safety net"

One long-held view of a key social function of laughter comes from the assumption that present-day human laughter evolved from the open-mouthed play face that helps chimps know that the situation is benign (e.g., Davila Ross et al., 2009; Preuschoft & van Hooff 1997; Provine, 2000). In turn, this "safety" signal would allow the conspecifics to play freely (e.g., Matsusaka, 2004), helping them to foster their relationship and acquire important life skills (see review in Gervais & Wilson, 2005). Moving from one primate to another, in humans, it is plausible that repeated doses of shared laughter between members of ongoing relationships could be associated with a greater sense that one is "safe" in the hands of the relationship partner. Specifically, the perception that one's partner is supportive regarding one's needs and concerns is widely considered to work as a social psychological safety net that facilitates personal and relational processes (Collins & Feeney, 2000). Here, we tested the association between the behavior of shared laughter and a well-known scale that measures the perception of the partner's support (Sarason, Sarason, Shearin, & Pierce, 1987).[3]

Affective quality of the relationship

Laughter is assumed – across species - to be a behavioral marker of felt enjoyment or amusement (Davila Ross, et al., 2009), and other research has shown that voiced laughter elicits positive emotions in the listener (Bachorowski & Owren, 2001). In turn, positively-valenced moments between two people theoretically would be and empirically have been associated with global evaluations of the relationship that are also affective in tone (e.g., Algoe, Fredrickson, & Gable, 2013; Aron, Norman, Aron, McKenna, & Heyman, 2000). Relationship satisfaction and passion are two common relationship constructs considered to have largely affective bases. Satisfaction, for instance, has been conceptualized as one's affective evaluation of the costs and benefits one receives from a relationship partner, relative to one's expectations (Rusbult, 1980), while passion refers to the intense longing and accompanied physiological arousal one feels toward their romantic partner (Hatfield & Sprecher, 1986). As such, we included both as possible outcomes of shared laughter that may signal differences in overall affective evaluations of the relationship.

Finally, it is common in relationships research to include commitment as an additional measure when satisfaction and passion are used. Commitment is theorized to be the product of multiple constructs, including relationship satisfaction, perceived quality of alternatives, and size of investment into the relationship (Rusbult, 1980). Due to its multi-faceted nature, the theoretical link between shared laughter and commitment is not as tight as the previous measures. However, as relationship satisfaction is considered one of the primary components of commitment, there may be a similar underlying affective path through which shared laughter is related to commitment.

[3]This prediction comes from theory that perceptions of support develop from (are caused by) shared laughter; an alternative, of course, is that perceptions of support provide the sense of safety required to experience positive emotions (and thus produce laughter) in the first place (see Fredrickson, 1998). For the present investigation, we are simply interested in whether an association exists at all and our method does not allow us to distinguish between these possibilities.

The Current Investigation

In the present work, we systematically observed spontaneously generated laughter during a naturalistic lab-based conversation between members of romantic relationships. We then tested the novel hypothesis that the amount of *shared laughter* during that conversation would be associated with qualities of the relationship reported prior to the conversation. Importantly, it bears acknowledgment that the classification of shared laughter necessarily situated all other laughter that occurred in these interactions as “unshared”. Moreover, our argument for shared laughter as an independent relational marker was reliant on the assumption that these remaining unshared laughs would not provide the same information as their shared counterparts. Specifically, drawing from the existing literature, we hypothesized that, whereas shared laughter would have all the qualities to situate it as a consistently positive relationship marker (i.e., positively associated with the aforementioned measures of relationship well-being), the relational signal value of unshared laughter would be less clear: unshared laughter might represent anything from an affiliative signal to a benign misunderstanding or even ill-intended mockery.

One strength of our method for observing shared laughter was that it allowed us to also observe all unshared laughter during the conversation. In turn, we were able to rule out alternative explanations that might have otherwise accounted for our primary hypotheses regarding shared laughter. For one, while previous theory might posit all laughter as a pro-relationship behavior, due to its assumed association with positive affect more broadly, we tested the possibility that shared laughter provides independent signal value by controlling for all other laughter that occurred during the conversation. Additionally, using the lens of relationship and social psychological science, we explored alternative theoretical models of the unshared laughter that may be of interest for future researchers attracted to this topic. Next, while we had no specific hypotheses regarding gender differences, we nevertheless tested for moderation by gender due to frequent discussion of this factor in the broader literature on humor use (e.g., Bressler, Martin, & Balshine, 2006, Bressler & Balshine, 2006, Ziv & Gadish, 1989). Finally, as a supplementary bridge to related literature, we examined how all bouts of observed laughter related to an established observational coding of laughter-eliciting humor (Coan & Gottman, 2007). Although related, the current construct of shared laughter and the existing classifications of humor use within social contexts have clear methodological and conceptual differences. When coding an interaction for humor, one must infer the meaning and intention behind each attempt (e.g., was the humor attempt positive or negative, affiliative or aggressive?). Moreover, information about whether the humorist laughed is often irrelevant to the research aims and is consequently overlooked. Our conceptualization of shared laughter focused directly on the observable behavior of both people to address a different research question. That is, our interest was not in testing whether one person’s affiliative intentions were associated with either person’s relationship well-being; instead, we were interested in whether simultaneous laughing behavior—regardless of its cause—is a marker of relationship well-being.

The current investigation of the shared behavior as observed in its social context represents one of the most thorough and objective investigations of the relational consequences of laughing with a relationship partner to date. We see it as an important first step.

