THE WEIGHT AND WAY OF SHARED LAUGHTER IN DYADIC RELATIONSHIPS

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ABSTRACT

LAURA E. KURTZ: The Weight and Way of Shared Laughter in Dyadic Relationships
(Under the direction of Sara Algoe)

Laughter is largely considered a social behavior and has been correlated with a number of relationship-relevant outcomes. Yet the majority of the existing research has employed methods that focus specifically on an individual's laughter, while neglecting to address the influence of the surrounding social context. We argue that when a laugh occurs within the presence of another person, as it most often does, whether or not the other person is also laughing (i.e., whether the laugh is shared versus solo) may have tremendous consequences for the pair's relationship. The current studies tested the hypothesis that shared laughter would promote relationship wellbeing via increased positive emotions, decreased negative emotions, and increased perceptions of similarity. A series of online and laboratory studies provide correlational and causal support for these hypotheses. Results are discussed in terms of their implications for future research pertaining to the importance of shared laughter within social contexts.

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Introduction

"Live, Laugh, Love"—the unofficial motto of female millenials across America. Whether added to the corner of an Instagram photo or decoupaged to a wooden sign in one's dorm room, these three words have become a prominent accessory of young adult life. But beyond their basic alliterative properties, what is it about these words that ties them together and imbues them with such widespread meaning and relevance? Well, to scientists and laypersons alike, the link between loving and living is increasingly clear. Repeatedly, research has shown that maintaining high quality relationships—those marked by love, commitment, and support—is beneficial for one's life. Such relationships provide individuals with a sense of belongingness and meaning (Stillman, Baumeister, Lambert, Crescioni, DeWall, & Fincham, 2009), and promote longer, healthier lives (House, Landis, & Umberson, 1988). Surprisingly, how laughter fits into the mix is notably less clear. What is known is that laughter is incredibly common. Throughout the course of a day, the average person will laugh approximately 18 times—the majority of which will occur in the presence of another person (Martin & Kuiper, 1999). These data alone highlight laughter's relevance to social life and situate the behavior as a likely contender for promoting relationship formation and maintenance. However, there is surprisingly little work on the topic of laughter within a social context (i.e., the laugh-love link). Instead, an overwhelming majority of the relevant research has utilized trait humor or the induction of amusement as a proxy for laughter, often employing methods that are ill suited for a proper examination of laughter as part of an interpersonal process. Understanding precisely how and why laughter might foster

healthy and meaningful relationships at all stages is the main focus of the current

investigation. Moreover, the current studies take a different approach to illuminate laughter's

role in social life, zooming in on what theory suggests is the most common and potentially

most salubrious instantiation of laughter in everyday life: the behavioral phenomenon of two

people laughing simultaneously, here termed *shared laughter*.

What do we know about laughter?

The existing research on laughter and amusement form a useful base for the current

studies and help make the case for studying shared laughter specifically. Individual

laughter—most often self-reported, but on rare instances behaviorally coded by observers—

and the emotional induction of amusement have been correlated with a variety of momentary

outcomes that might promote positive interpersonal relationships; these outcomes include:

emotional stability (Keltner & Bonanno, 1997), increased affiliation, liking, and closeness

(Keltner, Young, Heerey, Oemig,& Monarch, 1998; Smoski & Bachorowski, 2003), greater

social courage (Krys, 2010), and increased positive emotions (Bachorowski & Owren,

2001). Similarly, positive and affiliative humor use has been correlated with higher

relationship satisfaction (de Koning & Weiss, 2002; Ziv & Gadish, 1989; Butzer & Kuiper,

2008) and greater liking and love toward a romantic partner (Murstein & Brust, 1985), as

well as more effective conflict resolution (Campbell, Martin, & Ward, 2008), greater coping

ability (Overholser, 1992) and increased affection (Driver & Gottman, 2004).

Although the aforementioned research provides ties between laughter and relationship

relevant outcomes, the methods employed rely heavily on the experience and recollection of

one individual, while neglecting to address the social environment within which the laughter

or humor attempts likely occurred. Yet advances in relationships research have highlighted

just how much information might be missed by examining only one individual and instead emphasizes the importance of examining social behaviors through a dyadic lens (e.g., Diamond & Aspinwall, 2003; Gable & Reis, 2010). Accordingly, we propose a new classification of the behavior as it relates to the surrounding social context. Specifically, the proposed research aims to address the downstream relational consequences resulting from the response to the following question: Was the laugh met or shared with another's laugh or did it fall flat on the observer? We hypothesize that laughter that occurs within the presence of another and is likewise shared with the present other (i.e., both individuals laugh simultaneously) will lead to relational benefits; Laughter that occurs within the presence of another but is not shared (i.e., only one individual laughs) will be ambiguous at best and detrimental to the relationship at worst.

What good is shared laughter?

While greatly understudied, the concept of shared laughter is not entirely new. One study on romantic couples had couple-members reminisce together about a recent moment when they shared a laugh. This simple recall task increased participants' self-reported relationship satisfaction, relative to those participants who were asked to recall a moment when they had laughed with someone other than their partner (Bazzini, Stack, Martincin, & Davis, 2007). Smoski and Bachorowski (2003) coded audiotapes for what they termed "antiphonal laughter," between participant pairs playing various games. Antiphonal laughter is defined as laughter that follows or occurs during another's laughter. They found that participant pairs consisting of friends rather than strangers were more likely to produce antiphonal laughter, suggesting the relevance of social closeness to shared laughter (Smoski & Bachorowski, 2003).

Likewise, Gottman and colleagues have behaviorally coded hundreds of couples engaging in a variety of interaction tasks using the elaborate SPAFF coding system (Coan & Gottman, 2007). The SPAFF requires coders to note slight changes in facial expressions, vocal tone and content, and body posture for each of 16 potential codes—one of which is humor. Interestingly, humor according to the SPAFF is necessarily shared and may take a number of forms, from blatant joke telling to nervous giggling. Those instances in which only one person appears amused, whether following a hurtful joke or a much milder missed connection, are considered counterindicators and are thus not coded as humor. That is to say, all "humor" codes are actually instances of shared laughter or amusement and their established correlates (e.g., effective conflict resolution, playfulness, and happiness within romantic couples; Carstensen, Gottman, & Levenson, 1995; Driver & Gottman, 2004; Gottman, Coan, Carrere, & Swanson, 1998) can be interpreted as correlates to shared laughter as well.

Importantly, the SPAFF requires coders to gauge whether a humor attempt was intended to be and was taken as relationally positive. This distinction is often challenging to make, as some humor attempts may appear to have positive intentions but negative consequences (e.g., one person teases the other person playfully, but the target responds to the teasing in a less positive way than expected). Additionally, the necessary assumption of positive intention for the humor codes becomes easily confounded with the positive and relationship-focused outcomes with which the codes are associated. Making predictions about positive relationship outcomes based on codes that require the presence of positive, pro-relationship intentions is undoubtedly problematic and recursive. We argue that focusing on the behavior of laughter itself, rather than subjectively guessing each participant's

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underlying intentions preceding a laugh, is a cleaner, more objective way to test for laughter's impact on relationships. This strategy thereby avoids the issues of recursive reasoning and coder subjectivity while also allowing one to examine the specific relevance of shared laughter to relationship promotion.

Such a behavioral approach was taken in a recent study on laughter shared between romantic couples. Fourteen consecutive days of diary reports revealed that, controlling for the previous day's relationship satisfaction, participants who indicated laughing with their partner the previous day reported higher present day relationship satisfaction, relative to those participants who did not indicate laughing with their partner. Likewise, more shared laughter elicited spontaneously during a positively valenced interaction task (i.e., a discussion of how they first met) was correlated with greater relationship satisfaction, social support, commitment, and responsive behaviors (Algoe, Kurtz, & Fredrickson, in prep). The latter analyses were conducted while simultaneously controlling for solo laughing behavior, highlighting shared laughter's unique influence on the relationship. These findings provide preliminary evidence that shared laughter might be particularly well-suited for promoting relational outcomes and sets the foundation from which the current investigation builds.

