

ENTROPY AS AN EXPLANATORY MECHANISM FOR RELATIONAL MAINTENANCE

BEHAVIORS IN FRIENDSHIPS

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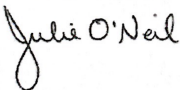
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Entropy as an Explanatory Mechanism for Relational Maintenance Behavior in Friendships

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Entropy as an Explanatory Mechanism for Relational Maintenance Behaviors in Friendships

For decades, interpersonal communication scholars have investigated how people maintain close and satisfying relationships and the reasons why people do so (Ogolsky & Bowers, 2013). Both researchers and laypeople wonder why some relationships succumb to relational drift whereas others continue over the course of a lifetime. In response to this question, Stafford and Canary (1991) proposed a typology of maintenance behaviors that people enact to foster healthy interpersonal relationships. They uncovered five distinct relational maintenance strategies including *positivity* (e.g., demonstrating a cheerful and optimistic attitude, acting polite), *openness* (e.g., expressing needs, freely discussing the quality of the relationship), *assurances* (e.g., making promises about the future of the relationship, emphasizing commitment to the other person), *shared social network* (e.g., prioritizing time with common friends and family), and *shared tasks* (e.g., assisting the other person with joint responsibilities, taking care of household chores) (Stafford & Canary, 1991). Even though this typology was originally applied to romantic relationships (Dailey, Hampel, & Roberts, 2010; Dainton & Aylor, 2001; Stafford & Canary, 1991), it has since been applied to many other types of interpersonal relationships such as sibling relationships (Goodboy, Myers, & Patterson, 2009; Myers, Brann, & Rittenour, 2008), extended family and parent-child relationships (Canary, Stafford, Hause, & Wallace, 1993; Mansson, Myers, & Turner, 2010; Myers & Glover, 2007), and friendships (Forsythe & Ledbetter, 2015; Johnson, 2001; LaBelle & Myers, 2016).

The present manuscript presents *entropy*, which is the tendency of the world to move from a state of order to a state of disorder, as a construct that might help laypeople and scholars understand what the enactment of relational maintenance behavior in friendships accomplishes. The current study not only advances theory, but it has practical implications as well. In regards to

theory, my goal is to explain what the enactment of relational maintenance strategies does in friendships by fleshing out the construct of entropy. Although there are a few theories that partially explain factors that motivate relational maintenance behaviors, these theories do not explain the central *function* of relational maintenance behavior itself (i.e., what it is about these behaviors that leads them to maintain relationships). For this reason, the present manuscript aims to advance a more complete explanation of the theoretically causal mechanism undergirding the enactment of relational maintenance strategies in friendships. I am seeking to explain precisely what relational maintenance strategies do to keep a friendship going. In conducting qualitative research in the first study, I aimed to develop a fuller understanding of the conceptual domain of relational entropy. Then, in the second study, I used these results to create a measure of entropy and to investigate the extent to which relational maintenance mediated the association between religious (dis)similarity (which emerged as a threat to friendship longevity in study 1) and relational entropy.

Previous research discovered that strong relationships are a key contributor to quality of life in marriages (Schrodt, Witt, & Shimkowski, 2014; Segrin, Hanzal, & Domschke, 2009), grandparent-grandchild relationships (Kam & Hecht, 2009), adult mother-daughter relationships (Gilchrist-Petty & Reynolds, 2015; Horstman, Maliski, Hays, Cox, Enderle, & Nelson, 2015), friendships (Rawlins, 2008), and other parent-child relationships (La Valley & Guerrero, 2010; Sumner & Ramirez, 2019). Therefore, in regards to practical implications, the present study seeks to create both a measure and a model of relational entropy to assist individuals in building strong friendships that can contribute to quality of life. First, by examining the emotional, cognitive, and behavioral manifestations of entropy, the present study aims to help scholars and practitioners (e.g. counselors, therapists) identify the signs of relational drift, decay, and

decomposition in friendships. Second, by examining the forces that accelerate entropy and the forces that decelerate entropy, the present study engages in important first steps toward eventually providing scholars and practitioners with the tools to intervene to stop and/or reverse relational decay. Therefore, the present study seeks to help individuals counter the (potentially) detrimental effects of entropy in interpersonal relationships and instead promote strong relationships that heighten quality of life.

Relational Maintenance Strategies

In their foundational scholarship, Stafford and Canary (1991) proposed five relational maintenance strategies. *Positivity* referred to “remaining cheerful or optimistic,” *openness* pertained to promoting “direct discussion or disclosure,” *assurances* referred to making “statements that imply a future,” *shared social network* corresponded with conversing with “common associations to keep the relationship going,” and *shared tasks* referred to completing “chores and other responsibilities” (Canary et al., 1993, p. 5).

Stafford and Canary’s typology of maintenance behaviors has been revised and extended several times. For instance, Canary and colleagues (1993) added additional maintenance behaviors to the original typology (Stafford & Canary, 1991). First, *joint activities* referred to spending quality time with the other person. Second, *cards, letters, and calls* corresponded with using communication technology and handwritten notes to engage in discussion with the other person. Third, *avoidance* referred to evading the other person or points of conflict within the relationship. Fourth, *anti-social* referred to actions that are not friendly in nature. Fifth, *humor* referred to joking around with the other person. Sixth, *miscellaneous* was the final category that corresponded with all other behaviors that did not fit into any of the previously mentioned categories (Canary et al., 1993).

The typology of maintenance behaviors (Canary et al., 1993; Stafford & Canary, 1991) describes what relational maintenance behaviors look like when they are manifested in close relationships; however, it does not provide a theoretical explanation of the reasons for and outcomes of those behaviors. In the following section, I will give an overview of three general theories that scholars have used to explain the enactment of relational maintenance behavior in close relationships.

Social Exchange Theories

When Stafford and Canary first proposed the typology of relational maintenance, they appealed to social exchange theories (Canary & Stafford, 1992; Stafford & Canary, 1991) to explain the enactment of relational maintenance behavior in close relationships. The central assumption guiding these theories is that individuals seek to maximize rewards and minimize costs in close relationships. Although social exchange theories such as interdependence theory (Thibaut & Kelley, 1959) and equity theory (Stafford & Canary, 1991) are quite valuable theoretical approaches, they are not without criticism.

First, scholars who study social cognition question whether people are rational beings who think in rigid, economic terms (Stafford, 2008). In other words, one might wonder whether or not individuals sift through a mental record of costs and rewards when deciding whether or not to enact relational maintenance behaviors in close relationships (Stafford, 2008). Ledbetter, Stassen, Muhammad, and Kotey (2010) asserted that from this perspective, “satisfaction is based on a mental ‘balance sheet’ via which dyad members monitor relational costs and rewards” (p. 22). Second, others (e.g., Ragsdale & Brandau-Brown, 2007) have argued that relationships based in what is considered to be love in its purest form (i.e. agape) do not consider what is in their own best interest when enacting relational maintenance behaviors. Rather, individuals who

display this type of love might enact relational maintenance behaviors in an attempt to selflessly serve, regardless of what they might get in return from the other person (Stafford, 2008).

Second, despite the large body of scholarship that uses social exchange theories as an explanation for relational maintenance and other outcomes (Ayres, 1983; Bell, Daly, & Gonzalez, 1987; Canary & Stafford, 2007; Stafford & Canary, 1991, 2006), little empirical data supports relational equity as the primary motivation for the enactment of relational maintenance strategies in close relationships (Hess, Pollom, & Fannin, 2009; Ledbetter, Stassen-Ferrara, & Dowd, 2013; Ragsdale & Brandau-Brown, 2005, 2007). For example, Dainton (2003) did not find substantial empirical support for the assumption that social exchange theories (i.e., equity theory and interdependence theory) explain the enactment of relational maintenance behaviors in close relationships. In contrast, Ledbetter and his colleagues (2010) discovered that there is more empirical support for the self-expansion theory approach (considered below) than the equity theory approach to explain the enactment of relational maintenance strategies in romantic relationships. Therefore, it is clear that although social exchange theories provide some insight into close relationships, they may not adequately explain why individuals enact relational maintenance behaviors in close relationships.

Uncertainty Reduction Theory

A second possible theoretical explanation of relational maintenance comes from uncertainty reduction theory. Berger and Calabrese (1975) proposed uncertainty reduction in its original form to explain initial interactions between strangers; however, scholars later applied uncertainty reduction theory to ongoing, close relationships (Theiss, 2018). Following this logic, Forsythe and Ledbetter (2015) examined the association between relational uncertainty and relational maintenance, finding that the association was inverse and robust. Nevertheless, I

contend that, although uncertainty reduction theory is one of the most heuristic and well-respected theories in the communication discipline, it provides only a partial explanation for why individuals enact relational maintenance behaviors in close relationships.

Although people may engage in relational maintenance behaviors such as *openness* in an attempt to reduce uncertainty in close relationships, there are nevertheless cases in which people do not lack sufficient information about a close relationship but still experience relational decomposition and decay. For example, two friends might engage in everyday talk, allowing them to know information regarding each other's work, family, and love life; however, they might still experience the emotional, cognitive, and behavioral symptoms of relationship decomposition. Specifically, the friends might experience a disruption (e.g., separation by distance) that prevents them from spending quality time together playing a sport they love, or they may experience relational conflict that produces emotional ambivalence towards one another. In other words, there are cases in which individuals do not lack information about each other, yet they still experience decomposition, decay, and disorder in the relationship. Although uncertainty may serve as one manifestation of entropy, uncertainty does not capture the entire domain of entropy as a construct. Likewise, I argue that relational maintenance is not only (or even mainly) about reducing uncertainty.