Method

Participants and Procedure

Seventy-seven heterosexual romantic pairs (N = 154) enrolled after receiving an e-mailed announcement sent to > 11,000 employees of the University of North Carolina at Chapel Hill.[4] Participants were predominantly in their twenties and thirties (M = 28.04 years, SD = 8.18) and reported an average relationship length of 4.17 years (SD = 4.93). Approximately 76.4% of the sample identified as White/Caucasian and 60.3% reported having obtained at least a bachelor's degree.

The current investigation focused on data from a 1.5-hour lab session that the couple attended together as part of a larger study designed to observe "Everyday Couple Interactions" (see description of several different tasks from that study described elsewhere: Algoe et al., 2013; Algoe & Way, 2014). Specifically, in the lab, after independently completing relationship well-being questionnaires,[5] couple-members participated in a series of videorecorded interactions; all but one involved one partner disclosing to the other. The current investigation targeted behavior from the remaining interaction, which was their first conversation in the lab —a mutual discussion of how the couple first met. This elicitation method was inspired by prior research (Bachorowski, Smoski, & Owren, 2001), but more relevant to the close relationship context under investigation here. In short, the conversation topic was mutual, positive in valence, and likely to elicit spontaneously-generated moments of shared laughter.

Shared Laughter

Six couples were removed from the sample due to technical errors that prevented coding of shared laughing behavior (i.e., missing visual or audio components of the recording). Couples engaged in an audio/videorecorded conversation in which they discussed how they first met, for approximately five minutes (M = 4.01 minutes; SD = 1.31; range = 1.43 to 5.91). Spontaneously generated laughter was quantified using a time-based microanalytic coding scheme which was designed to isolate the seconds during which both couple-members were laughing throughout the interaction.

A trained judge watched the recorded conversation with a view of just one member of the couple, noting the onset and offset times of every laugh, using Noldus Observer XT 10 software. A laugh was defined as any behavior that would be considered a laugh if the judge were to hear or see it in everyday life (see Smoski & Bachorowski, 2003). Once the first member of the pair had been coded, the judge would restart the video and repeat the process for the other participant. A separate judge also coded 25 of the interactions to verify the reliability of the onset and offset times for the master judge. Of these 25 interactions, the two judges agreed within a one-second window 91.24% of the time. The master judge's codes were then used to automatically categorize each laugh segment into those that were shared with the partner (i.e., happening simultaneously with the partner's laughter), and

[4]Three same-sex couples participated but are not included here due to limitations of the data analytic technique.
[5]We note that the only redundant aspect of the current study design with prior publications from this dataset is that it also uses the global measure of relationship satisfaction as one of several measures of interest here.

those that were unshared (i.e., did not overlap with the partner's laughter). Figure 1 depicts the time course of laughter segments across a horizontal axis for an example participant (top row) and his or her partner (second row).

A notable strength of the micro coding scheme is that it allowed for a detailed examination of laughing behavior between dyad members. As demonstrated in Figure 1, beyond pulling out only the time during which the couple shared laughter ("C" segments in the bottom row of Figure 1), it was possible to explore a more nuanced look at the amount of unshared laughter that occurred during the interaction. For example, prior research on "antiphonal laughter" showed that acquainted rather than unacquainted pairs were more likely to laugh *within two seconds of* a social partner's laugh (Smoski & Bachorowski, 2003); in the current work, we approached laughing behavior from a different theoretical angle, focusing specifically on the signal value of temporally *simultaneous* laughter (and see Footnote 1). However, that work led us to speculate that the time spent in unshared laughter *immediately leading into, sandwiched between, and immediately trailing after* a shared laugh is actually psychologically ambiguous territory. This is especially true in contrast with unshared laughter that did *not* bump up against moments of shared laughter – that is, pure unshared laughs. Such pure unshared laughs might have their own signal value regarding the laugher's interest in or perception of the relationship (De Koning & Weiss, 2002). As such, we isolated various instances of unshared laughs into separate categories for hypothesis testing (see example segments A, B, D, E, F in the bottom row of Figure 1).

Total durations for each laughter classification were computed and divided by overall conversation duration to standardize the metric across couples. For the current study, five separate laughter proportions were calculated. For each couple, we computed a shared laughter proportion (i.e., shared laughing duration over conversation duration) and a proportion to account for *all other laughter* that occurred during the conversation, which we call "total unshared laughter" (i.e., all unshared laughter time from either couple member over conversation duration). For each individual participant, we computed three separate proportions: one to account for *all the participant's laughter not shared by the partner* (i.e., unshared participant laughter), and two that break down this unshared laughter into proportion of time spent in *pure unshared laughter* and proportion of time spent in *ambiguous unshared laughter*.

Relationship Well-Being

As a measure of relational closeness, participants responded to the one-item inclusion of other in the self scale (Aron, Aron, & Smollan, 1992). This scale asks participants to indicate which of seven overlapping circles best represents their relationship, with greater overlap corresponding to higher values (i.e., 1–7) and greater closeness. Participants' perceptions of their partner's social support were measured with seven items on five-point scales (e.g., "To what extent can you turn to this person for advice about problems?"; Sarason et al., 1987; $\alpha = .75$). Higher averaged item ratings represent greater perceived support from the partner. Relationship satisfaction was assessed using Hendrick's (1988) seven-item scale. ($\alpha = .81$). Sample items include: "How well does your partner meet your needs?" and "How good is your relationship compared to most?" Responses for each item

range from one to seven with higher values corresponding to greater relationship satisfaction. Passion was measured using the Hatfield and Sprecher (1986) passionate love scale. This scale asks participants to indicate the extent to which each of fourteen statements applies to their relationship on a seven-point scale (e.g., "I possess a powerful attraction to my partner." $\alpha = .83$). Higher averaged scores correspond to greater passion. Finally the investment model scale (Rusbult, Martz, & Agnew, 1998) was used to measure commitment to the relationship. This seven-item assessment similarly asks participants to indicate how much each statement applies to his/her relationship on a seven-point scale (e.g., "I want our relationship to last for a very long time." $\alpha = .83$). Again, higher scores reflect greater commitment.