While the previous study demonstrated the independent predictive capabilities of shared laughter, it did not test for if and how shared laughter might *cause* boosts in relationship outcomes. The current studies expand on the previous work by testing for a causal path between shared laughter and relationship promotion while also addressing *how* such outcomes may arise.

How might laughter promote relationship quality?

Existing theory within evolutionary psychology and research on emotions and close relationships point to three mechanisms through which laughter may operate to promote relational wellbeing: momentary boosts in positive emotional experience, buffered negative emotions, and greater perceived similarity. Importantly, while we hypothesize that each mechanism contributes independently to the overall effects of laughter on relational outcomes, they are not mutually exclusive. Indeed, we posit that these mechanisms work in concert with one another and the relative weight of any given one may be influenced by a number of situational factors. Here we review the existing literature in support of laughter's relationship with each of the proposed mechanisms as well as each mechanism's demonstrated association with key relational outcomes. Additionally, we build off existing theory to posit how each mechanism may operate to predict shared laughter's specific relational trajectory, relative to that of solo laughter.

Laughter as positive emotion elicitor. As noted previously, much of the research on laughter has used amusement as a proxy for laughing behavior; and to some extent, this substitute is an appropriate one. Indeed, laughter is widely considered the behavioral manifestation of amusement or mirth, and some theorists have further posited laughter as an expression of appreciation and interest in another (Weisfeld, 1993). Even in the face of adversity, laughter has been associated with greater positive emotional experience. One study found that when asked to report on frequency of laughter, magnitude of stressful life events, and positive and negative affect across three days, men who reported greater frequency of laughter also reported greater positive affect on days marked by higher life stress (Kuiper & Martin, 1998). Likewise, a study on bereaving individuals found that those who were coded

as expressing more duchenne laughter self-reported experiencing greater positive emotions than those low on duchenne laughter (Keltner & Bonanno, 1997).

Yet, these studies situate laughter as concurrent to or following from positive emotions. We argue that laughter, and specifically shared laughter, is not just a marker of positive emotions, but might actually elicit further positive emotions within a social interaction. There is some evidence to support these claims. An individual's genuine or Duchenne laughter has been implicated with elevated positive emotional experience for not only the laugher, but for outside observers as well (Bachorowski & Owren, 2001, Keltner & Bonanno, 1997). That is, watching and hearing another person laugh can provide an observer with a momentary boost of positive emotions.

In the context of a shared laugh, these data become even more meaningful. If two individuals are simultaneously laughing and observing one another laughing, the positive emotional yield from the interaction will likely be much greater than if only one person were laughing. Rather than only one person experiencing the relational benefits of positive emotions, these shared elevated positive states may alter both individuals' perceptions of the interaction and prime the environment for greater social connection.

Positive emotions and relationships. If considered within the framework of Fredrickson's (1998) Broaden and Build Theory of positive emotions, laughter's ability to elicit positive emotions may serve to promote relational outcomes via broadened thought-action repertoires. Specifically, the theory posits that while experiencing positive emotions, one's thoughts, awareness, and behavioral considerations are broadened. This broadened state thereby encourages the individual to engage in varied behaviors, exposing one to novel

environments and relationships. Over time, such exploration may enable one to accrue valuable resources in the form of new skills and relationships (Fredrickson, 1998).

In the case of a shared laugh, both individuals may simultaneously experience this broadening effect, thereby making each more likely to be receptive to engaging in novel and potentially pro-relationship behaviors with the other.

Laughter as negative emotion buffer. Laughter's emotional correlates are not restricted solely to positive emotions; the experience of negative emotions has also been implicated in laughter and humor research in a number of ways. One large body of research has focused on how laughter might be used as a way to cope with negative affective experiences (e.g., Overholser, 1992; Keltner and Bonanno, 1997), whereas another has highlighted how certain humor attempts may actually enhance negative emotions (Kuiper, Grimshaw, Leite, & Kirsh, 2004). Each of these subfields provide important information when considering how and when laughter might promote or dampen relationship quality.

Modern stress-reduction theories of laughter situate the behavior as a strategic emotion regulation tool, particularly in the context of negative life events or social interactions (Lefcourt & Martin, 1986). For an individual, humor use during stressful life events is predictive of decreased depression, less loneliness, and higher self-esteem (Overholser, 1992). Returning to the aforementioned study on bereaved individuals, Keltner and Bonanno (1997) also found that those who exhibited more Duchenne laughter reported fewer negative emotions and greater adjustment following the loss. Likewise, Kuiper and Martin's (1998) diary study on stressful life events revealed that higher self-reports of laughter seemed to buffer against stressful events, with both men and women reporting less negative affect on highly stressful days. Extended to the dyad, the buffering effect of laughter

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may play a key role within a conflict discussion or moment of self-disclosure. Such interactions are often marked by increased negative emotional experience (Harris, Dersch, & Mittal,1999). A strategically timed laugh may serve to lighten the mood and reaffirm that the situation is still safe, leading to more open communication and effective resolution, as repeatedly seen in romantic relationships (e.g., Carstensen, Gottman, & Levenson, 1995; Driver & Gottman, 2004). Of course, not all interactions within a relationship will be negatively valenced. Some may be ambiguous while others may be largely positive. Pulling from evolutionary theory, we argue that laughter's buffering effect is not restricted solely to negative social interactions but may extend to others as well.

Evolutionary theorists contend that human laughter evolved from the open-mouthed play face and accompanying panting noise exhibited by primates used to convey that the present situation is safe (Gervais & Wilson, 2005). Following this signal, conspecifics were free to explore and play with one another without fear of harm, subsequently strengthening social bonds and resources necessary for survival. What was a previously ambiguous social environment became a safe and positive one with the mere production of a laugh. This theory can be readily extended to the case of a budding relationship. Upon first meeting, one may be unsure of how the relationship will progress. This uncertainty can increase self-focus and heighten anxiety or worry over doing or saying something that may turn the other person away (see Mor & Winquist, 2002 for a review of self-focus and negative affect). A laugh may in turn ease this anxiety, allowing the two individuals to speak and act without worry of embarrassment or shame.

Of course, we do not wish to imply that all laughter is capable of such a buffering effect. In fact, certain forms of humor and laughter have been implicated with increased

feelings of negative emotions. For instance, the use of negative or aggressive humor—often marked by solo laughter directed *at* another individual—has been shown to induce strong self-conscious negative emotions (e.g., embarrassment) in the target (Keltner, Young, Heerey, Oemig, & Monarch, 1998). We instead argue that shared laughter specifically is likely to buffer against negative emotions, whereas common forms of solo laughter might actually do the opposite. While a shared laugh signals that both individuals recognize the situation as safe, a solo laugh might signal a discrepancy in each individual's interpretation of the situation. This point is further highlighted in the consideration of perceived similarity as a possible mechanism made later in this paper.

Negative emotions and relationships. Theory contends that repeatedly disclosing personally revealing information to another may foster greater feelings of intimacy within the relationship over time, so long as the receiver of the information is appropriately responsive (Reis & Shaver, 1988). We hypothesize that the interpersonal safety conveyed by laughing with another individual may facilitate this process by setting the stage for disclosure. Specifically, we argue that shared laughter buffers against self-conscious negative emotions, such as embarrassment or shame, that often impede self-disclosure, thereby expanding lines of communication and fostering greater levels of intimacy. Given the prevalent link between intimacy and relationship satisfaction (Reis, 1990), this momentary buffering effect may hold significant power for promoting greater intimacy and higher quality relationships over time.