Self-Expansion Theory

Some scholars have used self-expansion theory to explain why individuals engage in relational maintenance behaviors (Ledbetter et al., 2010; Ledbetter et al., 2013). According to self-expansion theory, "individuals are motivated to expand their sense of self by sharing resources, perspectives, and identities with close relational partners" (Forsythe & Ledbetter, 2015, p. 324). Based on self-expansion theory (Aron, Mashek, & Aron, 2004), Ledbetter and

others (2010) proposed that a communal approach to relational maintenance might offer richer theoretical and practical contributions to our understanding of relational maintenance than social exchange theories. Indeed, empirical findings indicated that there is stronger support for the self-expansion theory approach than the equity theory approach in regards to relational maintenance in romantic relationships (Ledbetter et al., 2013).

Self-expansion theory argues that individuals build close relationships in order to expand their resources, identities, and perspectives (Aron et al., 2004). It is important to note that unlike the social exchange theories, self-expansion theory assumes that individuals take a communal approach as they engage in the cognitive process called inclusion of the other in the self (Aron et al., 2004). Instead of thinking of each other as “you” and “I,” friends and other close relational partners may begin to think of one another as “we” (Aron, Aron, & Smollan, 1992; Ledbetter et al., 2013). Although the IOS approach based on self-expansion theory (Aron et al., 2004) accounted for more variance than social exchange theories (Ledbetter et al., 2010; Ledbetter et al., 2013), this theoretical explanation as to why people enact relational maintenance strategies still leaves something to be desired.

Ledbetter et al. (2010) contended that IOS is “fundamentally communicative” and that relational maintenance consists of “communicative acts that foster perception of shared resources, identities, and perspectives” (p. 22), but a follow-up study noted that self-expansion theory alone does not serve as “an overarching theory of maintenance behavior” (Ledbetter et al., 2013, p. 48) because it focuses on cognitive representations of relationships rather than the communicative enactment of those relationships. They instead argued that self-expansion theory “offers a heuristic basis for developing a truly communication-focused theory of relational maintenance behavior” (Ledbetter et al., 2013, p. 48) when synthesized with Stafford’s (2003)

observation that relationships tend to deteriorate over time. They indicated two propositions that should undergird a relational maintenance theory: (a) that relationships deteriorate over time due to entropy and (b) relational maintenance may serve to counteract that entropy. The series of studies reported here aimed to investigate and elaborate these propositions.

Entropy

For decades, scholars have operated under the assumption that relationships require at least some form of relational maintenance lest they deteriorate (Canary & Stafford, 1994; Duck, 1988; Stafford, 2003). For instance, Canary and Stafford (1994) stated, “relational properties erode without the benefit of maintenance behaviors” (p. 5). Guerrero, Eloy, and Wabnik (1993) also discovered that individuals who abstain from engaging in relational maintenance strategies are more likely to end their relationships or experience this type of relational decomposition in their relationships. Following Ledbetter et al.’s (2013) suggestion that entropy represents this phenomenon, the present manuscript considers entropy as an alternative theoretical framework for understanding why individuals enact relational maintenance behaviors in close relationships.

Entropy recognizes that all ordered systems deteriorate over time. Ledbetter and colleagues (2013) asserted that even “physicists note that entropy is a property of any system” (p. 49) according to the second law of thermodynamics (Hawking, 1996). For example, an automobile is an ordered system. Over the course of five years, that automobile, or ordered system, will begin to break down. All ordered systems in the universe move from an organized state to a chaotic state over the course of time (Ledbetter et al., 2013). *Entropy* is this natural tendency of the world: over time, systems move from a state of order to disorder. One might wonder what constitutes order (or a lack of) in a friendship. In the same way that I believe that there are different ways of defining what mechanically constitutes order in an automobile or

what structurally constitutes order in a house or what biologically constitutes order in the human body, I posit that scholars can investigate what emotionally, cognitively, and behaviorally constitutes order in friendships. In other words, entropy in relationships can be assessed by a lack of order in the heart (i.e., emotions), brain (i.e., cognitions), and communication behavior. Furthermore, this is an inherently dyadic process, meaning that the lack of order is occurring at the level of the dyad, in accordance with systems theory (Miller, 2005).

For this reason, ordered systems require maintenance to counter this tendency toward disorder. Therefore, work is necessary to counteract entropy in ordered systems. For example, if the oil is not changed in an automobile, it will eventually stop working. Maintenance is required in order to counteract the natural forces in the world. At the same time, drivers do not want to make repairs to their cars every day; after all, while performing maintenance, they cannot simultaneously use the car to drive from place to place. In the same way, individuals might not want to engage in particular relational maintenance behaviors such as positivity all the time. There may be seasons when a friend needs a lot of positivity in the face of his or her job loss; however, at some point, that friend would not benefit from reducing entropy in the friendship via enacting more positivity. In fact, if the enactment of positivity continued for weeks, the friendship might become too regimented; indeed, expressing positivity or assurances too frequently might be taken by the friend as insincere, and thus such redundant expression of maintenance may cease its efficacy as relational maintenance (as Stafford & Canary, 2006, p. 235 asked rhetorically: “For instance, how many times in a day can a person say ‘I love you’ before that message becomes vacuous?”). In other words, I am not predicting that reducing relational entropy by enacting relational maintenance behaviors is always the goal in every interaction between friends. Furthermore, ordered systems are never stationary; they are

constantly in flux. For example, the human body is an ordered system. Wise athletes who exercise regularly do not quit exercising once they reach their ideal body weight. These athletes know that some force, whether it is healthy eating and/or exercise, needs to counteract their body's natural tendency to move towards decomposition.

Individual relational maintenance behaviors might function to accomplish different goals in a friendship. In the same way that a mechanic can make the argument that one needs to change the brakes in their car every two to six years based on how much the owner plans on using the car and at what speed the owner plans on driving the car, I posit that not all relationships need to be maintained at the same frequency or with the same relational maintenance strategies to be ordered. For example, a woman might maintain a relationship that is high in emotional, behavioral, and cognitive order with her same-sex best friend by enacting lots of interaction sprinkled with a little openness. On the other hand, that same woman might need to maintain a friendship with her next door neighbor by enacting lots of positivity and a little bit of supportiveness.

Because relationships are ordered systems in accordance with assumptions of systems theory (Miller, 2005), they too require maintenance, lest they deteriorate over time. Given that interpersonal relationships are systems, and ordered systems tend to fall apart naturally, it stands to reason that people would be motivated to enact relational maintenance behaviors in an effort to counteract the effects of entropy. According to Ledbetter and colleagues (2013), an expenditure of energy is necessary to counteract the effects of entropy (p. 49). In other words, people engage in relational maintenance behaviors to combat relational entropy in the same way that people engage in automobile maintenance to combat the natural tendency of the world for ordered systems to break down.

Communicate bond belong theory, recently developed by Hall (2017), also suggests that relational maintenance behaviors serve as investments of energy into relationships. The theory claims that human beings are motivated to satisfy a fundamental need to belong because relationships offer psychological and/or physiological health benefits to individuals (Hall, 2017). Due to a scarce amount of resources (i.e., time and energy) to spend investing in relationships, communicate bond belong theory predicts that people are most likely to privilege the relationships in their life that require the least social energy expenditure for the most feelings of belonging (Hall, 2017). Enacting relational maintenance in friendships requires energy expenditure. According to Ledbetter and colleagues (2013), “An interpersonal relationship is one such system and relational maintenance behavior may be the expenditure of energy to counteract the disorganizing effect of entropy.” (p. 49).

Because the overarching goal of this research is to explore entropy as an alternative theoretical framework for understanding relational maintenance behavior in close relationships, I initially used a qualitative data analytic strategy, as was previously used to study relational maintenance, equity theory, and self-expansion theory (Dainton & Stafford, 1993; Ledbetter et al., 2010; Stafford & Canary, 1991). I advance the following research questions:

RQ1: What do friends perceive to be the causes of relational entropy?

RQ2: How do friends understand the experience of relational entropy?

RQ3: How do friends seek to reduce relational entropy?

Study 1

Methods

Participants

The sample consisted of 414 participants, most of whom were undergraduate students enrolled in communication courses at a private Southwestern university who completed the study for a small amount of course credit or extra credit. The majority (67.9%) of the participants were female (n=281). The sample was 83.3% White/Caucasian, 6.8% Hispanic, 4.6% African American, 3.9% Asian/Island Pacific, and 1.4% other. The age range was fairly representative of the general population (18 years - 74 years), with a mean age of 24.61 years.

Procedure

The study's survey methodology mirrored previous qualitative research on relational maintenance (i.e. Ledbetter et al., 2010; Stafford & Canary, 1991). After consenting to participate in the study, I presented the participants with the following written prompt:

In this study, we are trying to understand people's experiences when they perceive that their friendship has changed in some way. Some people might describe this as being less in sync with their friend, or that the friendship has drifted, or that the friendship is more chaotic and less organized than in the past, or that friends aren't quite on the "same page" anymore. We would like you to think of a friendship where this has happened, where you feel less on the same page or in sync now than in the past. We don't care about the magnitude of the change—you may feel just a little less in tune with your friend, or maybe you feel like you've drifted very far apart. We're interested in any friendship where changes like these have taken place, big or small. We'd like to start by asking you for some information about the friendship.