Supplementary Coding: Laughter-Eliciting Humor

For descriptive information about how the micro-coded laughter might be related to the measure of laughter-eliciting humor use established in the empirical literature on close relationships, we modified the humor dimension of the Specific Affective Coding System (i.e., SPAFF, Coan & Gottman, 2007). The SPAFF is an encompassing coding system; it consists of eighteen separate behavioral dimensions, one of which is humor, and requires that coders simultaneously consider participants' facial expressions, verbal content, and vocal tone when evaluating the interactions. We focused only on the humor dimension as that was most relevant for the current investigation, although it bears noting that SPAFF instructions explicitly indicate that the humor code cannot be used in isolation from the 17 other dimensions.

This caveat considered, three independent coders classified each micro-coded laugh based on the SPAFF definition of humor, which requires that a moment be marked by *shared amusement*. Indicators of humor include: good-natured teasing, wit and silliness, private jokes, fun and exaggeration, and nervous giggling. Counterindicators (i.e., behaviors that should not be counted as "humor" but instead fall into one of the other behavioral dimensions) include: unshared humor, tense humor, affectionate humor, belligerent humor, and contemptuous humor. Each micro-laugh was marked as one of these 10 classifications. At least two coders agreed on 89.90% of the laugh classifications. A final code was decided for each laugh based on majority response, or, in the case of no agreement, by the designated master coder's classification. All laughs categorized as belonging to one of the five humor indicators were summed for a total humor score for each couple; the remaining laughs (i.e., those classified as counterindicators) were similarly summed for a total counterindicator score for each couple.

Results

Analysis Plan

Below, we have provided descriptive information regarding the measures collected in the study, followed by the results of primary hypothesis tests regarding shared laughter's associations with relationship quality. To address our hypotheses, we tested the effects of shared laughter while controlling for other laughter that occurred during the interaction in three different ways. First, to rule out the possibility that the relational correlates of shared

laughter are simply the relational correlates of laughter or positivity more broadly, we tested shared laughter controlling for all other (i.e., unshared) laughter the couple produced during the conversation. Second, we took a more social-contextual approach by evaluating shared laughter's relational effect while controlling for each couple member's unshared laughter individually (i.e., the unshared laughter produced by the reporting participant as well as the unshared laughter produced by the reporting participant's partner, entered separately into the models), to see if one person's unshared laughter might provide a clearer understanding of shared laughter's effects. Third, we considered the possibility that the ambiguous unshared laughs, although objectively unshared, might be perceived as and thus operate similarly to shared laughs with regard to their relational correlates due to temporal proximity to the shared laugh (Smoski & Bachorowski, 2003). As such, we tested shared laughter's effects while separately controlling for the participant's own pure and ambiguous unshared laughs. Following these results, we have provided supplementary descriptive analyses that address how the currently observed shared and unshared laughter classification relates to prior research on humor within social interactions.

To account for the dependence in couple-member reports regarding relationship well-being, multilevel models were constructed using HLM 5 (Raudenbush, Byrk, Cheong, & Congdon, 2000), with individuals nested within couples. Shared laughter was always entered as a level two predictor; unshared laughter was entered at level two when combined across the couple (i.e. total unshared laughter), and level one when referring to the participant's produced unshared laughter or his/her partner's produced unshared laughter. Each of the level one outcomes detailed in the introduction (i.e., participant's felt closeness, social support, relationship satisfaction, passion, and commitment) were then regressed on the aforementioned laughter variables. We also tested whether effects were moderated by participant sex; these models included a main effect for sex as well as interaction terms for each of the model's predictors. We only reported results of these exploratory sex-differences analyses when they were statistically significant at $p < .05$, for clarity of presentation. Models are described further in each section.

Spontaneous Laughing Behavior between Partners

From the recorded interactions, a total of 1399 laughter segments were observed: 256 shared laugh segments, 643 pure unshared laughs, and 500 unshared laugh segments leading into, trailing after, or sandwiched between shared laughs (i.e., ambiguous laughs). On average, couples engaged in 3.55 shared laughs each (*Range*= 0 – 20, *SD* = 3.58), shared laughing segments lasted 1.49 seconds (*SD* = 1.14), and did not differ from pure unshared laughing segments in duration, $t(897) = 0.31$, $p = .76$. Couples who engaged in a lot of shared laughter were also likely to have higher amounts of solo laughter, as shared laughter and couple-level total unshared laughter were moderately and positively correlated ($r = .58$, $p < .001$). A full break-down of all laugh counts and average duration of each type can be found in Table 1.