A recent study provides preliminary support for this idea. Specifically, pairs of same-sex friends who were assigned to laugh together subsequently reported fewer self-conscious negative emotions (i.e., embarrassment, shame, and guilt) during and as a result of a self-disclosure than did those who had not previously laughed together. Those in the shared

laughter condition also indicated that it was easier for them to think of a topic to share than those in the other conditions (Kurtz, Algoe, & Fredrickson, in prep). These findings lend initial support to the notion that shared laughter promotes self-disclosure via decreased negative emotions. The current studies aim to extend these findings one step further by completing shared laughter's trajectory from buffered negative emotions all the way to relationship satisfaction.

Laughter as marker of similarity. The final mechanism through which laughter may promote relationship growth and maintenance is by increasing perceptions of similarity. The Benign-Violation Hypothesis of humor argues that laughter results from a situation that is recognized as both benign and a violation to one's worldview (McGraw & Warren, 2010). Extended to the case of a shared laugh, the theory would imply that if two people laugh at the same situation, they have both identified a benign violation to a shared worldview. In contrast, if only one person laughs at the situation, the two either interpreted the event differently (e.g., one may consider it benign whereas the other may view it as serious) or they may hold conflicting worldviews. Such common or conflicting interpretations and perspectives would likely manifest in the individuals' overall perceptions of similarity with one another. A shared laugh may leave an individual with the sense that the other person "gets" them and that they are on the same wavelength; while an unrequited laugh may signal a disconnect between the two, a sign that something is off.

Research on behavioral synchrony provides further support that shared laughter, as a synchronous behavior, may influence judgments of similarity. Observing two individuals waving or walking in synch with one another has been associated with greater outsider perceptions of pair entitativity and rapport (Lakens & Stel, 2011). Similarly, tapping a finger

in synch with an experimenter leads to greater reports of affiliation with that experimenter (Hove & Risen, 2009). As another form of synchronous behavior, it would follow that shared laughter would also likely spark perceptions of entitativity and rapport that would likewise lead to increases in liking and affiliation between two individuals. Moreover, the occurrence of shared laughter in everyday life is undoubtedly far more prevalent than shared finger tapping or hand waving, emphasizing shared laughter as a behavior worthy of detailed study.

It is worth noting that some solo laughter may also provide boosts in perceived similarity, particularly if the laughter is the result of a positive humor attempt. Although we are unaware of any direct test of this effect, we suspect that if an individual attempts and is successful at making another laugh, regardless of whether or not they themselves laugh, the two individuals may perceive one another as more similar—at least with regards to their humor preferences. Conversely, we suspect that solo laughter resulting from a failed, negative, or aggressive humor attempt will instead decrease perceptions of similarity. No longer do the two individuals share a common sense of humor; rather, their differences become highlighted by the unrequited laugh.

Similarity and relationships. The link between similarity and relationships has been well documented in the existing research. Similarity is one of the classic predictors of initial attraction and has implications for longer term relationship outcomes (see Montoya, Horton, & Kirchner, 2008 for review). Individuals who share or perceive to share common attitudes, belief systems, personality traits, or upbringings are more likely to be attracted to and maintain high quality relationships with one another (Byrne, Griffitt, & Stefaniak, 1967, Schug, Yuki, Horikawa, & Takemura, 2009; Tidwell, Eastwick, & Finkel, 2013;). Even sharing seemingly unimportant characteristics in common, such as the having the same

birthday, has been shown to increase liking for another individual (Jones, Pelham, Carvallo, & Mirenberg, 2004).

There are a number of reasons as to why similarity might be important for relationships. Holding similar attitudes or communication styles can foster positive interactions and buffer against unnecessary and unhealthy conflict (Burleson, & Denton,1992), whereas sharing common hobbies and activity preferences can increase and make more positive the time one spends with another individual (Swim & Surra, 1999). Notable dissimilarities between two individuals, while perhaps exciting and attractive initially, have been associated with greater conflict and less relationship satisfaction in the long run (Jehn, Chadwick, & Thatcher, 1997).

Current Studies

The current studies utilize a variety of methods to test the association between shared laughter and each of the three proposed mechanisms. Studies 1 and 2 tested for correlations between shared laughter, positive and negative emotional experience, and perceived similarity using an online survey and event reconstruction methodology. Study 3 replicated these findings within the controlled setting of the lab and provided the first causal test of shared versus solo laughter's effects on budding relationships.

Finally, it is worth noting that we utilize solo laughter as a comparison behavior to shared laughter, both in terms of establishing theory as well as in the methodological approach for each of the studies. We may therefore make predictions or provide examples that pertain to or rely on the comparison of shared to solo laughter. While helpful for comparison purposes, the focus of the current studies is not intended to be on solo laughter, and any incorporation of the behavior should be considered as it pertains to shared laughter.

That said, Studies 2 and 3 do allow for some exploration into whether solo laughter might actually be harmful for one's relationships. We include auxiliary analyses to test for such effects, as we think they may be of some interest to the reader and may help to guide future research on the topic.

Study 1

Study 1 tested for basic correlations between laughter and each of the three potential mechanisms described above using an online survey and event reconstruction method. There were two hypotheses:

The presence of laughter during an interaction will be associated with higher relationship satisfaction (H1a), greater positive emotions (H1b), less negative emotions (H1c), and greater perceptions of similarity (H1d) during and as a result of the interaction. Moreover, the association between laughter and relationship satisfaction will be independently mediated by greater positive emotions (H2a), less negative emotions (H2b), and greater perceptions of similarity (H2c) during the interaction.

Study 1 also began to highlight the specific role of shared laughter in promoting relationship outcomes. To this point, there were two parallel hypotheses:

Greater shared laughter during an interaction will be further associated with higher reports of relationship satisfaction (H3a), more positive emotions (H3b), fewer negative emotions (H3c), and greater perceptions of similarity (H3d) during and as a result of the interaction. And again, the association between shared laughter and relationship satisfaction will be independently mediated by increased positive emotions (H4a), decreased negative emotions (H4b), and greater perceptions of similarity (H4c) during the interaction.

Method

        202 people were recruited to complete an online questionnaire through an advertisement posted on Amazon's Mechanical Turk website. Participants ranged in age from 18 to 66 years ($M = 32.01$, $SD = 10.96$), 63.9% were female, 76.9% identified as White/Caucasian, and 8.6% were Hispanic. The 20-minute questionnaire first asked participants to choose an individual with whom they interact face-to-face on a regular basis. The individual they chose could have been a romantic partner, friend, colleague, family member, etc.—the precise nature of their relationship was of little concern, as long as they interacted with the individual at least twice weekly. Participants then responded to a few measures assessing their relationship with the chosen individual before continuing to the event reconstruction.

        For the event reconstruction, participants were asked to recall their most recent interaction with their chosen individual that lasted at least 15-minutes. Participants provided a brief description of the interaction and answered a series of questions about it. Relationship satisfaction following the interaction was assessed with a single item: "How satisfied were you with your relationship with (name here) following this interaction?" (*1:Very dissatisfied, 7:Very Satisfied*). Laughter during the interaction was assessed as part of an event checklist. If participants indicated that they laughed during the interaction (i.e., if they answered "yes"), they were then asked to estimate what percentage of their laughter was shared with the other person. This particular estimate allows one to make inferences about shared laughter's effects above and beyond those of solo laughter—a necessary distinction for hypotheses 3 and 4. Other established pro-relationship behaviors were also included in the event checklist, including items assessing the presence of physical and verbal displays of affection.

Emotions during the interaction were assessed using the Modified Differential

Emotions Scale (Fredrickson, Tugade, Waugh, & Larkin, 2003). The mDES asks participants

to indicate the extent to which they felt each of 22 different emotions on 5-point scales

(0:Not at all to 4:Most of the time). Eleven of the 22 items measured positive emotions and

were averaged to gauge overall positive emotional experience during the interaction (α=.91,

M=2.12, SD=.93). The remaining eleven items measured negative emotions and were

likewise averaged to form a composite negative emotions score (α=.93, M=.61, SD=.75).