A manipulation check followed that asked participants if they were thinking about such a friend with a yes/no question. The researchers removed 10 participants who did not respond "yes" to

this question from the data analysis. Next, participants indicated the age and sex of their friend, as well as whether or not they were ever involved in a romantic relationship with the friend.

The rest of the survey posed a few open-ended questions. I instructed participants to share more details about the changes in their friendship, specifically how they felt less in sync with their friend. I asked four core questions: (a) “Please tell us about the story of this friendship. How do you think you and your friend became less in sync with each other? What led to these changes?,” (b) “How has this changed how you think and feel about the friendship?,” (c) “How has this changed how you communicate and interact with your friend?,” and (d) “What do you think would need to happen for you and your friend to feel like you’re on the same page again?”

Data Analysis

To begin, I enlisted the help of an expert in relational maintenance to read through and code these data. We each independently read through approximately 100 of the cases and then they independently developed their own list of categories. Next, we met together and discussed the categorical scheme and in doing so, inductively developed an initial list of categories. Then we coded approximately 50 cases using this scheme. Finally, the researchers met again to discuss the coding scheme after independently coding all 414 responses. Overall, we found much agreement, but realized that the original coding scheme was too complex. With that in mind, we reconciled differences and simplified the coding scheme. Because this was a thematic analysis conducted in collaboration rather than a formal content analysis, we did not aim for complete agreement on categorization of each case, but rather agreement regarding the overall categories that describe the conceptual terrain. However, we report percentage agreement for each of the broad categories below.

The final thematic map contained three categories including (a) causes of relational entropy, (b) experience of relational entropy, and (c) reduction of relational entropy. First, causes of relational entropy contained two themes for conflict and disagreement (88.4% agreement across coders), four themes for difference and change (84.8% agreement), and one theme for disruptions created by the social network (91.8% agreement). Second, experience of relational entropy contained five themes for communicative disorder (94.0%), two themes for cognitive disorder (74.6%), and four themes for emotional disorder (72.0%). Third, reduction of relational entropy contained four themes for changing communication (80.4%), one theme for relational repair (90.6%), four themes for restoring similarity (89.1%), and one theme for change in the social network (94.2%).

Results

Causes of Relational Entropy

Conflict and disagreement. Two themes emerged within conflict and disagreement: (a) *conflict internal to the relationship* and (b) *conflict external to the relationship*. *Conflict internal to the relationship* included disagreement about how much time to spend together (e.g. “I am very intentional with my time...even if it only means meeting for 10 min...my friend prefers to spend the entire day together when we both have time”), disagreement about the importance of the friendship (e.g. “She befriended another female and they both left me out of plans”), and disagreement about whether to transition to a romantic relationship (e.g. “romantic feelings started to arise”). Finally, *conflict internal to the relationships* also included betrayals (e.g. “He betrayed my trust and did something I did not agree with).

Conflict external to the relationship included tensions emerging from differences in religious beliefs (e.g. “Our differing beliefs strengthened over time and we grew apart,” “I feel

like she doesn't know how much I have changed and how that has affected my worldview, and my relationships in general"), political beliefs (e.g. "He is a hard core Trumpie and conspiracy theorist"), and moral beliefs (e.g. "He turned to drugs," "I did not support her lifestyle"). In regards to religious beliefs, one participant confessed, "I don't enjoy pretending to be a fanatic Christian, and so I don't. She recognized this shift, became concerned for my soul, and conversation material dwindled on that front." In regards to political beliefs, one participant stated, "I think we have become less in sync due to differences of opinions regarding issues highlighted by the current president surrounding women's rights."

Difference and change. Four themes emerged within difference and change including (a) *major trauma or life-changing events*, (b) *geographic distance*, (c) *demographics*, and (d) *activities and hobbies*. *Major trauma or life-changing events* included experiences of illness or injury (e.g. "We were super close, nearly inseparable, until a traumatic event happened that affected us both," "the death of her husband").

Geographic distance included moving away for school (e.g. "I moved to another city going into high school," "Since college started, we are now 1000 miles away from each other") or work. Many participants echoed the sentiment that post-graduation, they moved far way from one another, leading the friendship to drift.

Participants identified several types of *demographics* such as socioeconomic status (e.g. "disparity in our incomes," "he ran into financial trouble and became embarrassed just lost most contact"), marital status (e.g. "different times getting married and settling down," "she is going through a divorce while I am happily married"), children (e.g. "[She] had kids right away"), and education (e.g. "He also became a PhD student"). One participant said, "She would always invite

me to the ladies nights out with church, and the discussion always turned to mom life. As a non mom, I felt left out.”

Activities and hobbies included fraternity/sorority involvement (e.g. “Greek life”), sports involvement (e.g. “I began my season in my sport, which put a strain on the relationship,” “She was involved in athletics”), and use of free time (e.g. “Social activity differs with him [being] single”).

Disruptions created by the social network. Disruptions created by the social network include a change in network ties connected to work (e.g. “My friend and I used to work together. She got a new job”), friend groups (e.g. “We made new friends,” “Then at different times we expanded our social network”), and romantic relationships (e.g. “She would often choose [her boyfriend] him over me”).

Experience of Relational Entropy

Insight into the causes of relational entropy emerged from the data set; however, insight into the experience of relational entropy also emerged from the data set. I divided the experience of relational entropy into three categories. Specifically, I investigated how relational entropy manifests (a) communicatively, (b) cognitively and (c) emotionally. In the following sections, the themes that emerged within these three categories that are concerned with the experience of relational entropy will be discussed.

Communicative disorder. Four themes emerged within communicative disorder including (a) *reduction in the amount/quantity of communication*, (b) *changes in the content of the communication*, (c) *changes in the context of the communication*, and (d) *disruption in rituals and routines*.

Reduction in the amount/quantity of communication included decreases in the amount of time the friends spend interacting with one another. Responses included, “we communicate less and less,” and “we talk a lot less now and hangout even less.” Many other respondents echoed these sentiments.

Changes in the content of the communication included awkward conversations and pleasantries in place of deeper conversations and heart to hearts. One participant explained, “We only talk occasionally and when we do it feels more forced since we are not as close as we used to be.” Other participants mentioned that conversations with their friend are “awkward” and/or “guarded.” Someone else noted, “We don’t really communicate anymore unless we run into each other in public.” Finally, one participant confessed, “Sometimes we don’t know what to say to each other.”

Changes in the context of the communication included changes in the medium or channel through which interactions took place. One participant confessed, “Texting has replaced my verbal communication and I think this has impacted]friendship.” Another participant mentioned sending their friend an “occasional snapchat.” Finally, one participant commented, “Ironically, social media has allowed us to remain in touch on a regular basis and is a safe zone where we do not have to address our feelings directly. We can just simply ‘like’ each others posts and make small sentimental comments and not have to interact.”

Disruption in rituals and routines included changes or shifts in patterns of interaction with their friend. For instance, one participant commented, “I used to wake up next to the kid for 3 straight months. A lot has changed.” Similarly, another participant indicated a disruption in patterns of interaction with the friend by stating, “We are no longer inseparable and neither of us are our go-to-person.”

Cognitive disorder. Two themes emerged within cognitive disorder including (a) *reframed what the relationship meant or means* and (b) *uncertainty*. When participants *reframed what the relationship meant or means* they would typically express that they used to think the relationship was X, but now they think it is something else. For example, one participant divulged, “I wouldn’t trust her with some of the information I used to. I feel like she has a whole side that I’ve never seen.” This theme also includes mentally justifying and explaining the change in the relationship. For instance, one participant said, “It makes me miss our friendship, but I know this happens.” This category also included a change in the understanding of the self as part of the change in the relationship (e.g. “I want nothing to do with her because I’ve realized my life is better without a personality like hers bringing me down all the time”).

Some participants referenced some type of *uncertainty* or a lack of knowledge about their friendship. For example, one participant explained, “I feel a little like I don’t know a ton of what is happening in her life because I am not seeing her every weekend anymore.” Another participant asserted, “I don’t know much about what goes on in her life anymore.”

Emotional disorder. Four themes emerged within emotional disorder including (a) *positive emotions*, (b) *negative emotions*, (c) *ambivalence*, and (d) *disinterest*. *Positive emotions* included fond remembrance and nostalgia and missing how it used to be. For instance, one participant reminisced, “I wish we were closer and I miss her most of the time and its made me appreciate the time we had together.” Other participants stated, “still love the guy” and “I miss her friendship.”

Negative emotions included anger (e.g. “I care less about this friendship day to day, but when I think about it I am sad and angry that we did not make more of an effort to stay connected”), frustration (e.g. “I have just been very annoyed and frustrated with her”), regret

(e.g. “Regret...I needed a little compassion [and] she provided it in abundance, even though I did not deserve it”), and disappointment (e.g. “Makes me sad that we aren’t friends anymore”).

Ambivalence included responses revealing a mix of positive and negative emotions and conflicting feelings. For example, one participant disclosed, “We really love each other so this has been a disappointment for me. I was blessed to have this true and genuine friendship in college.” Other participants expressed a mix of positive and negative emotions as well.

Disinterest included a lack of effort, desire, and interest in the relationship. Some participants said that they “don’t put any effort into the relationship,” “avoid communicating with her.” Another participant explained, “It seemed clear that he wasn’t interested in continuing it.”

Reduction of Relational Entropy

On a most basic level, there is the binary question of intent and desire, which means that the individuals either expressed a desire to improve the friendship, which would mean that they were willing to exert some sort of effort to change it. Alternatively, some individuals showed no desire to reduce the entropy or restore order to the friendship. If the participants wanted to reduce entropy in the relationship, some ways of doing so included:

Changing communication. Four themes emerged within changing communication including (a) *increasing amount/quantity*, (b) *changing communication content*, (c) *changing context of communication*, and (d) *spending quality time together*.