Generally, the females in the sample laughed more than the males, accounting for 708 (i.e., 61.94%) of the 1143 coded laughs. Likewise, female participants laughed for longer during the conversation, averaging nearly double the total laughing time of a typical male (M_{women}

= 19.01, SD_{women} = 13.82; M_{men} = 10.41, SD_{men} = 9.76); however, this difference was not statistically significant, $t(1397) = -0.46$, $p = .65$. These overall sex differences extended to how contagious one's laugh was: a logistic regression revealed that an unshared laugh was 1.73 times more likely to spark a shared laugh if it were produced by a male rather than female, $\chi^2(1) = 12.13$, $p < .001$. Moreover, female participants were 1.50 times more likely to continue on laughing following a shared laugh than were male participants ($Count_{Women}$ = 146, $Count_{Men}$ = 98, $\chi^2(1) = 20.52$, $p < .001$).

Descriptive Statistics Regarding Relationship Well-Being

In general, the sample was comprised of notably happy couples. On average, participants scored between the two upper most scale points on social support, relationship satisfaction, passion, and commitment. Responses to the closeness measure were slightly lower and exhibited greater spread and deviation. Means, standard deviations, and ranges for all five relationship measures are presented in Table 2.

Shared Laughter as an Independent Predictor of Relationship Well-Being

Shared laughter beyond all other couple-produced laughter—Results of initial multilevel models demonstrated that shared laughter independently predicted closeness and social support. Specifically, individuals belonging to couples with higher shared laughter durations reported feeling closer to and more supported by their partners, even when controlling for all other laughter during the conversation ($B = 13.50$, $p < .05$; $B = 3.49$, $p < .05$, respectively). Notably, the additional laughter that occurred during the conversation significantly predicted closeness in the opposite direction. That is, individuals belonging to couples that produced greater amounts of unshared laughs during the conversation actually reported feeling significantly less close ($B = -5.59$, $p < .05$). Shared laughing duration did not independently predict relationship satisfaction, passion, or commitment (See Table 3 for all results).

Interestingly, sex was found to moderate the effects of shared laughter on relationship satisfaction ($B = 4.04$, $p < .05$), passion ($B = 5.40$, $p = .001$), and commitment ($B = 9.82$, $p < .01$), but not closeness ($B = 2.33$, $p = .69$) or social support ($B = 2.78$, $p = .12$). Unstandardized simple slopes were calculated for the interactions that were statistically significant using the online tool offered by Preacher, Curran, and Bauer (2006). These analyses revealed that for female participants, shared laughter was not significantly associated with relationship satisfaction ($B = 0.65$, $p = .86$), passion ($B = -1.71$, $p = .60$), or commitment ($B = -7.63$, $p = .18$), but for male participants, the amount of shared laughter in the conversation significantly positively predicted each outcome ($B = 7.44$, $p < .05$; $B = 9.09$, $p < .01$; $B = 12.02$, $p < .01$, respectively). A graph depicting the moderated effect of shared laughter on passion can be found in Figure 2; the remaining effects (i.e., those for satisfaction and commitment) were visually similar. Sex also moderated the effect of *unshared* laughter on commitment ($B = -4.07$, $p < .05$), but in the opposite direction, with total unshared laughter having a moderately significant negative association with commitment for male participants ($B = -4.60$, $p = .08$), and no effect for female participants ($B = 3.53$, $p = .19$).

Shared laughter beyond participant's produced or partner's produced unshared laughter—Rather than collapsing all unshared laughs at the couple level as we did above, one may choose to break down unshared laughs into participant- or partner-produced for a more dyadically-driven examination. Indeed, a long tradition of research in social psychology has recognized that each member of a social interaction has independent effects on its real or perceived consequences (Jones & Nisbett, 1979). Within the literature on laughter and humor, many have posited that another person's laugh serves as a signal to the observer (here, the participant; e.g., Bryant & Aktipis, 2014), while another perspective (e.g., self-perception theory, Bem, 1972) might suggest that one's own laughter is an index of feelings about the relationship. Here, we thus separated the total unshared laughter from the prior analysis into unshared laughter produced by self or partner for additional information.

As in the prior analyses, shared laughter was significantly associated with greater closeness and social support, but did not significantly predict any of the three global relationship outcomes when controlling separately for self or partner-produced unshared laughter (See Table 4 for results). In short, the total unshared laughter composite duration used in the prior analysis does not appear to mask a stronger independent effect of either couple member's unshared laughter than shared.

Interestingly, however, beyond effects of shared laughter, this analysis also suggested independent contributions of participant- and partner-produced unshared laughter to the participant's reports about the relationship. Specifically, while participant-produced unshared laughter was not significantly associated with closeness, it did positively predict greater social support, satisfaction, and passion. In contrast, greater partner-produced unshared laughter predicted *less* closeness at marginal statistical significance and was not associated with social support, relationship satisfaction, or passion. Neither self- nor partner-produced unshared laughter were associated with commitment. See Table 4 for all unstandardized coefficients. With the exception of the differences in closeness, these findings suggest that the independent effects of unshared laughter on relationship quality after accounting for shared laughter seem to be driven mostly by those unshared laughs that were participant-produced.

Again, sex was found to moderate the effect of shared laughter on passion ($B = 3.92$, $p < .05$) and commitment ($B = 9.33$, $p < .01$), with each effect being significant for male participants ($B = 7.42$, $p = .01$; $B = 10.93$, $p < .01$, respectively), but not for female participants ($B = -0.42$, $p = .91$; $B = -7.73$, $p = 0.19$, respectively). Sex did not moderate effects of participant-produced or partner-produced unshared laughter.