Finally, perceived similarity was assessed with two items to which participants indicated

their agreement on 7-point scales (-3:Strongly disagree to 3:Strongly Agree): "During the

interaction, it was clear that (Name here) and I have a lot in common," and "(Name here) and

I were on the same wavelength during the interaction." Responses on the two items were

averaged to provide one score of perceived similarity (α=.92, M=1.75, SD=1.43).

Results

Ninety-two participants chose to discuss their relationship and interaction with a

romantic partner; 43 chose a friend, 42 a family member, 16 a coworker, and 8 other. One

participant did not provide a response. On average, participants reported having known the

other person for 10.90 years (SD =10.52). One hundred-sixty five participants reported

laughing during the interaction and the average shared laughter percentage estimate from

those 165 was approximately 80.74% (SD=28.73).

Negative emotions, perceived similarity, and relationship satisfaction all exhibited

substantial skew. Because there was no reason to suspect measurement error, the extreme

values were considered valid and were thus not removed from the sample. Rather, to

minimize the effect of the extreme values on the parameter estimates of the model, the

decision was made to use a non-linear transformation on each of these variables. The logged value of participants' scores on negative emotions was taken, while perceived similarity and relationship satisfaction were each reflected and then logged. Positive emotions scores were normally distributed and were thus left in their original scale. All estimates provided for the proceeding analyses should be interpreted with these transformations in mind. All mediation analyses were conducted using the INDIRECT macro extension for SPSS (Preacher & Hayes, 2008).

To test the first set of hypotheses and establish mediation of overall laughing behavior on relationship satisfaction through each of the proposed mechanisms, we included the binary laughter assessment (i.e., "During the interaction did you laugh?") as the independent variable in the initial model. A series of regression analyses were conducted to assess the relationship between laughter, each of the mediators, and relationship satisfaction (*H1a-d*). As hypothesized, the presence of laughter during the interaction was associated with higher reports of relationship satisfaction following the interaction ($B=2.08$, $t(199)=8.43$, $p<.001$) as well as greater positive emotions ($B=.90$, $t(200)=5.69$, $p<.001$), fewer negative emotions ($B=-.17$, $t(200)=-5.76$, $p<.001$), and greater perceived similarity ($B=-.30$, $t(200)=-7.44$, $p<.001$). Likewise, each of the proposed mediators significantly predicted relationship satisfaction, such that greater positive emotions ($B=.91$, $t(199)=9.01$, $p<.001$), fewer negative emotions ($B=-4.76$, $t(199)=-8.71$, $p<.001$), and greater perceived similarity ($B=-4.64$, $t(199)=-15.04$, $p<.001$) were predictive of greater reports of relationship satisfaction.

Because each of these associations were significant, mediation analyses were conducted with the recommended 5000 bootstrap samples with bias-corrected confidence estimates (Preacher & Hayes, 2008). Results show that when all mediators were included

simultaneously in the model, the effect of laughter on relationship satisfaction decreases in significance (B=.64 t(200)=3.07, p<.01) suggesting partial mediation. Examining the confidence intervals for the indirect effects of each mediator, we find that the indirect effect of positive emotions, negative emotions, and perceived similarity were each independently significant (CIpos: .11 to .55; CIneg: .10 to .56; CIsim: .57 to 1.23), demonstrating support for hypotheses 2a-c.

To test for the unique predictive capabilities of shared laughter specifically, the same analyses were repeated but with shared laughter percentage as the predictor. Only those who indicated laughing during the interaction were included in these analyses. Once again, regression analyses revealed significant associations between shared laughter percentage and each of the proposed mechanisms as well as relationship satisfaction following the event, providing support for *H3a-d* (Brelsat=.01, t(160)=3.38, p=.001; Bposemo=.01, t(161)=3.92, p<.001; Bnegemo=-.001, t(161)=-2.17, p<.05; Bsim=-.001, t(161)=-2.40, p<.05)

Mediation analyses, again with 5000 boostrap samples with bias-corrected confidence intervals, show that when all three predictors are included in the model, the effect of shared laughing percentage on relationship satisfaction dropped from .01 (*t(*161)=3.38, *p*<.001) to .003 (*t(*161)=1.35, *p*=.18). Examining the confidence intervals of each indirect effect, we see that increased positive emotions and perceived similarity seem to be the contributing mediators (CIpos: .001 to .005; CIsim: .001 to .004), lending support for *H4a* and *H4c*; the indirect effect of negative emotions (*H4b*) was not significant (CIneg: .000 to .003).

To address whether the effects were unique to the behavior of shared laughter, independent from other positive relationship behaviors that may happened during the interaction, we reran the analyses while controlling for two other positive, relationship-

relevant behaviors that might have occurred during the interaction—verbal or physical expressions of affection and love. The results remain the same for each model (i.e., both the model with the binary code of laughter and the model with shared laughter percentage as the predictor), suggesting unique effects of the behavior of laughter.

Discussion

Study 1 was conducted to test for statistical mediation of overall laughter and shared laughter's effect on relationship satisfaction via each of the three proposed mechanisms. As hypothesized, the presence of laughter during a social interaction was positively associated with relationship satisfaction following that interaction. Moreover, this effect was statistically mediated by increased positive emotions, decreased negative emotions, and greater perceived similarity during the interaction. Zooming in on shared laughter specifically, we found that the percentage of shared laughter elicited during the interaction likewise predicted relationship satisfaction following the interaction. This association was also statistically mediated by increased positive emotions and perceptions of similarity. These results lend support to the notion that not all laughter is necessarily created equally. Rather, as can be inferred from the current measure of shared laughter (i.e., percentage shared versus solo laughter), it seems that shared laughter serves as a particularly potent pro-relationship behavior due to its ability to boost positive emotions and perceptions of similarity above and beyond what can be expected from a bout of solo laughter.

Interestingly, the effect of shared laughter on relationship satisfaction was not found to be mediated by negative emotional experience. One explanation for this finding is that the average shared laughter percentage in the sample was rather high, suggesting that the salience of solo laughter within the reported interactions was relatively insubstantial.

Employing alternate methods to emphasize the difference between shared and solo laughter within an interaction may help to better detect the anticipated effects on negative emotions. Further, the current study was entirely correlational, so a causal relationship between shared laughter, any of the mediators, and relationship satisfaction cannot be inferred. Study 2 was designed to address these limitations using a between-subjects design.

Study 2

To examine more closely the relational influence of shared laughter relative to solo laughter, Study 2 had participants recall either an instance in which they laughed with someone else (i.e., shared laughter), an instance in which they laughed at something but the person they were with did not laugh (i.e., solo laughter), or an instance in which it is unlikely that they or the person they were with laughed (i.e., no laughter). There were four hypotheses. *H1* and *H2* attempted to replicate the results of Study 1 using the strength of a between-subjects design, while *H3* and *H4* offered supplemental predictions regarding the effects of solo laughter within relationships.

Participants in the shared laughter condition will report having felt significantly greater relationship satisfaction (H1a), greater positive emotions (H1b), decreased negative emotions (H1c), and increased perceived similarity (H1d) during and as a result of the interaction.

The association between shared laughter and relationship satisfaction will again be mediated by increased positive emotions (H2a), decreased negative emotions (H2b), and greater perceived similarity (H2c).

Participants in the solo laugh condition will report having felt significantly less relationship satisfaction (H3a), decreased positive emotions (H3b), increased negative emotions (H3c), and lower perceived similarity (H3d) than those in the no laughter condition.

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The association between solo laughter and decreased relationship satisfaction will be mediated by lower positive emotions (H4a), increased negative emotions (H4b), and lower perceived similarity (H4c).