Increasing amount/quantity included an increase in the amount of time spent talking to the friend regardless of the channel. For example, some participants confessed that they would have to be “better about calling each other more often.”

Changing communication content included engaging in deeper conversations and/or having a heart to heart with their friend. One participant asserted, “We need to sit down and tell each other how we feel and figure out where/why we exactly fell off.” Another participant noted the need for “honest discussions” with their friend.

Changing context of communication included visiting the friend in person rather than using other mediated channels of communication such as texting or social media (e.g. “seeing each other in person”).

Spending quality time together included things such as taking time to do “a girls day” or taking a day to “reconnect and catch up.”

Relationship repair. Relational repair included apologizing for relational transgressions within the friendship and/or engaging in a conversation about past conflict. For example, one participant said, “She would need to apologize for talking bad about us, lying, and leaving us for him [her boyfriend].”

Restoring similarity. Four themes emerged within restoring similarity including (a) *demographic changes*, (b) *activities/hobbies*, (c) *worldview*, and (d) *wanting the other person to change*. *Reducing geographic distance* included being “back in the same town again,” being “with each other physically,” and living “in the same city again.”

Demographic changes included socioeconomic status (e.g. “I can afford to do things that she just cannot swing and I don’t want her to feel the pressure of ‘keeping up’”), education (e.g. “the same major at the same university”), work (e.g. “get a job and then finally be able to have much more things in common,” and marital status and children (e.g. “Wait until both of us get married and have kids”).

Activities/hobbies included engaging in shared activities with their friend once again or for the first time. One participant expressed, “We would need to find new hobbies to do together.” Another participant stated, “We need to start ...getting coffee, especially since we now live ten minutes away.”

Worldview included adopting the same beliefs as their friend or developing a tolerance for disagreement for their friend’s differing beliefs. One participant disclosed, “I’d have to try and push her towards losing her fixation on religion...and being exactly what the Bible wants or just push her towards accepting that we all take different paths in life.” Other participants stated that moral or lifestyle changes would need to take place before the friendship could be restored. One participant asserted, “She would need to get over her slight distaste for my lifestyle and I would need to do the same for her.” Another participant stated, “I would like her new career (holistic nutritionist) to get more science-based. She now shares conspiracy theory stuff.”

Wanting the other person to change included wanting the other person to make changes in their own lives before restoring the relationship. One participant stated that that the friend would need to “be less overbearing and self centered.” Another participant shared, “I need her to understand that sometimes her actions can be selfish...I would also just need her to stop playing games with guys and realize we’re getting too old for this.” Another participant disclosed, “I think she would need to apologize and really convince me that she’s changed as a person and is more supportive of her friends rather than self-involved.”

Change in the social network. *Change in the social network* included shifts in network ties connected to friend groups and romantic relationships. One participant said, “He would have to hang out with different people.” Another participant indicated that in order for the friendship to be restored, his friend would have to “stop dating his girlfriend.”

Study 2

Theoretical Warrant

Religious Similarity and Relational Entropy

Based on the findings from Study 1, Study 2 attempted to accomplish two goals. First, guided by the inductive analysis in Study 1, I developed a quantitative survey measure of entropy, evaluating its dimensionality and convergent/divergent validity with related concepts. This methodological goal served the second goal, which was to test whether relational maintenance behaviors explain the association between perceived religious dissimilarity (i.e., regarding spiritual moral, and/or worldview beliefs) and relational entropy in friendships.

Previous research has indicated that relationships often form and continue on the grounds of similarity (Burlleson, Kunkel, & Birch, 1994). According to the attraction-similarity hypothesis, the more satisfied individuals are with their friendships, the more similar their friends are to themselves (Morry, 2005). For example, Morry (2005) discovered that similarity in friendships predicted relational satisfaction even after controlling for closeness and duration of the friendship. Following the same line of reasoning, Hafen, Laursen, Burk, Kerr, and Strattin (2011) discovered that adolescents who reported similar “delinquent activities, intoxication frequency, achievement motivation, and self worth” remained friends longer than adolescents who reported dissimilar lifestyle choices and attitudes. Overall, there is theoretical reason to believe that similarities in friendships lead to specific outcomes.

In addition to testing a measure for entropy, the second study seeks to add to an existing academic conversation on religious beliefs and relational maintenance (Afifi, Zamanzadeh, Harrison, & Torrez, 2019). Specifically, I hope to quantitatively investigate two important qualitative findings from Study 1. First, discrepancies in religious beliefs emerged as a cause of

relational entropy in friendships in Study 1. Second, Study 1 also revealed that the act of eliminating discrepancies in religious beliefs emerged as a way to repair friendships. In other words, participants in Study 1 indicated that if they were to adopt their friend's religious beliefs or if their friend were to adopt their religious beliefs, order would be restored in a previously disordered, chaotic friendship. Following the attraction-similarity hypothesis, those who perceive religious differences in their friendships may maintain those relationships less fervently. Likewise, it stands to reason that perceived religious dissimilarity predicts greater levels of entropy in friendships; conversely, it stands to reason that perceived religious similarity predicts lower levels of entropy in their friendships. Thus, the following hypotheses will guide this investigation:

H1: Religious similarity is positively associated with relational maintenance.

H2: Religious similarity is inversely associated with relational entropy.

Relational Maintenance and Relational Entropy

Based on the findings from Study 1, the second study attempts to quantitatively evaluate the relationship between relational maintenance behavior and relational entropy in friendships. It is important to note that relational entropy is distinct from relational uncertainty. Relational uncertainty is the absence of information, whereas relational entropy is the absence of order not only regarding cognitions, but also emotions and communication/behavior (see results of Study 1). Thus, in some circumstances cognitive entropy (or, relatedly, uncertainty) may be quite low, but other forms of entropy may exist in the relationship. I conceptualize uncertainty, then, as a potential subtype of the broader domain of entropy, although entropy is not limited only to the cognitive elements of an interpersonal relationship.

Following prior theorizing (Ledbetter et al., 2010, 2013) and the results of Study 1, I posit that maintenance behaviors serve to counteract entropy. To recap, according to the second law of thermodynamics, entropy (i.e., the natural tendency for systems to move from an organized state to a state of chaos) is a property of all ordered systems (Hawking, 1996; Ledbetter et al., 2013). All ordered systems require maintenance, lest they deteriorate over time. Given that interpersonal relationships are ordered systems, it stands to reason that interpersonal relationships require maintenance to increase order in the relationship, lest they succumb to decomposition without any relational maintenance whatsoever. As positioned in this manuscript, relational maintenance are the behaviors that counteract relational entropy, which have been tied to various positive outcomes (Stafford & Canary, 1991). Therefore, if individuals do not maintain their interpersonal relationships (i.e., to counteract relational entropy), it stands to reason that their interpersonal relationships will deteriorate over time due to the force of entropy. Thus the following hypothesis will guide this investigation:

H3: Relational maintenance is inversely associated with relational entropy.

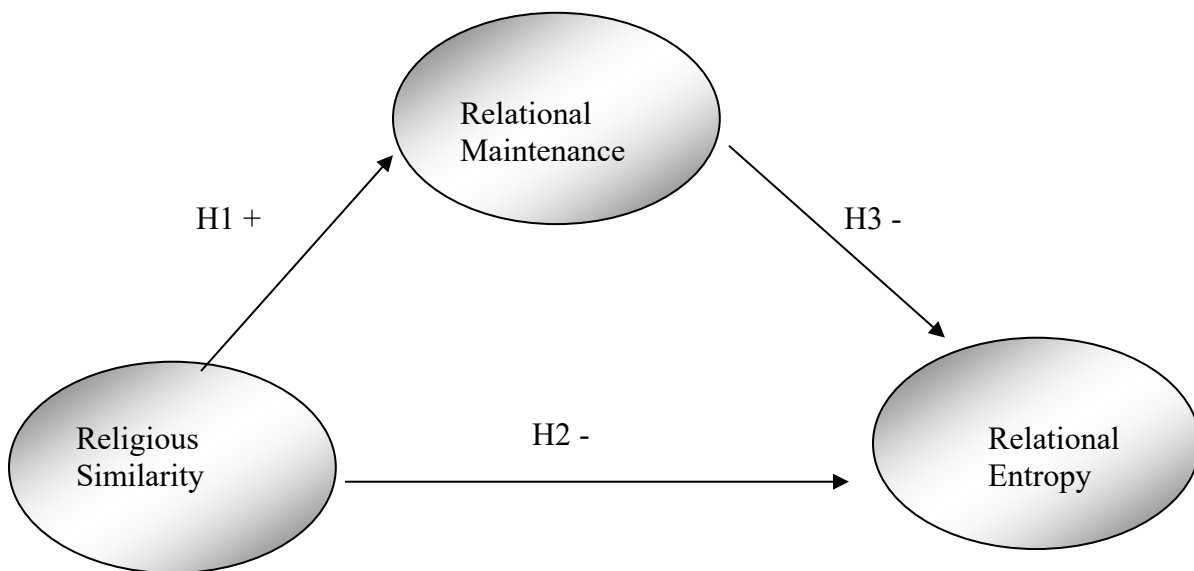
Relational Maintenance as Mediator

In accordance with communicate bond belong theory (Hall, 2017), I predict that individuals might be more motivated to invest in their friendships that are religiously similar than religiously dissimilar because (a) people have a fundamental need to belong, (b) have finite resources such as time and energy, and (c) are then motivated to maintain relationships that take less resources to maintain in order to satisfy their need to belong (Hall, 2017). When individuals have to communicate over differences, whether those differences are political, cultural, or religious in nature, it seems logical that it would take more energy to maintain the relationship. Therefore, I would argue that individuals are more likely to enact relational maintenance

strategies within friendships marked by religious similarity. Furthermore, I predict that such individuals will invest in their friendships by enacting relational maintenance strategies. In conclusion, I posit that relational maintenance mediates the relationship between religious similarity and relational entropy. In other words, relational maintenance is at the heart of the model because the relationship between religious similarity and relational entropy depends on the enactment of relational maintenance strategies; i.e., decreased energy devoted to maintenance explains why religious dissimilar friends might experience greater relational entropy (and conversely for religiously similar friends). Thus the following hypothesis will guide this investigation:

H4: Relational maintenance mediates the association between religious similarity and entropy.