Shared laughter beyond different categories of participant's own unshared laughs—Results of analyses testing shared laughter controlling separately for participants' own pure and ambiguous unshared laugher are presented in Table 5. Consistent with prior analyses, shared laughter independently positively predicted closeness and perceptions of social support. In this analysis, greater shared laughter was also associated with significantly higher relationship satisfaction and passion. Thus, the potentially unique signal value of different types of the participant's own unshared laughter – whether pure or ambiguous--as

indicators of relationship well-being did not account for the effects of shared laughter on these outcomes.

This is despite the fact that the current analyses suggest distinctions between pure and ambiguous unshared laughing durations may be warranted. Specifically, while more pure unshared laughter significantly positively predicted participants' greater perceptions of social support, passion, and commitment, more ambiguous unshared laughter significantly predicted greater relationship satisfaction but also *less* felt closeness and commitment.

The effect of shared laughter on passion was again moderated by sex ($B = 3.51$, $p < .05$), with the effect significant for male ($B = 8.18$, $p < .01$), but not for female participants ($B = 1.17$, $p = .69$).

Supplementary Analyses

Shared laughter relative to shared humor—We were curious about the extent to which the laughter segments we observed would have been captured by the SPAFF coding system's indicators and counterindicators of humor. Results show that 247 (i.e., 96.5%) of the shared laughs were coded as one of the 5 humor indicators, whereas 572 (i.e., 88.96%) of the pure unshared laughs were coded as one of the counterindicators. Interestingly, the classifications for the unshared laughs before, between, or after shared laughs were less predictable, with approximately half (i.e., 48%) coded as indicators. Indicator totals for a given couple ranged from 0 to 55, with an average of 11.18 ($SD = 10.29$), whereas counterindicator totals ranged from 2 to 22, with an average of 8.24 ($SD = 3.93$). The humor indicator count variable was highly correlated with the micro-coded shared laughing durations ($r = .74$, $p < .001$) and moderately correlated with the combined unshared laughing duration ($r = .46$, $p < .001$); the counterindicator variable was not significantly correlated with shared laughter ($r = .07$, $p = .59$), but was moderately correlated with the combined unshared laughing durations for each couple ($r = .31$, $p < .01$). In sum, the micro-coding of shared laughter appears to cover a narrower range of behavior than does the SPAFF coding of shared humor within couple conversations, and the moderate correlations suggest that, although similar, shared laughter is not the same as laughter-eliciting humor.

Discussion

Researchers across multiple disciplines – including but not limited to anthropology, biology, clinical psychology, ethology, neuroscience, and social psychology - have claimed that laughter plays an important role in social life. Here, we have provided rare evidence linking the behavior to social outcomes within ongoing relationships. Beyond methodological contributions, we built on prior evidence as well as social psychological theory to hypothesize and find *shared laughter* to be an independent predictor of relationship outcomes, even beyond the other laughter occurring during the interaction. In addition, analyses that included either partner's unshared laughter or considered the relative timing of the participant's own unshared laughter demonstrated complexity in interpreting the value—and in some cases, detriment—of unshared laughter during a positively-valenced conversation. Of all the laughter evaluated, shared laughter was consistent in its independent positive associations with relational closeness and perceptions of partner supportiveness,

whereas associations between unshared laughter and any given relational outcome were dependent on the precise analytical model or research question that was being tested. Interestingly, some of the results indicated that, for men, shared laughter may be particularly diagnostic of the overall quality of the relationship, including satisfaction, passion, and commitment. We discuss implications of these findings below.

Putting Laughter in Context: The Concept of Shared Laughter

Laughter does not occur in a social vacuum: most instances of laughter arise in social contexts. This fact alone positions laughter as both interesting and potentially important for social life. Recent advances in relationship science have provided both the theory and methods to tackle these questions in systematic and rigorous ways going forward. Here, we took one approach to provide information about how laughing behavior, observed in context, is associated with feelings about one vitally important social partner.

Specifically, we drew from theory to suggest a particular moment of laughter that would be especially telling about the nature of the relationship with the social partner: shared laughter. On the one hand, we drew from theory to recognize that any unshared laughter during the interaction lands in more ambiguous territory than shared laughter, and requires understanding of additional situational constraints before one would be able to predict whether it will have positive, negative, or neutral effects. For example, prior literature on observed laughter in a relational context requires inference regarding benevolent intent of the person who caused the laugh (Coan & Gottman, 2007). Yet even more important than side-stepping the potential interpretive difficulties of unshared laughter, the literature on primate laughter (Davila-Ross, et al., 2009) and neurophysiology (Rizzolatti & Craighero, 2004; Rizzolatti, et al., 1999) actually suggests that shared laughter will be particularly potent for solidifying a connection between the two people and making them feel safe. We believe our evidence substantiating these possibilities in humans lays an important foundation for theory development and simultaneously illuminates a path forward for hypothesis tests regarding the causal role of shared laughter in relationship development as well as potential mechanisms for such effects.

In fact, it was interesting that, on average (i.e., collapsed across genders), shared laughter was not consistently associated with global evaluations of satisfaction, passion, or commitment. There may be a variety of explanations for these discrepancies. For instance, it is possible that the highly positive nature of the interaction or the happy couples that comprised our sample operated to obscure links between shared laughter and the more affectively-based measures of relationship well-being. Alternatively, the discrepant results may simply be the result of basic differences in level of analysis, with satisfaction, passion, and commitment providing tree-top, global evaluations of the relationship, compared to the more focused, process-driven constructs of perceived social support and closeness. Future research examining the production of shared laughter within more affectively neutral interactions, and with a more diverse sample, may provide some insight into these open questions.