Method

210 participants were recruited to participate in the study using Amazon's Mechanical Turk. The average age of the participants was 34.96 years ($SD=13.02$), 89 participants were female, 78.6% identified as white/Caucasian, and 7.6% were Hispanic. Upon consenting, participants were taken to a 20-minute Qualtrics questionnaire and were randomly assigned to one of three conditions: shared laughter, solo laughter, or no laughter recollection. Participants in the shared laughter recollection condition were asked to recall the most recent instance in which they laughed with another individual. Participants in the solo laughter condition were asked to recall the most recent instance in which they laughed at something, but the person they were with did not laugh. Participants in the shared and solo conditions were asked to consider what it was that made them laugh, how long they laughed, how they felt while laughing, and any additional details about the event that they could recall. Participants in the no laughter condition were asked to recall the most recent instance in which they engaged in an emotionally neutral or mundane task with another person, such as going to the grocery store or doing laundry. Again, participants in the no laughter condition were asked to consider what it was that they were doing, how long the task took, how they felt while engaging in the task, and any other details they could recall. This third condition served as a comparison by which to test for relative increases (*H1*) and decreases (*H3*) in the main outcome variables resulting from shared or solo laughter. All participants

were asked to provide a detailed description of the recollection, with those in the shared and solo laugh conditions also reporting on specifically what caused the laugh.

As in Study 1, participants again completed the mDES to evaluate the positive and negative emotions they felt during the interaction, the two item assessment of perceived similarity (i.e., "During the interaction it was clear that (name here) and I have a lot in common" and "(Name here) and I were on the same wavelength during the interaction."), and the one item assessment of relationship satisfaction (i.e., "How satisfied were you with your relationship with (name here) following this interaction?"). Two attention checks were also included to ensure that participants were responding thoughtfully to the questionnaire. These attention checks simply asked participants to choose a specific response for an item embedded within one of the measures (e.g., "Select the first answer").

Results

Twenty-four participants were excluded from all analyses for failing at least one of the attention checks. Of the remaining 186 participants, 59 were assigned to the shared laughter condition, 45 were assigned to the solo laughter condition, and 82 were assigned to the no laughter condition. As in Study 1, negative emotions, perceived similarity, and relationship satisfaction were all transformed to minimize the influence of the extreme values on the parameter estimates, while still preserving all valid data. Negative emotions were again log-transformed, while perceived similarity and relationship satisfaction were reflected and then log-transformed.

To test *H1a-d* and *H3a-d*, a series of regression analyses were conducted to test for each condition's effect on relationship satisfaction, positive and negative emotions, and perceived similarity during the interaction. Two sets of dummy variables were created to test

for differences across conditions. For H1a-d, condition was dummy coded into two binary predictors with shared laughter as the reference group, whereas for H3a-d, condition was dummy-coded into two different binary predictors with solo laughter as the reference group. As can be seen in Table 1, those in the shared laughter condition experienced significantly greater relationship satisfaction, fewer negative emotions and greater perceived similarity than those in either the solo or no laughter conditions, thereby supporting *H1a*, *c*, and *d*. Those in the shared laughter condition also reported significantly greater positive emotions than those in the solo laughter condition, providing partial support for *H1b*. Comparing the solo laughter to the no laughter condition, we find that those in the solo laughter condition reported experiencing significantly less relationship satisfaction, less positive emotions, as well as less perceived similarity during the interaction (*H3a*, *b*, and *d*). There were no differences in negative emotions across the two conditions, counter to our predictions (*H3c*).

Three separate mediation analyses at 5000 bootstrap samples with biased corrected confidence intervals were then conducted to test for differences between each of the groups. As hypothesized, those in the shared laughter condition reported greater relationship satisfaction following the interaction than those in the solo laughter condition (*B*=-.23, *p*<.001). When positive emotions, negative emotions, and perceived similarity were included in the model as mediators, the effect of condition on relationship satisfaction becomes nonsignificant (*B*=-.03, *p*=.57). Examining the confidence intervals, we find that negative emotions and perceived similarity are each significant mediators (CIneg: -.12 to -.03; CIsim: -.20 to -.04), such that those in the shared laughter condition reported lower negative emotions and greater perceived similarity during the interaction than those in the solo

condition (*H2b* and *c*). The indirect effect of positive emotions was not significant (CIpos: -.06 to .001), counter to our predictions (*H2a*).

Effects were similar when comparing the shared laughter condition to the no laughter condition. Those in the shared laughter condition reported significantly higher relationship satisfaction following the interaction than those in the no laughter condition (*B*=-.11, *p*<.01). Moreover, this association dropped out when including negative emotions and perceived similarity as mediators (*B*=-.01, *p*=.70) and each mediator had significant indirect effects (CIneg: -.08 to -.02; CIsim: -.09 to -.01). Positive emotions were not included in this mediation model because they were not found to be significantly associated with the shared versus no laughter condition comparison in the previous regression analyses. Thus, those in the shared laughter condition experienced lower negative emotions, greater perceived similarity, and as a result greater relationship satisfaction than those in the no laughter condition, thereby providing further support for *H2b* and *c*.

Finally, mediation analyses were run to compare the solo and no laughter conditions. As hypothesized, those in the solo condition reported lower relationship satisfaction relative to those in the no laughter condition (*B*= -.12, *p*<.01). This effect dropped to nonsignificance when positive emotions and perceived similarity were included in the model (*B*=.01, *p*=.80). Interestingly, the indirect effect of perceived similarity was significant (CIsim: -.20 to -.07), whereas the indirect effect of positive emotions was not (CIpos: -.03 to .01). These findings lend support to our hypothesis that solo laughter may actually dampen relationship satisfaction via lower perceptions of similarity (*H4c*), however we found no evidence of mediation via positive or negative emotions for this effect (*H4a-b*).

Discussion

Study 2 provided further evidence of shared laughter's relevance to relationship satisfaction, particularly via increased perceptions of similarity and buffered negative emotions. Study 2 failed to replicate the previous findings pertaining to positive emotions, suggesting that this particular mechanism may not be as consistent or powerful as the other two. The current study also explored the question of whether solo laughter might actually predict lower relationship satisfaction, and whether the same mechanisms might explain such an association. Results showed that the predicted effect of solo laughter on relationship satisfaction was significant, although the path was mediated only by decreased perceptions of similarity. These data are interesting and contribute to the existing literature in that they provide the first evidence for the opposing relational trajectories arising from shared versus solo laughter.

While both Studies 1 and 2 provide preliminary support for our predictions of how shared and solo laughter might operate within relationships, the methods employed allow little room for causal inference and rely entirely on participant recall—a methodological strategy prone to bias and reporting error. Study 3 addressed these limitations by experimentally manipulating shared versus solo laughter within a controlled laboratory setting.

Study 3

Study 3 provided the first causal test of shared laughter's unique effect on relationships. The paradigm used and questions addressed in Study 3 were similar to those of Study 2—in that participants were assigned to shared, solo, or no laughter conditions—however, the controlled lab environment enabled us to manipulate behavior rather than

relying on recall. Moreover, while participants were free to report on a relationship of their choosing in the previous two studies, Study 3 examined the effects of laughter in newly acquainted pairs. There were four hypotheses:

Relative to those who laugh alone or do not laugh at all, participants perceiving shared laughter with another will report greater liking toward and desire to get to know that individual further (i.e., affiliation, H1a), as well as greater positive emotions (H1b), fewer negative emotions (H1c), and greater perceived similarity (H1d) during and as a result of the interaction..

The association between shared laughter and liking and affiliation will be mediated by the increased positive emotional experience (H2a), decreased negative emotional experience (H2b) and increased perceptions of similarity (H2c).

Additionally, relative to those who do not laugh at all, participants perceiving solo laughter in the presence of another person will report less liking toward and desire to get to know that individual further (H3a), fewer positive (H3b) and more negative emotions (H3c), and less perceived similarity (H3d) during and as a result of the interaction.