Figure 1: Theoretical Model



Note. The model does not depict H4, which predicts that relational maintenance mediates the relationship between religious similarity and entropy.

Methods

Participants

The sample consisted of 318 participants. In regards to sex, 209 participants (65.7%) identified as female and 109 participants (34.3%) identified as male. In regards to ethnicity, 254 participants (79.9%) identified as White/Caucasian, 28 participants identified as Latino/a/Hispanic American (8.8%), 11 participants identified as Black or African American (3.4%), 14 participants identified as Asian/Asian American, eight participants identified as other (2.5%), two participants identified as Native American (<1%), and one participant did not indicate an ethnicity (<1%). The mean age of the participants in this sample was 24.3 years (*SD* = 11.7), with a range of 54 years (i.e., between 18-72 years of age). In terms of distribution across recruitment pools, 254 participants (79.9%) were students completing the survey for a small amount of course credit or extra credit and 64 (20.1%) participants were not students.

Procedure

In order to test the hypotheses, I administered a Qualtrics survey. After individuals consented to participating in the study and filled out basic demographic information, they were randomly assigned to report on either a religiously similar or a religiously different friend. In order to do so, I first collected data from students enrolled in the basic communication course. Those students received a small amount of course credit for taking the survey. Next, I gave students in another course the opportunity to refer older adults to the survey for a small amount of extra credit. Third, I recruited participants via posts and announcements on social media (i.e. Facebook). I provided the participants who did not identify as TCU students the opportunity to enter a drawing for one of two \$20 Amazon gift cards, redirecting participants to a separate

Qualtrics survey at the end of the study if they indicated that they would like to enter the drawing.

Measures

Entropy. The results from Study 1 guided the development of a new measure of entropy, with an initial pool of 50 items informed by the qualitative data analyzed in Study 1. Items were measured on a 7-point Likert-type scale where 1 = strongly disagree and 7 = strongly agree. I submitted the items to an exploratory factor analysis with principal axis factoring and varimax rotation. When determining the number of factors to extract, I considered both eigenvalues and Scree plots, but put weight of emphasis on the Scree plot output, which initially suggested three dimensions. I used a .50/.40 criterion as guidance for retaining items. After removing weak loading items, I discovered that the third factor was questionable in terms of its conceptual integrity, that the items in the factor were reverse-coded (several of them), and that several items cross-loaded onto other factors. After deleting the items that loaded on the third factor and removing weak and cross-loaded items, I obtained a final factor structure with two dimensions. The first factor referred to *drift entropy*. Cognitive, behavioral, and communicative indicators that a friendship has gradually changed characterize this factor. For example, some of the items included in the factor are “I think that my friend and I have drifted apart,” and “My friend and I don’t spend much quality time together anymore.” The alpha reliability for drift entropy was .92. The second factor referred to *emotional entropy*. This factor was characterized by indicators reflecting heightened mixed/negative emotional reactions to changes in the friendship, accompanied by a strong lack of desire to renew the friendship. For example, some of the items included in the factor are “I feel regret when I think about the friendship,” “I feel frustrated when

I think about the friendship,” and “I do not want this friendship to continue.” The alpha reliability for emotional entropy was .91.

To evaluate the convergent and discriminant validity of the new measure, I examined the association between the two dimensions and equity (as assessed by one item from Hatfield, Traupmann, & Walster, 1979 and one item from Sprecher, 1986; see Ledbetter et al., 2013), uncertainty (using the relationship uncertainty dimension from the relational uncertainty measure developed by Knobloch & Solomon, 1999), and IOS (using a single-item pictorial measure, Aron et al., 1992) I ran the correlations and descriptive statistics (means and standard deviations) among these study variables (see Table 3). Entropy and equity were not correlated (emotional entropy: $r = -.06, p < .01$; drift entropy: $r = .01, p > .05$), but correlations of moderate strength emerged for entropy and uncertainty (emotional entropy: $r = .65, p < .01$; drift entropy: $r = -.49, p < .01$), and entropy and IOS (emotional entropy: $r = -.45, p < .01$; drift entropy: $r = -.45, p < .01$). The magnitude of these associations suggests the constructs exhibit convergent validity (i.e., it would be expected that entropy would exhibit some association with other predictors of relational maintenance behavior, although perhaps not with equity as an inconsistent predictor of maintenance; Ledbetter et al., 2013) but also divergent validity (i.e., the correlations are not so strong that the constructs would appear to be identical).

Table 1
Dimensions and Items of the Relational Entropy Measure

Items	Primary Factor Loading
<i>Factor 1: Drift</i>	
1. I do not know as much about my friend's life as I used to.	.72
2. I know less about my friend's day-to-day life as I used to.	.68
3. My friend and I talk less frequently than we used to.	.68
4. My friend and I engage in fewer deep conversations than we used to.	.67
5. My friend and I do not prioritize each other as much as we used to.	.67
6. I think that my friend and I have drifted apart.	.67
7. My friend and I don't spend much quality time together anymore.	.66
8. My friend and I engage in fewer personal conversations than we used to.	.65
9. I miss the friendship that we used to have.	.63
10. My friend and I interact less often than we used to.	.60
11. My friend and I do not carve out time for each other as much as we used to.	.55
12. My friend and I used to have friendship rituals that we don't really do anymore.	.54
13. I wish our friendship could go back to the way things used to be.	.54
14. My friend and I have neglected to spend time together lately.	.52
<i>Factor 2: Emotional</i>	
1. I do not want this friendship to continue.	.82
2. I'm ready to move on from this friendship.	.76
3. I think that I would be better off without my friend.	.69
4. I have mixed emotions about this friendship.	.68

5. I feel frustrated when I think about the friendship.	.66
6. I think that this friendship has always had some problems.	.64
7. I feel disappointment when I think about the friendship.	.63
8. I do not desire to put more effort into the friendship.	.61
9. I feel regret when I think about the friendship.	.61
10. My memories of this friendship bring back bad feelings.	.58
11. My feelings about this friendship are a blend of good and bad.	.56
12. I am uncertain how to interact around my friend.	.56

Friend religious similarity. I randomly assigned participants to think of a friend who was (a) religiously similar or (b) religiously different. As one manipulation check, I then asked participants to indicate whether they were reporting on a friend that was religiously similar to them or not. A chi-square analysis revealed that the experimental manipulation was significantly associated with this binary self-report of the friend's religious similarity, $\chi^2(1) = 109.75, p < .001$. Guided by items used in McCurry, Schrodt, and Ledbetter (2012), a further manipulation check measured religious similarity continuously, asking participants to indicate on a 5-point Likert-type (1 = very different, 5 = very similar) how similar they and their friend were on beliefs about a variety of spiritual topics (e.g., God, the meaning of life, prayer, right and wrong, attending worship services, and so forth). The Cronbach's alpha reliability estimate for friend religious similarity was .92. An independent samples *t*-test revealed that the experimental conditions differed on this continuous variable, $t(302.45) = 8.73$, equal variances not assumed, $M_{\text{similar}} = 3.88, M_{\text{different}} = 2.98$). For all study analyses, this continuous measure was used as the indicator of religious similarity.

Relational maintenance. Oswald, Clark, and Kelly's (2004) relational maintenance measure assessed maintenance along four dimensions: (a) positivity, (b) openness, (c) interaction, and (d) supportiveness. Participants were asked to indicate the frequency with which they employ each of the relational maintenance behaviors on a 6-point Likert-type scale (1 = *never*, 7 = *very frequently*). All dimensions demonstrated acceptable estimates of reliability (positivity = .65, openness = .73, interaction = .77, supportiveness = .84).

Data Analysis

I used correlations to evaluate bivariate hypotheses, and I used PROCESS with nonparametric bootstrapping to evaluate mediation (Hayes, 2018). In the regression model, the independent variable was the continuous measure of friend religious similarity, the mediators were the four dimensions of relational maintenance. Both analyses controlled for whether or not the participant was recruited from a university classroom. I ran separate regression analyses for each of the dependent variables.