Moreover, the consistent links with closeness and felt support will be important targets for future investigation of the ways in which shared laughter may indirectly support overall

relationship quality and even personal adjustment. There is growing consensus that close relationships can not only help people survive, but also to thrive, and increasing attention has been placed on the everyday emotion-fueled interpersonal processes that may underlie these effects (e.g., expressions of gratitude, Algoe et al., 2013; social support, Collins & Feeney, 2000; capitalization, Gable, Gosnell, Maisel, & Strachman, 2012). Moments of shared laughter may be another such feature of high quality relationships that makes people feel they have the resources necessary to explore and grow, both together and individually (also see Aron et al., 2000). We see these as exciting future directions from this work.

Behavioral Measure of Laughter in Social Interaction

The reason we were able to test our hypotheses is that we used an objective coding scheme that allowed for temporal matching of laughs while accounting for other laughter that occurred within the conversation. We believe this novel method provides a contribution to the literature for several reasons. Perhaps most obviously, it provides a direct and objective assessment of laughing behavior in social context without the need for an elaborate training process for coders. Additionally, because it captures the onset and offset of each person's laughter, it allows for precise theoretical tests that had previously gone overlooked; here, we focused on our novel hypotheses regarding shared laughter.

Notably, the fine-grained nature of the current coding method allowed us to rule out three alternate possibilities for shared laughter's relevance to closeness and perceived social support. First, prior literature has suggested that laughter may be a signal of positive affect or enjoyment (Davilla et al., 2009), which may lead to the prediction that any laughter in the conversation (particularly in the current positively-valenced relationship context) would be positively associated with relationship outcomes; controlling for all other laughter that occurred ruled out the possibility that the observed associations of shared laughter were simply the associations of laughter more broadly. Second, the relationship science literature in particular has drawn attention to the fact that a person's own behavior and the partner's behavior may differentially account for relationship ratings (e.g., Gable, Reis, & Downey, 2003). Our analyses controlling for the separate influences of self-produced and partner-produced additional laughter ruled out the possibility that the prior analysis was merely masking a person-perception explanation. Third, prior research that has focused on laughter in the social context addressed different questions related to the contagiousness of laughter, focusing on the relational antecedents of laughter that occurred within a two-second window of the social partner's laugh (Smoski & Bachorowski, 2003); our analyses partialling out the independent effects of temporally shared laughter from the psychologically-ambiguous zone of unshared laughter that happens just before, between, or after shared laughs highlight the potential novel contribution of the construct of shared laughter for understanding the power of this behavior in social processes.

While there is much value in addressing research questions pertaining to relational correlates of laughter-eliciting humor use (e.g., Carstensen et al., 1995), Duchenne laughter (Bonanno et al., 2007), and antiphonal laughter (Smoski & Bachorowski, 2003), we believe the current findings provide support for the notion that shared laughter, as suggested by prior literature, may be an especially powerful source of relational glue, worthy of study in its own right. In

sum, the observation of temporally shared laughter presents important opportunities for precisely testing theory regarding the psychological mechanisms through which this behavior may be important for social life.

A Closer Look at Unshared Laughter

Although the focus of the present investigation was on shared laughter, our analyses revealed some interesting findings regarding unshared laughter that are worth noting. Some of these findings were consistent with prior literature while others present interesting avenues for future research. Here, we present possible explanations and support for each finding, but caution against over interpretation; additional research directed specifically at unshared laughing behavior within a social context is needed for more solid understanding.

First, while shared laughter rarely predicted the global relationship outcomes of satisfaction, passion, and commitment, unshared laughter was consistently associated with relationship satisfaction. This particular finding is most consistent with prior work on laughter-eliciting humor (e.g., Carstensen et al., 1995). Moreover, the association between unshared laughter and relationship satisfaction appears to have been driven by the participant's own unshared laughter—especially that which surrounded moments of shared laughter. This temporally-derived detail is consistent with the previous work on antiphonal laughter (Smoski & Bachorowski, 2003). Interestingly, and inconsistent with prior work, this same ambiguous unshared laughter was associated with *less* closeness and commitment. On the other hand, moments of pure unshared laughter were associated with greater passion and commitment. Understanding when and why these temporally-distinct moments of unshared laughter might have positive, negative, or neutral relational effects remains an intriguing area for future research. Prior work on Duchenne laughter (e.g., Bonanno et al., 2007) and teasing in social context (Campos, Keltner, Beck, Gonzaga, & John, 2007; Keltner, Young, Heerey, Oemig, & Monarch, 1998) will likely provide rich sources for hypothesis generation.

Gender Differences

Although also not a primary focus of the current paper, a number of gender differences were observed with regard to frequency, contagion, and relational impact of laughing behavior. Specifically, if a man were to begin laughing, there was a greater likelihood that his laugh would spark a shared laugh from his partner than vice versa. Moreover, women were more likely than men to continue laughing following a shared laugh. With respect to the relational correlates of shared laughter, it appears that the signal value of shared laughter may be stronger for men than for women. While shared laughter was never associated with commitment for women, the two were found to be significantly associated for men in two different analyses. Likewise, while greater shared laughter consistently predicted higher reports of passion for men, the two were uncorrelated for women.

Combined, these effects suggest that shared laughter may be a particularly diagnostic relationship behavior for men. Extended to related literature, these data provide some support for conclusions drawn from the research on humor and attraction. Indeed, previous work has shown that while women value male partners who can make them laugh, men are more likely to be attracted to women who appreciate their humor use—women who will

laugh at their jokes (Bressler et al., 2006). Shared laughter may therefore serve as a stronger symbol of understanding and validation for men than for women—a signal that their partner "gets" them. This validation may in turn map onto the more global relationship evaluations measured here (e.g., passion), however a direct test of this pathway is beyond the scope of the current study.