The association between solo laughter and decreased liking and affiliation will also be mediated by lower positive emotions (H4a), higher negative emotions (H4b), and lower perceptions of similarity (H4c).

Further, Study 3's design allowed for exploration of the mechanism of perceived similarity in more detail than the previous studies by testing *where* the perceived similarities lie. Is it, for instance, that a shared laugh makes one think that they might get enjoyment out of the same hobbies? Or might the relationship go deeper than that, signaling similarity on a more complex level (e.g., personality, moral beliefs)?

Method

One hundred and sixteen students from the University of North Carolina participated in the two-part study in exchange for course credit or monetary compensation ($7-10). The sample was 74.1% female, 57.4% white, and 5.3% Hispanic, with an average age of 20.77 years (SD=3.41). Participants responded to a 15-minute online questionnaire before attending a 30-minute laboratory session at least 3 days later.

Upon expressing interest in the study, participants were emailed the link to the brief online questionnaire. The questionnaire included a number of personality assessments and a checklist of personal interests and hobbies. Once completed, participants were scheduled for a lab session ostensibly about how computer-mediated communication influences first impressions.

Prior to arriving at the lab, participants were randomly assigned to one of three conditions: shared laughter, solo laughter, or no laughter. To manipulate laughter, participants began the session by watching a short slideshow on the computer while purportedly video chatting with the confederate. The nature of the stimuli within the slideshow and the behavior of the confederate were altered according to condition to increase perceptions of shared, solo, or no laughter. Details regarding the three conditions are provided in the following section.

Following the slideshow, participants completed a questionnaire assessing their first impressions of the confederate. They indicated how much they liked the confederate, their desire to get to know the confederate further, and how much they thought they had in common with the confederate. To discretely assess perceived similarity as a possible mediator, participants were asked to complete the same measures they completed online,

prior to the laboratory session, but this time from the perspective of the confederate. That is, participants responded to each of the items as they would expect the confederate to respond. This repeated assessment allowed a difference score to be calculated from each item's responses (i.e., |participant's baseline response – confederate's anticipated response|), with lower values indicating greater perceived similarity, while avoiding some common biases related to self-report measures.

Once the final questionnaire was completed, participants were debriefed, thanked, and compensated for their time.

Manipulation. Participants were randomly assigned to one of three conditions-- shared laughter, solo laughter, or no laughter. All participants watched a 3-minute slideshow of GIFs while purportedly video chatting with the confederate and were told to refrain from talking to one another during that portion of the study. Participants in the shared and solo laughter conditions watched a slideshow comprised of humorous GIFs that were preselected for the frequency at which they elicit laughter. Half of the GIFs were found to have a low laugh probability (i.e., they elicited laughter in less than 30% of the 226 pilot participants) and half had a high laugh probability (i.e., at least 60%). All of the humorous GIFs were pilot tested so as to be considered reasonably funny; that is, at least 50% of pilot participants indicated that it would be reasonable for someone to laugh at each of the selected GIFs. The slideshow alternated between high and low probability stimuli in no discernable pattern.

Participants in the solo laughter condition simultaneously viewed the confederate laughing at all of the low laugh stimuli, whereas participants in the shared laughter condition viewed the confederate laughing at all of the high laugh stimuli. Because participants were more likely to laugh at the high laugh stimuli than the low laugh stimuli, those who viewed

the confederate simultaneously laughing at the high laugh stimuli would perceive more

shared laughter than those who viewed the confederate laughing only at the low laugh stimuli

(i.e., the solo laughter condition). This design controlled for participants' own laughter as

well as that of the confederate—only manipulating whether or not the laughter was perceived

as shared. Participants in the control (i.e., no laughter) condition watched a 3-minute

slideshow of neutral stimuli, again under the impression that the confederate was watching

the same slideshow. The confederate responded with a calm and pleasant smile throughout,

while exhibiting no laughing behavior whatsoever. This condition allowed participants to

observe themselves behaving similarly to the confederate, just without laughter.

Following the slideshow, participants responded to a final 15-minute questionnaire to

measure each of the variables of interest (i.e., liking, affiliation, positive and negative

emotions, and perceived similarity).

Measures. Liking and affiliation were assessed after the slideshow with the

following questions: "How much do you think you would like the other participant?" (1=Not

at all to 7 = A great deal) and "How willing would you be to establish a friendship outside of

the lab with the other participant?" (1=Not at all willing to 7=Extremely willing). Perceived

similarity and emotional experience during the slideshow were assessed with the same

measures used in Studies 1 and 2.

Four additional measures were included in the online and post-manipulation

questionnaires to provide the responses necessary for exploring the different dimensions

along which the shared laughter-perceived similarity relationship may operate. The measures

included: Moral Foundations Questionnaire (MFQ; Graham, Haidt, & Nosek, 2009); the

short form State-Trait-Cheerfulness-Inventory, Trait version (STCI-T; Ruch, Köhler, & van

Thriel, 1997); the Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003); and a checklist of popular interests and hobbies.

The MFQ consists of 32 items that evaluate participant opinions on five moral dimensions—harm/care, fairness/reciprocity, in-group/loyalty, authority/respect, and purity/sanctity. The first half of the questionnaire asks participants to indicate on a 6-point scale the relevance of each item when determining whether something is right or wrong. Sample items include "whether or not someone suffered emotionally" and "whether or not someone acted unfairly." The second half of the questionnaire asks participants to indicate their agreement with 16 statements, including, "I am proud of my country's history" and "Respect for authority is something all children need to learn." Scores are tallied for the items corresponding to each of the five dimensions.

The short STCI-T contains 30 items measuring trait cheerfulness, seriousness, and bad mood, and was included for its relevance to laughing behavior. Participants indicate their agreement with each of the items on a 4-point scale (1 = strongly disagree; 4 = strongly agree). Sample items include, "I like to laugh and do it often"(cheerfulness dimension), "I am a serious person" (seriousness dimension), and "I am often sullen" (bad mood dimension). Composite scores are calculated from the items corresponding to each dimension.

As the name implies, the TIPI is a 10-item personality measure of the Five-Factor Model. Participants respond to each item by indicating the extent to which pairs of traits apply to their personality on a 7-point scale. Items include "Extraverted, enthusiastic" (extraversion dimension), "Sympathetic, warm" (agreeableness dimension), "Dependable, self-disciplined" (conscientiousness dimension), "Anxious, easily upset" (neuroticism

dimension), and "open to new experiences, complex" (openness to experience dimension). Again, composite scores are calculated for each dimension.

Finally, a checklist of twenty popular hobbies and activities was included as a more practical test of perceived similarities. Participants rated the extent to which they typically enjoy each of the hobbies/activities, including "listening to music" and "volunteering." A full list of items is included in the Appendix.

A quick manipulation check was also included in the final set of questions, following each of the aforementioned measures. The manipulation check simply asked participants to estimate what percentage of the slideshow they spent laughing, and what percentage of their own laughter was accompanied by the other participant also laughing (i.e., shared laughing percentage).

Results

Eleven participants were excluded from data analyses due to technical error during the manipulation (N=2), knowing the confederate (N=3), not following/understanding instructions (N=1), or expressing notable suspicion over the confederate's behavior or videochat program (N=5). This left 34 participants in the shared laughter, 37 in the solo laughter, and 34 in the no laughter condition.