Results

Table 2

Descriptive Statistics and Correlations Among Study Variables

Variables	<i>M (SD)</i>	1	2	3	4	5	6
1. Religious Similarity	4.76 (1.16)	--					
2. Positivity	5.29 (0.92)	.35**	--				
3. Openness	3.34 (1.31)	.36**	.70**	--			
4. Interaction	3.68 (0.93)	.40**	.62**	.71**	--		
5. Supportiveness	5.25 (1.04)	.38**	.63**	.75**	.63**	--	
6. Entropy Drift	4.11 (0.90)	-.28**	-.46**	-.51**	-.58**	-.43**	--

7. Entropy Emotional	5.80 (0.95)	-.35**	-.63**	-.57**	-.51**	-.57**	.59**
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** $p < .01$

Table 3

Descriptive Statistics and Correlations for Tests of Convergent and Divergent Validity

Variables	$M(SD)_{\text{manifest}}$	1	2	3	4	5	6
1. Entropy Drift	4.76 (1.16)	--					
2. Entropy Emotional	5.29 (0.92)	.59**	--				
3. Uncertainty	3.34 (1.31)	-.49**	-.65**	--			
4. Relational Turbulence	3.68 (0.93)	.29**	.59**	-.48**	--		
5. Equity	5.25 (1.04)	.01	-.06	.09	-.02	--	
6. IOS	4.11 (0.90)	-.45**	-.45**	-.49**	-.22**	-.09	--

** $p < .01$

Table 4

Bootstrapped Estimates of Unstandardized Indirect Effects

Indirect Effect	B	SE	95% CI for B
1. Religious similarity → Positivity → Drift Entropy	-.05	0.03	-0.11: 0.01
2. Religious similarity → Openness → Drift Entropy	-.07*	0.04	-0.16: 0.001
3. Religious similarity → Interaction → Drift Entropy	-.22*	0.05	-0.34: -0.13
4. Religious similarity → Supportiveness → Drift Entropy	-.01	0.04	-0.07: 0.10
5. Religious similarity → Positivity → Emotional Entropy	-.13*	0.03	-0.19: -0.08
6. Religious similarity → Openness → Emotional Entropy	-.03	0.03	-0.09: 0.02
7. Religious similarity → Interaction → Emotional Entropy	-.02	0.03	-0.08: 0.03
8. Religious similarity → Supportiveness → Emotional Entropy	-.07*	0.03	-0.13: -0.01

Tables 2 and 3 report all correlations and descriptive statistics (means and standard deviations) among the study variables. Hypothesis 1 predicted that religious similarity would be positively associated with relational maintenance. Results revealed that religious similarity was indeed positively associated with all four maintenance dimensions: positivity ($r = .35, p < .01$), openness ($r = .36, p < .01$), interaction ($r = .40, p < .01$), and supportiveness ($r = .38, p < .01$). This pattern of results supports H1.

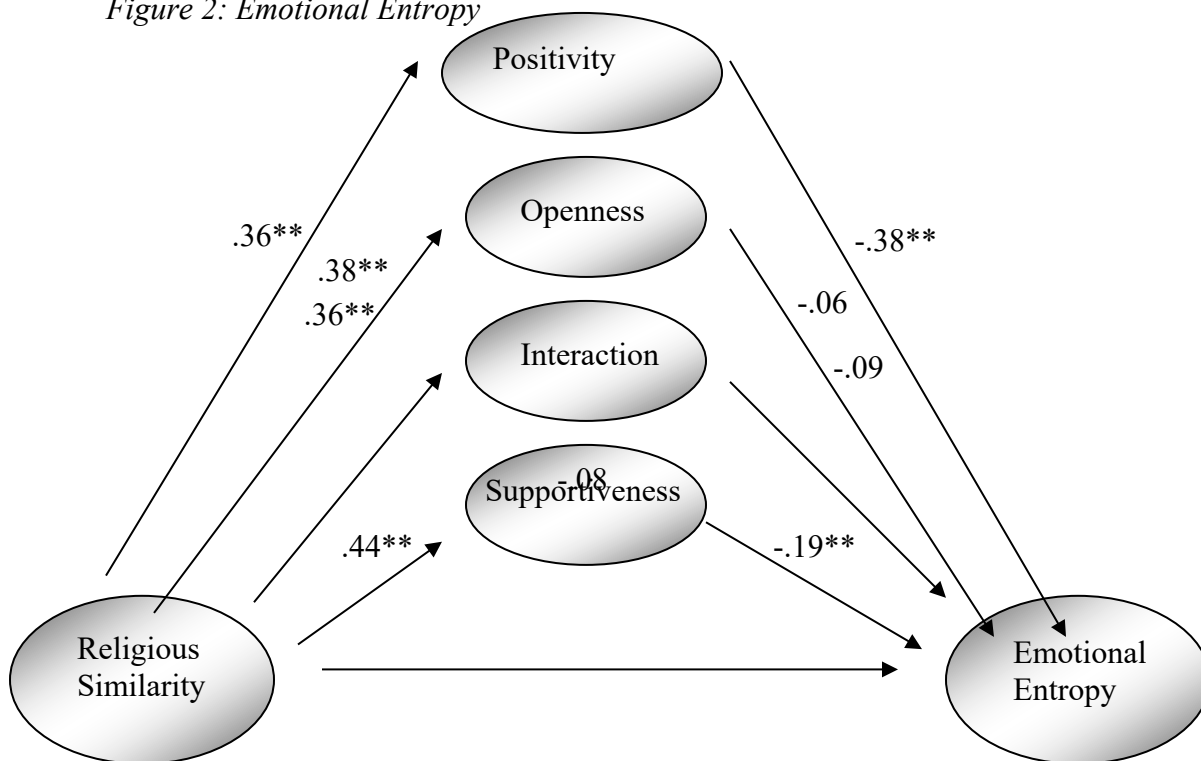
Hypothesis 2, which predicted that religious similarity would be negatively associated with entropy, was supported. Overall, religious similarity was negatively associated with both types of relational entropy. Specifically, religious similarity was negatively associated with drift entropy ($r = -.28, p < .01$). Likewise, religious similarity was also negatively associated with emotional entropy ($r = -.35, p < .01$). These results support H2.

Hypothesis 3, which predicted that relational maintenance would be inversely associated with entropy, was supported. Relational maintenance was inversely associated with relational entropy. In regards to drift entropy, it was inversely associated with positivity ($r = -.46, p < .01$), openness ($r = -.51, p < .01$), interaction ($r = -.58, p < .01$), and supportiveness ($r = -.43, p < .01$). Likewise, emotional entropy was inversely associated with positivity ($r = -.63, p < .01$), openness ($r = -.57, p < .01$), interaction ($r = -.51, p < .01$), and supportiveness ($r = -.57, p < .01$). In sum, this pattern of results supports H3.

Hypothesis 4, which predicted that relational maintenance would mediate the association between religious similarity and entropy, was supported. I used a mediation model in PROCESS to run the statistical analyses of the data. Table 4 reports all the bootstrapped estimates of

unstandardized indirect effects. Interestingly enough, two specific maintenance behaviors mediated drift entropy and the other two maintenance behaviors mediated emotional entropy. Specifically, positivity and supportiveness both mediated the association between religious similarity and emotional entropy, which means that the finding that religiously similar friends who reported experiencing less emotional entropy was partially accounted for through the enactment of positivity and supportiveness (see Figure 2). Similarly, openness and interaction both mediated the association between religious similarity and drift entropy. In other words, the finding that religiously similar friends reported experiencing less drift entropy was partially mediated or accounted for through the enactment of openness and interaction in the friendship (see Figure 3). In sum, these results support H4.

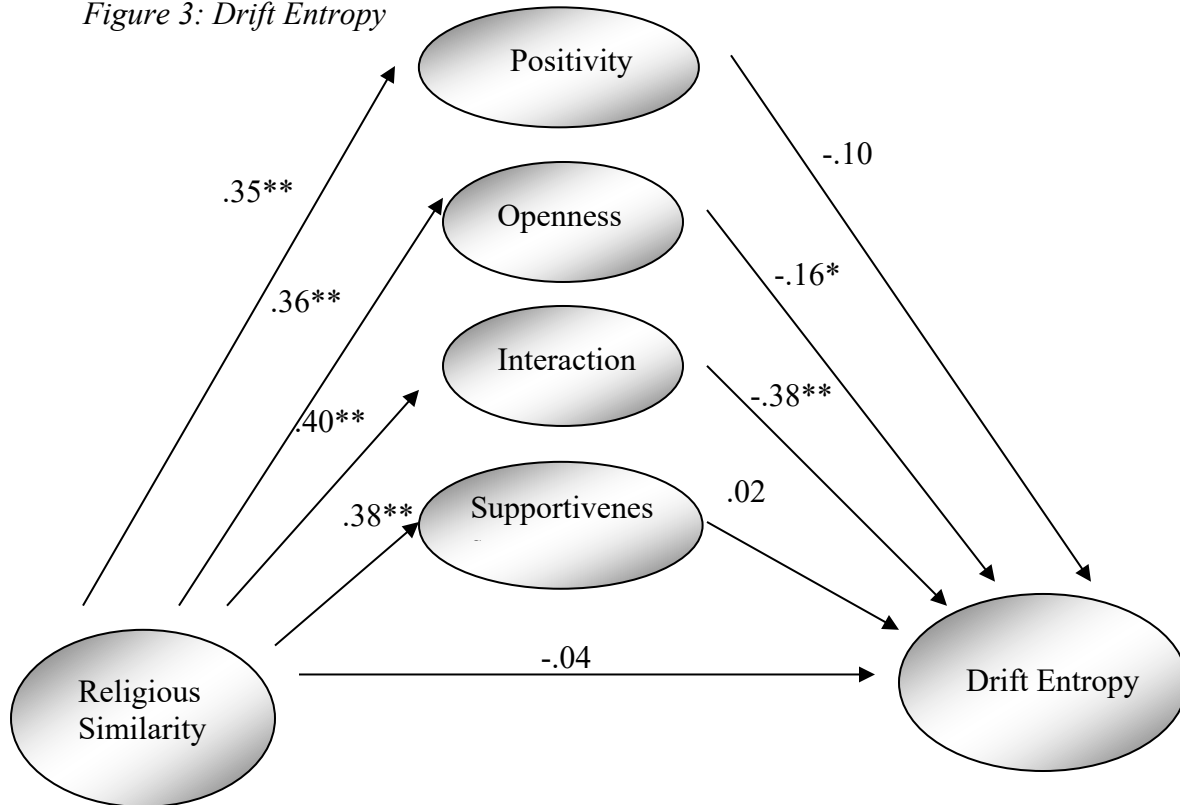
Figure 2: Emotional Entropy



$** p < .01$ $* p < .05$

Note. All coefficients are standardized.