It may also be the case that the observed gender differences are the function of some underlying individual or relational differences between the male and female participants, such as their trait agreeableness or perhaps an implicit power structure. Indeed, previous theorists have situated humor use as a behavioral marker of status and power (Gruner, 1997), and there is some research, especially on the use of teasing and aggressive humor within relationships, in support of this notion (e.g., Kehily & Nayak, 1997; Keltner et al., 1998; Tragesser & Lippman, 2005). Insofar as one's gender indicates one's status, it may be that the women in the current sample, as lower status individuals, felt more inclined to join in when their higher status counterparts began laughing, as a show of solidarity or agreeableness. In turn, this culturally-expected function may leave women less likely to interpret their own laughter, consciously or not, as a unique behavioral marker of relationship quality.

Future research directed at exploring these possibilities as well as evaluating the consistency of the observed gender differences across different interactions and relationships (e.g., same-sex friend or romantic pairs) may prove especially enlightening. Moreover, while the current study measured gender with one item, future research might utilize measures better suited to test the extent to which the observed differences might be biologically or culturally-driven.

Limitations, Future Directions, and Conclusions

Though the current study provides initial evidence for shared laughter as a behavioral index of relationship well-being, there remain a number of interesting questions and areas for future research. First, here we targeted shared laughter within a positively valenced conversation. While this particular context allows for a relatively conservative test of shared laughter's independent effects beyond other laughter that occurred, it will be interesting to examine the frequency, duration, and relational implications of shared laughter across different types of situations, such as conflict (see Gottman & Levenson, 1999). Interestingly, work on positive emotions suggests they are especially useful in times of stress (see review in Algoe & Fredrickson, 2011); the extent to which the same is true of shared laughter amidst more difficult interpersonal contexts may be particularly relevant for future research. Likewise, an additional contextual factor that may influence the social impact of shared laughter is the type of relationship itself. While the current study examined shared laughter between romantic pairs, theory suggests that findings using the microanalytic laughter coding scheme will extend to other forms of social relationships, although this remains to be tested.

Next, although the current study was based on theory that repeated instances of shared laughter accumulate to cause relationship benefits, the correlational methods do not allow for such causal interpretation. Perhaps just as plausibly, couples that already feel close and supported may in fact be more likely to elicit shared laughter than those in either

unestablished or lower quality relationships. The current sample was indeed comprised of largely young, satisfied couples. Replicating these findings on a more individually and relationally diverse sample while also employing an experimental manipulation of shared laughter will prove necessary for testing a causal association between shared laughter and relationship outcomes. Once established, uncovering the potential mechanisms through which shared laughter might operate to produce relational wellbeing, or vice versa, will also provide invaluable information to help understand the potential utility of this pervasive behavior within budding and established relationships alike.

In sum, evidence from the current study provides an important first link in the empirical chain of discovery by introducing an objective method to assess the behavior of shared laughter as well as first tests of its role in relationship health. We believe emerging statistical sophistication and theoretical strides in relationship science (e.g., Reis, 2007) provide ample tools for future researchers to advance understanding of laughter's role in social life. Such tools will be especially useful for testing the important next questions regarding shared laughter, an inherently dyadic and surprisingly empirically overlooked social behavior which, through its frequency in social communication, stands to have great influence on one's most critical relationships.

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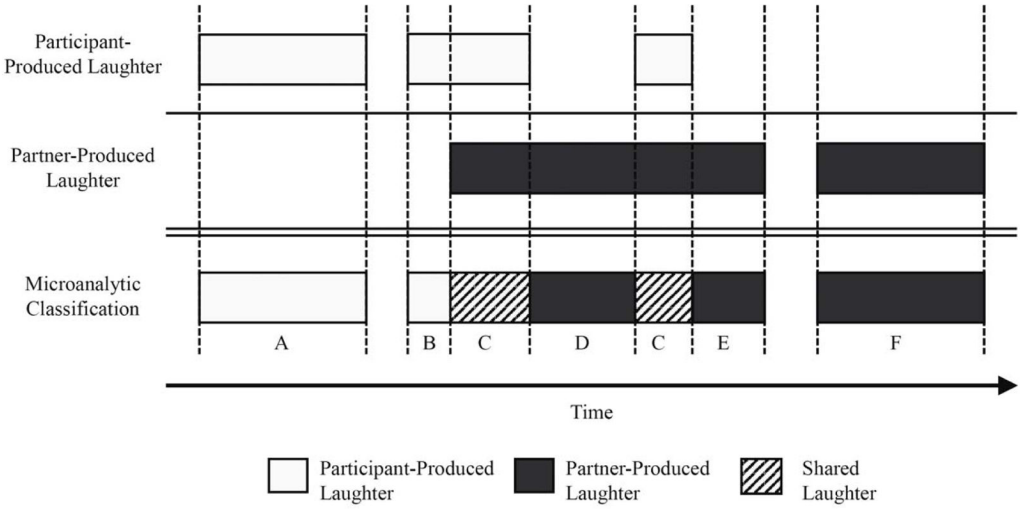

Figure 1.

Sample Pictorial Depiction of Micro Shared Laughter Coding Scheme.