Manipulation Check. To verify that those in the shared laughter condition perceived significantly more shared laughter with the confederate than those in the solo or no laughter conditions, condition was dummy coded into two variables with shared laughter as the reference group. Participants' estimates of shared laughing percentage was then regressed on both dummy coded variables simultaneously. As expected, those in the shared laughter condition reported significantly more shared laughter than those in the solo laughter (*B*=-

37.37, *p<.001*) and no laughter conditions (*B=-69.50, p<.001*). The shared and solo laughter

conditions were also compared on how much overall laughter (i.e., shared or solo)

participants reported during the video chat interaction. As intended, there was no difference

in overall laughter reported by those in the shared versus solo laughter conditions (*B=-5.12,*

p=.35). This finding highlights that the manipulation was effective in altering only

perceptions of shared laughter, while encouraging equal amounts of overall laughter across

the two laughter conditions. Any results obtained by comparing these groups may therefore

be attributed to the shared laughter manipulation specifically.

Although the preceding analyses are promising for the manipulation's effectiveness,

it is worth noting that many participants in the solo laughter condition reported sharing at

least some laughter with the confederate. In fact, only 7 participants in the solo laughter

condition (i.e., 18.9%) reported engaging in no shared laughter with the confederate, with

over half of the solo participants (i.e., 51.4%) reporting shared laughter estimates of 40% or

more. We return to these findings and their implications for the primary analyses in the

discussion section.

Primary Analyses. To test whether those in the shared laughter condition reported

greater liking and desire to get to know the confederate further relative to those in the solo

laughter or no laughter conditions (*H1a*), a series of regression analyses were conducted.

Condition was again dummy-coded into two variables, with shared laughter as the reference

condition. The model regressing liking on each of the dummy codes revealed no significant

differences between the shared laughter and solo or no laughter conditions (Bsolo=.05,

$t(102)=-.27, p=.78$; Bnolaughter=.29, $t(102)=-1.43, p=.17$). The model regressing affiliation

on condition did, however, reveal a significant difference between the shared and no laughter

conditions, with those in the shared laughter condition reporting significantly greater desire to get to know the confederate more than those in the no laughter condition (Bnolaughter= -.735, $t(102)$=-2.84, p<.01). There were no differences in affiliation scores between those in the shared and solo laughter conditions (Bsolo=-.07, $t(102)$=-.26, p=.79).

To test for mediation of the demonstrated association between shared versus no laughter and increased affiliation, another set of regression analyses were conducted. Although it would be improper to conduct mediation analyses for the shared versus solo distinction, due to the lack of a significant overall effect, we still wished to test these conditions for differences on each of the mediators (*H1b-d*). Thus, each of the proposed mechanisms was regressed on both of the dummy-coded condition variables, simultaneously. Again, the distribution of reported negative emotions felt during the interaction was notably skewed; scores were thus log transformed. The model regressing positive emotions on condition (*H1b*) revealed no significant differences, although the predicted comparison between shared and solo laughter was trending toward significance (Bsolo=-.26, $t(102)$=-1.64, p=.11; Bnolaughter=.08, $t(102)$=.49, p=.63). The model regressing log-transformed negative emotions on condition (*H1c*) revealed another marginal effect, this time between shared and no laughter conditions, with those in the no laughter condition reporting slightly more negative emotions than those in the shared laughter condition (Bnolaughter=.04, $t(102)$=1.84, p=.07). The difference between the shared and solo laughter conditions on negative emotions was not significant (Bsolo=-.01, $t(102)$=-.27, p=.79). Finally, when perceived similarity was regressed on condition (*H1d*), both comparisons were significant. That is, those in the shared laughter condition reported greater perceptions of similarity than

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those in the solo and no laughter conditions (Bsolo=-1.09, $t(102)$=-3.98, $p<.001$; Bnolaughter=-.912, $t(102)$=-3.27, $p=.001$).

Given that perceived similarity was the only significant outcome for the shared versus no laughter comparison, we then filtered the file so as to exclude participants in the solo laughter condition, and regressed affiliation on perceived similarity. With this test significant ($B=.49$, $t(66)$=5.03, $p<.001$), a formal test of mediation was conducted with 5000 boostrap resamples and bias-corrected confidence intervals. As hypothesized, the association between condition (shared versus no laughter) and affiliation is no longer significant when perceived similarity is included in the model ($B=.34$, $p=.13$), implying full mediation. The confidence intervals for the indirect effect of perceived similarity reiterate this finding in partial support of *H2d* (CI: -.78 to -.16)

To test the third and fourth hypotheses, that solo laughter might actually lead to decreases in liking and affiliation via lower positive emotions, higher negative emotions, and less perceived similarity, a similar set of analyses were conducted. First, condition was again dummy-coded, this time with solo laughter as the reference group. Two regression analyses comparing the solo to no laughter conditions on reports of liking and affiliation reveal findings opposite our predictions. While there are no differences across conditions on reports of liking (Bnolaughter=-.24, $t(69)$=-1.18, $p=.24$), those in the no laughter condition reported significantly less desire to get to know the confederate than those in the solo laughter condition (Bnolaughter=-.67, $t(69)$=-2.34, $p<.05$). To explore why this might be the case, we again regressed positive emotions, log-transformed negative emotions, and perceived similarity on condition (*H3b-d*). These analyses revealed significant differences between the solo and no laughter conditions on positive emotions and negative emotions, with those in

the no laughter condition reporting significantly greater positive emotions, but also significantly greater negative emotions than those in the solo laughter condition ($B=.33$, $t(69) = 2.04$, $p<.05$ and $B=.04$, $t(69)=1.97$, $p=.05$, respectively). There were no differences between groups on perceived similarity ($B=.17$, $t(69)=.62$, $p=.54$). While the differences in positive emotions align with our predictions (*H3b*), the difference in negative emotions runs counter to our hypotheses (*H3c*) and may provide some explanation for the unpredicted differences in affiliation scores across the two groups.

To test if the increased negative emotions in the no laughter condition accounted for the lower scores on affiliation relative to the solo condition, affiliation was regressed on the log-transformed negative emotions before proceeding to the full mediation model. As would be expected, greater negative emotions during the interaction was significantly associated with lower reports of affiliation ($B=-3.17$, $t(69)=-1.98$, $p=.05$). Interestingly, when included in the boostrapped model as a mediator for the condition to affiliation pathway, the significance of the direct effect of negative emotions on affiliation drops out ($B=-2.44$, $t(69)=-1.51$, $p=.14$), and the indirect effect is not significant (CI: -.36 to .03).

Because of the noted concerns over individuals in the solo laughter condition reporting high shared laughter percentages, we conducted one final set of analyses in which participants' reports of shared laughter, regardless of condition, served as the main predictor. When liking and affiliation scores were independently regressed on shared laughing percentage, the predicted associations arise. The higher participants' reported shared laughter percentage, the more they liked the confederate ($B=.004$, $t(103)=2.18$, $p<.05$) and the greater their desire to get to know the confederate further ($B=.01$, $t(103)=2.98$, $p<.01$). When each of the mediators were regressed on shared laughing percentage, we see that although shared

laughing percentage does not significantly predict positive emotions ($B=.00$, $t(103)=.68$, $p=.50$), it does predict fewer negative emotions ($B=-.001$, $t(103)=-2.52$, $p=.01$), and greater perceived similarity ($B=.01$, $t(103)=3.91$, $p<.001$). As both negative emotions and perceived similarity significantly predicted liking (Bnegemo=-2.08, $t(103)=-2.09$, $p<.05$; Bpercsim=.35, $t(103)=6.04$, $p<.001$) and affiliation (Bnegemo=-3.05, $t(103)=-2.35$, $p<.05$; Bpercsim=.42, $t(103)=5.42$, $p<.001$), two separate mediation analyses were then conducted.

Again, mediation analyses were conducted with 5000 bootstrap samples and bias-corrected confidence intervals. Once negative emotions and perceived similarity were included in the model, the effects of shared laughter on liking and affiliation were no longer significant, suggesting full mediation of both pathways. The confidence intervals for the indirect effects of each model show that perceived similarity was the significant mediator (CIliking: .002 to .006; CIaffiliation: .002 to .008), whereas negative emotional experience was not (CIliking: -.000 to .002; CIaffiliation: -.000 to .003).