Figure 3: Drift Entropy



** $p < .01$ * $p < .05$

Note. All coefficients are standardized.

Discussion

Overall, the two studies reported here sought to conceptualize, measure, and evaluate the role of entropy in the process of relational maintenance. During Study 1, I collected and coded the responses of 414 participants and developed an extensive list of themes (i.e. causes of relational entropy, experiences of relational entropy, reduction of relational entropy) and subthemes that can be explored in follow-up studies on relational maintenance and entropy. Building from the qualitative results produced in Study 1 and using an exploratory factor analysis, I produced and tested a new measure of entropy with two dimensions. Next, I added to the body of research on relational maintenance by demonstrating that individual relational maintenance behaviors accomplish unique functions in the context of friendships. Lastly, I

discovered some findings with practical implications for friendships marked by similar and different religious beliefs. In this discussion section, I will consider three key implications of the study's findings by discussing: (a) the new measure of entropy and its two dimensions, (b) the distinct functions of relational maintenance behaviors in friendships, and (c) the higher levels of relational maintenance and lower levels of relational entropy in friendships marked by religious similarity.

The first implication is the development of a new measure for entropy. To recap, the purpose of Study 1 was to get a fuller understanding of the experience of entropy in friendships in terms of its cognitive, behavioral, and communicative manifestations. The results of Study 1 then guided the development of items for a preliminary measure of entropy, and in Study 2, one of the goals was to evaluate and refine this new measure of entropy. After running an exploratory factor analysis, the measure loaded quite cleanly onto two distinct factors, which I labeled emotional entropy and drift entropy.

The conceptualization and development of a measure of entropy in friendships extends and challenges previous theoretical assumptions and adds to the growing body of literature on relational maintenance. Respectively, the two dimensions of entropy represent a lack of order in terms of cognitions and emotions (i.e. emotional entropy) and a more general lack of order in one's behavior and communication (i.e. drift entropy). These two dimensions of entropy are distinct from one another because they are "profiles" of different patterns of entropy that tend to co-occur. *Drift entropy* is a combination of behavioral and cognitive entropy and often includes at least some interest in maintaining the friendship, whereas *emotional entropy* is based on feelings that can be positive, negative, or mixed in valence and often does not include an expressed interest in maintaining the friendship. Drift entropy is marked by a lack of order in

one's patterns of communication and behaviors and emotional entropy is marked by a lack of order in one's feelings towards the friendship. With that said, individuals who are experiencing drift entropy might want to restore the friendship; however, they might not always know exactly how to do so, which implies a lack of order in one's brain and behavior. On the other hand, people who are experiencing emotional entropy might be experiencing emotions that either fluctuate between feeling frustrated with their friend and feeling remorse or regret about the role they played in the friendship (but are certain that they do not want to continue the friendship), which implies a lack of order in one's heart.

This conceptualization of relational entropy in friendships extends our current understanding of the relationship between uncertainty reduction theory and relational maintenance (see Table 3). Specifically, it is possible that a part of the function of relational maintenance behaviors is to reduce uncertainty about what a friend is thinking (i.e., drift entropy). On the other hand, the findings challenge the line of reasoning that assumes that relational maintenance strategies maintain relationships by making them equitable, as supported by the non-significant correlations with equity presented in Table 3.

Future research could investigate a variety of other relationships that are susceptible to entropy with this new measure. For example, it might be interesting to explore entropy in family relationships such as marital relationships and parent-child relationships. As sad as it is to admit, friendships often get what is left over in terms of energy and resources once individuals say, "I do" and have children. Due to the nature of friendships to be more transient at times (i.e., friends for a season), it is possible that entropy might manifest itself differently in other relationships such as marriages. Based on communicate bond belong theory (Hall, 2017) and what previous research has shown about friendships (Rawlins, 2008), it is plausible that individuals are more

motivated to reduce entropy in their marriages and parent-child relationships and therefore report experiencing less entropy with their spouse than their closest friend because they have already satisfied their need to belong in those other family relationships. On the other hand, entropy may produce more negative psychosocial outcomes in the context of family and marriage, where relational partners may be unable to avoid interacting with each other and relational dissolution is difficult (if not, in some cases, impossible). With that said, I am not suggesting that friendships are not important; rather, I am arguing for the importance of maintaining them in addition to family relationships.

Lastly, a couple of limitations are that I did not collect dyadic or longitudinal data on friendships. Although it is not ideal, communication scholars commonly examine dyadic and system-level constructs (e.g., demand-withdrawl patterns, family communication patterns, etc.) by studying individuals. This study established a foundation for dyadic studies in the future, which should follow. Because the very definition of entropy showcases that it is bound up in time and the lack of order is theorized to occur at the dyadic level in friendships, it is important to study it in a longitudinal manner. In doing so, it might be interesting to investigate dyadic perceptions of entropy in friendships over time. Specifically, future researchers could examine whether or not there are discrepancies between how friends view the state of order in their relationships. It is possible that some individuals might decide that they no longer want to maintain their friendship. When that happens, it would be interesting to see how the person who decided that they no longer wanted to be a part of the friendship adjusts their maintenance behaviors and, even more interesting, the ways in which their friend's maintenance behaviors and perception of entropy changes as a result.

The second implication from this study (and arguably the most exciting in terms of advancing the current research on relational maintenance) is that individual relational maintenance strategies functioned to accomplish specific yet distinct purposes in the context of friendships. To date, scholars have produced many typologies of relational maintenance, but have undertheorized the role, function, and purpose of the behaviors within those typologies. In other words, most scholars have examined and conceptualized these strategies collectively or as a whole rather than seeking to differentiate antecedents and outcomes attached to specific behaviors. In Study 2, results of the mediation analyses revealed that openness and interaction (but not positivity and supportiveness) mediated the relationship between religious similarity and drift entropy. In a similar way, positivity and supportiveness (but not openness and interaction) mediated the relationship between religious similarity and emotional entropy in the context of friendships.

Theoretically, if emotional entropy signifies a lack of order in terms of feelings and emotions at the dyadic level, it is possible that positivity and supportiveness (but not openness and interaction) mediated the relationship between religious similarity and emotional entropy because those relational maintenance behaviors are emotionally warm in valence. In addition, if drift entropy indicates a lack of order in terms of cognitions and behaviors at the dyadic level, it is possible that openness and interaction (but not positivity and supportiveness) mediated the relationship between religious similarity and drift entropy because (a) openness is a relational maintenance behavior that allows individuals to share information, potentially reducing cognitive entropy, and (b) interaction is a relational maintenance behavior that provides individuals the opportunity to spend time with one another or engage in a time of shared behavior, possibly reducing behavioral entropy. In other words, these are a few explanations as to why these

particular relational maintenance behaviors functioned to reduce emotional entropy and drift entropy (in the context of friendships) in Study 2.

Future research should examine the functions of specific relational maintenance behaviors in a variety of other contexts. For example, it is possible that helping one's spouse complete household chores functions to accomplish something different than engaging in shared activities with a shared network. It is even possible that enacting positivity or openness in a marriage leads to a different relational outcome than enacting positivity or openness in a friendship. With that said, it would be interesting to replicate Study 2 within another interpersonal relationship such as a romantic relationship to see if the four maintenance behaviors that were examined in this study (i.e. positivity, openness, supportiveness, interaction) also mediate the relationship between religious similarity and relational entropy in that specific interpersonal relationship. If the results differ, scholars might draw conclusions about the unique nature of friendships and romantic relationships as they relate to relational maintenance behaviors.

Not only do these results offer important theoretical implications for relational maintenance literature, they also provide practical implications for religiously similar friendships. For example, it is plausible that friends who hold similar religious beliefs might want to enact positivity and supportiveness when they feel as though they are experiencing drift entropy at the dyadic level. Another practical application is that counselors might use this research to diagnose problems in friendships. For example, a counselor might be able to identify the attributes of a relationship characterized by emotional entropy. If so, that counselor might be able to recommend that the religiously similar friends start to enact more openness and interaction, and it is possible (although not certain) that doing so might restore emotional and

cognitive order to the friendship. Friendships marked by difference in religious beliefs might also benefit from enacting specific relational maintenance behaviors such as supportiveness and positivity when they are experiencing emotional entropy at the dyadic level. It is possible that these relationships might require more investment in terms of relational maintenance behaviors, in accordance with communication bond belong theory (Hall, 2017), which is a possible avenue for future research.