A: Pure unshared laughter, self-produced

B: Ambiguous unshared laughter before shared laughter, self-produced

C: Shared laughter

D: Ambiguous unshared laughter between shared laughs, partner-produced

E: Ambiguous unshared laughter after shared laughter, partner-produced

F: Pure unshared laughter, partner-produced

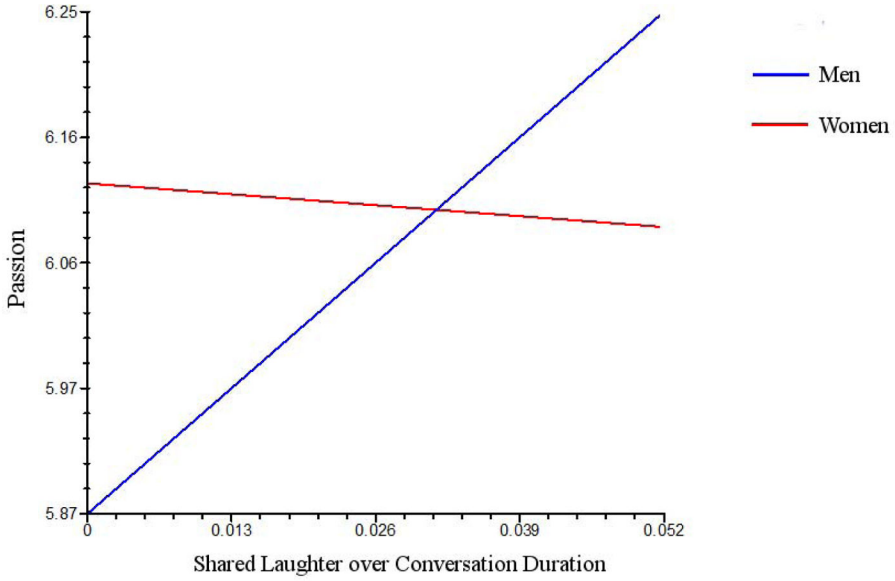

Figure 2.
Sex Moderation of Shared Laughter's Association with Passion

Table 1

Frequencies and Average Durations for Micro-Coded Laughter Segments

	Frequency			Average Duration in Seconds *M* (*SD*)		
Micro-Coded Classification	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Shared Laughter	-	-	256	-	-	1.49 (1.14)
Pure Unshared Laughter	184	459	643	1.31 (.84)	1.53 (1.15)	1.47 (1.08)
Ambiguous Unshared Laughter	203	297	500	.61 (.67)	.94 (2.19)	.80 (1.75)
Before Shared Laughter	100	144	244	.63 (.76)	.61 (.70)	.62 (.73)
Between Shared Laughs	5	7	12	1.07 (.58)	1.01 (.53)	1.04 (.53)
After Shared Laughter	98	146	244	.57 (.56)	1.25 (3.02)	.98 (2.38)

Table 2

Descriptive Statistics for Relationship Outcomes

Outcome	Range	Mean (SD)
Closeness	1.00 – 7.00	5.19 (1.28)
Social Support	3.00 – 5.00	4.54 (.46)
Satisfaction	3.43 – 7.00	6.07 (.67)
Passion	3.71 – 7.00	6.06 (.64)
Commitment	2.71 – 7.00	6.58 (.76)

Table 3

Unstandardized Coefficients from Multilevel Models Regressing Relational Wellbeing on Micro-Coded Shared and Total Unshared Laughter

Outcome Variable(L1)	Shared Laughter (L2)		Total Unshared Laughter (L2)	
	B	SE	B	SE
Closeness	13.50*	5.72	−5.59*	2.79
Social Support	3.49*	1.60	0.84	0.70
Satisfaction	3.35	3.07	3.44**	1.24
Passion	3.69	2.48	1.47	1.17
Commitment	2.19	3.68	−0.53	2.05

Note.

* $p<.05$.

** $p<.01$.

Table 4

Unstandardized Coefficients from Multilevel Models Regressing Relational Wellbeing on Micro-Coded Shared and Participant and Partner Produced Unshared Laughter

Outcome Variable (L1)	Shared Laughter (L2)		Participant Unshared Laughter (L1)		Partner Unshared Laughter (L1)	
	B	SE	B	SE	B	SE
Closeness	13.50*	5.72	−5.93	4.27	−5.25+	2.87
Social Support	3.57*	1.60	2.07*	0.87	−0.55	0.84
Satisfaction	3.43	3.08	4.40**	1.25	2.30	1.43
Passion	3.69	2.48	2.59*	1.23	0.34	1.32
Commitment	2.19	3.68	0.78	1.97	−1.85	2.45

Note.

+ p=.07,

* p<.05.

** p<.01.

Table 5

Unstandardized Coefficients from Multilevel Models Regressing Relational Wellbeing on Micro-Coded Shared and Participant-Produced Pure and Ambiguous Unshared Laughter

Outcome Variable (L1)	Shared Laughter (L2)		Pure Unshared Laughter (L1)		Ambiguous Unshared Laughter (L1)	
	B	SE	B	SE	B	SE
Closeness	12.79*	5.18	1.03	5.57	−13.62*	6.32
Social Support	4.28**	1.46	3.56**	1.12	−0.85	1.19
Satisfaction	5.32*	2.58	2.24	1.40	3.71*	1.70
Passion	5.97**	2.16	4.33**	1.39	−2.94	2.52
Commitment	3.48	2.57	5.20**	1.58	−6.23*	2.93

Note.

* $p<.05$.

** $p<.01$.