Exploring perceived similarity. Given the consistent finding that shared laughter promotes increased perceptions of similarity, we conducted an additional set of analyses to detect precisely where these similarities are thought to lie. To do so, we calculated difference scores between participants' responses to the items on the baseline questionnaires and those they completed in the lab while taking the perspective of the confederate (i.e., |baseline item – in-lab response| or |self – "other"|). Difference scores were then combined for each of the measure subscales to produce ten separate difference scores (i.e., 5 corresponding to the MFQ dimensions, 3 for the STCI-T subscales, one for the TIPI, and one for the hobbies checklist). Each of these scores were then independently regressed on condition which was dummy-coded into two variables with shared laughter as the reference group.

Results indicate no differences in perceptions of similarity between conditions on any of the moral foundations subscales, trait cheerfulness subscales, or the TIPI. There were, however, significant differences between conditions on similarity of hobbies. Specifically, those in the solo laughter condition had greater difference scores on the hobbies checklist than those in the shared laughter condition ($B=5.45$, $t(95)=2.28$, $p<.05$) while those in the no laughter condition had marginally greater difference scores than those in the shared laughter condition ($B=3.78$, $t(95)=1.56$, $p=.12$). These findings suggest that perceptions of similarity resulting from sharing a laugh with another may be largely ascribed to behavioral commonalities rather than shared underlying traits or attitudes.

Discussion

Study 3 evaluated the unique relational effects of shared laughter within the context of unacquainted pairs. Importantly, the method allowed for a causal test of the effects found in Studies 1 and 2 and also enabled for a deeper exploration of perceived similarity as a mediator of shared laughter's effect on liking and affiliation. Results provided partial support for each of the hypotheses. Perceived similarity was consistently found to be boosted by shared laughter, whether comparing or collapsing across conditions. The role of positive and negative emotions was less clear, with some analyses showing the predicted effects (e.g., fewer positive emotions in the solo versus no laughter condition) and others showing just the opposite (e.g., solo laughter's lower negative emotions than the no laughter condition).

We consider these mixed results to likely be the product of the shared laughter manipulation. Although there were significant differences across conditions in participant reported shared laughter, the majority of those in the solo laughter condition still reported engaging in a substantial amount of shared laughter with the confederate. It may be the case

that for those in the solo laughter condition, the occurrence of solo laughter was not as salient as we had hoped. Perhaps the presence of just a small amount of shared laughter was enough to shift participants' attention toward the shared and away from the solo laughter. Future research might test the question of whether there is a cutoff point, or percentage of solo to shared laughter, at which one becomes more salient and, in turn, more influential for the relationship than the other. Our prediction is that shared laughter is so potent that even a small amount of shared laughter amidst a rather large amount of solo laughter might be enough to flip the switch, although this remains to be tested.

Finally, the deeper exploration into perceived similarity as a mediator revealed some interesting results. While shared laughter did not predict differences in perceptions of similarity for measures testing one's operating world view, attitudes, or personality, shared laughter did predict a greater likelihood of perceiving the other as likely enjoying the same hobbies and activities.

General Discussion

Most people would agree that laughter is a good thing. However, these ubiquitous social moments have been empirically overlooked and underestimated, and may actually provide a foundation for the relationships that are most critical to our health and wellbeing. The current studies contribute to the existing literature in two key ways: 1) by providing the first demonstration of shared laughter's *causal role* in promoting higher quality relationships, and 2) by highlighting precisely *how* such a seemingly simple behavior can lead to profound downstream consequences.

Across three studies—both correlational and experimental—shared laughter was associated with key relationship outcomes (i.e., satisfaction, liking, and affiliation). These

associations were also repeatedly mediated by increased perceptions of similarity. The current research also lends some support to positive and negative emotions serving as other potential mediators of shared laughter's effect on relational wellbeing, although the results of these analyses were less consistent across the three studies.

There were a few notable limitations of the current studies that warrant consideration when interpreting the results. Studies 1 and 2 were largely correlational and relied on participant recall. Such methodological restrictions increase the likelihood for response error and bias and do not allow for causal inferences to be made. Study 3, although effective in addressing these concerns, was also not without fault. While the shared laughter manipulation did appear to be effective, the majority of those in the solo condition still reported shared laughter percentages of 40% and above. These data might explain why we failed to find significant differences in liking or affiliation between those in the shared versus solo conditions. Future research might test the question of whether there is a tipping point, or ratio of shared to solo laughter, at which the effects of one become more influential than the other.

Future research might also benefit from a deeper exploration of solo laughter's unique trajectories. Although not central to the current research, the findings pertaining to solo laughter's effect on relationships relative to no laughter were mixed. Illuminating the situations and boundary conditions in which solo laughter might operate similarly or differently from shared laughter is an interesting and potentially fruitful topic for future studies.

Finally, while theory might suggest that a shared laugh signals a common world-view, Study 3 failed to find any differences in similarity on relevant attitude and trait

measures following the experience of shared laughter. Interestingly, participants perceiving more shared laughter with another did indicate greater similarity on a measure of behavioral tendencies (i.e., hobbies). The accuracy of these perceptions as well as what they might mean for long-term relationship growth and maintenance remain another topic for future research.

In sum, the current studies provide the first examination of shared laughter's influence on relationship wellbeing. While there are a number of limitations and directions for future research, the current studies contribute to the existing literature both methodologically and theoretically. Whereas previous research on the social import of laughter has focused on humor or individual amusement as a proxy for laughter, the current studies target the behavior itself and introduce a new and socially driven distinction—that of solo versus shared laughter. This methodological approach takes into consideration the influence of the surrounding social context while avoiding some of the common pitfalls of the more traditional humor classifications (e.g., reliance on subjective coding schemes, recursive reasoning). Moreover, the implications of the current studies extend to research on relationships more broadly by situating shared laughter as a behavioral tool capable of facilitating a variety of pro-relationship processes and interactions (e.g., self-disclosure, conflict resolution) within any stage or classification of relationship. With a shared laugh, a new friendship may be sparked, a conflict may be resolved, and what may have once been a notable difference between two people may suddenly seem trivial. Indeed, the maxim "Live, Laugh, Love" has never been more fitting.

APPENDIX: HOBBIES AND ACTIVITIES CHECKLIST

Instructions: Please rate the extent to which you typically like engaging in each of the following activities (-3: Strongly Dislike to 3: Strongly Like).

1. Competing in a team sport such as soccer, baseball, basketball, etc.
2. Exercising (e.g., going to the gym, walking, running)
3. Reading for leisure
4. Writing for leisure (e.g., blogging, journaling)
5. Surfing the internet
6. Creating visual art through painting, drawing, sculpting, etc.
7. Performing art (e.g., playing a musical instrument, singing, acting)
8. Communicating or spending time with friends
9. Communicating or spending time with family
10. Volunteering
11. Working on tasks for a paid job
12. Working on tasks for class (e.g., writing papers, studying, reading)
13. Shopping
14. Cleaning/organizing
15. Cooking
16. Listening to music
17. Watching television or movies
18. Playing videogames
19. Traveling to new places
20. Outdoor activities (e.g., hiking, camping)

Table 1

Means and Standard Deviations of Primary Outcome Variables across Conditions

	Shared Laughter	Solo Laughter	No Laughter
Relationship Satisfaction (reflected & log-transformed)	.12 (.19)[ab]	.34 (.28)[b]	.23 (.24)
Positive Emotions	2.09 (.81)[a]	1.48 (.99)[b]	1.97 (.90)
Negative Emotions (log-transformed)	.05 (.10)[ab]	.15 (.16)	.14 (.15)
Perceived Similarity (reflected & log-transformed	.25 (.22)[ab]	.59 (.22)[b]	.36 (.24)

Note. [a]significantly different from solo laughter condition.
[b]significantly different from no laughter condition.

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