The last implication from this study is that friendships marked by similar religious beliefs experienced less entropy and reported enacting more relational maintenance behaviors. Based on the similarity attraction hypothesis, individuals are more likely to have friendships that are marked by similarity than difference in the first place (Morry, 2005), which brings me to a limitation of Study 2. Some participants who were randomly assigned to report on a friendship characterized by religious difference did not do so; however, I used the quantitative report of the degree of similarity and difference to analyze the two conditions or groups. Based on communicate bond belong theory (Hall, 2017), because individuals are motivated to satisfy a need to belong using the path of least resistance, it is possible that friends will maintain relationships marked by religious similarity at a higher frequency than those marked by difference. It might take more energy to communicate across difference than similarity, which is why it is so beautiful when two young students who speak different languages, have different belief systems, and were raised in extremely different cultures build a friendship. It is worth noting that another limitation of this study is that it was not longitudinal in nature. Future research might investigate what happens when one friend's religious beliefs change and become either the same as their friend's religious beliefs or different from their friend's religious beliefs. It is plausible that communicating across a change in religious beliefs might be just as (or

perhaps even more) energy-consuming as communicating with a friend who has always held different religious beliefs.

In conclusion, there were three implications from the two studies that were included in this manuscript. These implications offered valuable methodological, theoretical, and practical implications. In addition to discussing the methodological and theoretical implications regarding (a) the development of a new measure of entropy, (b) the unique functions of specific relational maintenance behaviors in friendships, and (c) the higher levels of relational maintenance and lower levels of relational entropy in friendships marked by religious similarity, I also addressed the limitations of Study 1 and Study 2 and outlined possible avenues for future research on relational maintenance and relational entropy in a variety of other interpersonal contexts. The models that were presented in Study 2 (see Figure 2 and Figure 3) could be used to study a plethora of other factors that were identified in Study 1 (e.g., demographic changes, illnesses, interpersonal conflict, geographic distance) that might accelerate entropy in friendships, which offered many directions for future research in this area. Finally, after reviewing a number of theories related to relational maintenance in this manuscript, I aimed to conceptualize, measure, and evaluate the role of entropy. In doing so, I took the first step towards developing a more cohesive theoretical perspective on maintenance with entropy at the heart of it (Ledbetter et al., 2013).

Appendix

Survey Measures and Demographic Items

Directions: In the following spaces, please select or report the most appropriate response to each question. If there is a separate set of directions, please read those directions carefully and answer each question according to the directions for that section of the questionnaire.

1. What is your age? _____
2. What is your biological sex?
 - a. Male
 - b. Female
3. What is your ethnicity or race?
 - 1 White
 - 2 Black/African American
 - 3 Latino/a/Hispanic American
 - 4 Native American
 - 5 Asian/Asian American
 - 6 Other (please specify): _____
4. Are you a student at TCU?
 - 1 Yes
 - 2 No

(If they are a student):

5. What is your year in school?
 - 1 Freshman
 - 2 Sophomore
 - 3 Junior
 - 4 Senior
 - 5 Graduate student
 - 6 Other (please specify): _____
6. How did you hear about this survey?
 - 1 Through an instructor.
 - 2 Through social media.
 - 3 Other (please specify): _____
7. Which of the following terms best describes your religious affiliation?
 - 1) Agnostic
 - 2) Atheist
 - 3) Baptist
 - 4) Buddhist
 - 5) Catholic
 - 6) Disciples of Christ
 - 7) Hinduism
 - 8) Islam

- 9) Judaism
- 10) Lutheran
- 11) Methodist
- 12) Mormon/Latter-Day Saint
- 13) Non-denominational Christian
- 14) Presbyterian
- 15) Other (please specify): _____

Religiosity measures:

Directions: Listed below are some religious activities that people might do. Please indicate how often you do these things.

Never	Very Rarely	Occasionally	Sometimes	Often	Very Frequently
0	1	2	3	4	5

1. Praying privately.	0	1	2	3	4	5
2. Engaging in meditation.	0	1	2	3	4	5
3. Watching or listening to religious TV or music.	0	1	2	3	4	5
4. Reading religious literature (e.g., the Bible).	0	1	2	3	4	5
5. Saying prayers or grace at mealtime.	0	1	2	3	4	5
6. Attending religious services.	0	1	2	3	4	5
7. Taking part in activities at a place of worship (other than religious services).	0	1	2	3	4	5

Directions: Please indicate your level of agreement with the statements below. Note that “religious beliefs” refer to whatever your beliefs are about faith, spirituality, and the supernatural (e.g., if you are Christian, think about your Christian beliefs; if you are an atheist, think about your atheist beliefs, and so forth).

Strongly Disagree			Undecided			Strongly Agree
1	2	3	4	5	6	7

1. I try hard to live my life according to my religious beliefs.	1	2	3	4	5	6	7
2. I do not let my religious beliefs affect my daily life.	1	2	3	4	5	6	7
3. My whole approach to life is based on my religious beliefs.	1	2	3	4	5	6	7
4. My religious beliefs are very important to me.	1	2	3	4	5	6	7
5. I am committed to my religious beliefs.	1	2	3	4	5	6	7
6. I constantly think about my religious beliefs.	1	2	3	4	5	6	7
7. I am certain that my religious beliefs are true.	1	2	3	4	5	6	7

[At this point in the survey, participants will randomly receive one of the following sets of directions:]

RELIGIOUSLY SIMILAR CONDITION: Directions: At this time, please think of a friend who has **similar** beliefs about faith, spirituality, and religion than you do. This friend should not be a current romantic or sexual partner. You will complete the rest of the questionnaire with this person in mind.

RELIGIOUSLY DISSIMILAR CONDITION: Directions: At this time, please think of a friend who has **different** beliefs about faith, spirituality, and religion than you do. This friend should not be a current romantic or sexual partner. You will complete the rest of the questionnaire with this person in mind.

8. What are the initials of this friend? _____

9. How would you describe this friendship?

- 1) Acquaintance
- 2) Casual friend
- 3) Close friend
- 4) Best friend

10. Is this friend a current romantic or sexual partner?

- 1) Yes
- 2) No

11. Which of the following terms best describes **your friend's** religious affiliation?

- 1) Agnostic
- 2) Atheist
- 3) Baptist
- 4) Buddhist
- 5) Catholic
- 6) Disciples of Christ
- 7) Hinduism

- 8) Islam
- 9) Judaism
- 10) Lutheran
- 11) Methodist
- 12) Mormon/Latter-Day Saint
- 13) Non-denominational Christian
- 14) Presbyterian
- 15) I don't know
- 16) Other (please specify): _____

12. What is the sex of this friend?

- 1 Male
- 2 Female

13. About how old is this friend (in years)?

- 1 Less than 18 years old
- 2 18-25 years old
- 3 25-34 years old
- 4 35-44 years old
- 5 45-54 years old
- 6 55-64 years old
- 7 65-75 years old
- 8 More than 75 years old

14. How long have you known this friend (in years)? _____

15. Generally, would you say that this person is a local friend, or a long-distance friend?

- 1 Local friend
- 2 Long-distance friend

16. "The friend I am thinking of:

- (a) Has similar beliefs about faith, spirituality, and religion.
- (b) Has different beliefs about faith, spirituality, and religion."

[Relational maintenance scale – Oswald et al., 2004]

Directions: For the following questions, answer using the following scale:

Never	Very Rarely	Rarely	Sometimes	Frequently	Very Frequently
0	1	2	3	4	5

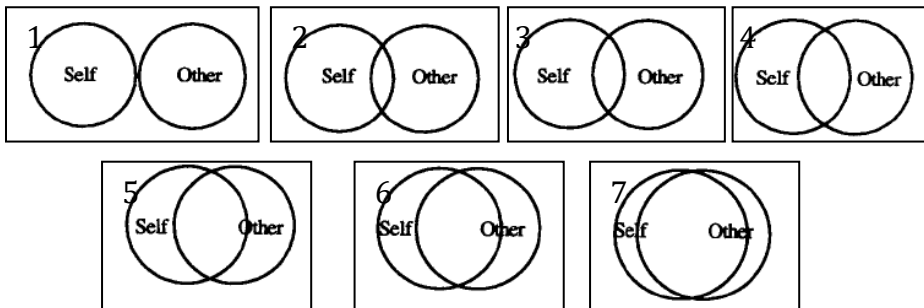
How often do you and your friend...

1. Express thanks when one friend does something nice for the other?	0	1	2	3	4	5
2. Try to make each other laugh?	0	1	2	3	4	5
3. Share your private thoughts with each other?	0	1	2	3	4	5
4. Do favors for each other?	0	1	2	3	4	5
5. Repair misunderstandings?	0	1	2	3	4	5

6. Not return each other's messages?	0	1	2	3	4	5
7. Try to make the other person "feel good" about who they are?	0	1	2	3	4	5
8. Give advice to each other?	0	1	2	3	4	5
9. Work together on jobs or tasks?	0	1	2	3	4	5
10. Try to be upbeat and cheerful when together?	0	1	2	3	4	5
11. Support each other when one of you is going through a difficult time?	0	1	2	3	4	5
12. Have intellectually stimulating conversations?	0	1	2	3	4	5
13. Provide each other with emotional support?	0	1	2	3	4	5
14. Reminisce about things you did together in the past?	0	1	2	3	4	5
15. Show signs of affection toward each other?	0	1	2	3	4	5
16. Make an effort to spend time together even when you are busy?	0	1	2	3	4	5
17. Let each other know you want the relationship to last in the future?	0	1	2	3	4	5
18. Celebrate special occasions together?	0	1	2	3	4	5
19. Let each other know you accept them for who they are?	0	1	2	3	4	5

IOS Closeness Scale (Aron, Aron, & Smollan, 1992):

Directions: Please select the picture below which best describes your relationship. In the diagrams below, you are "self" and your friend is "other."



Relational Uncertainty Measure (Knobloch & Solomon, 1999):

Directions: We would like you to rate how certain you are about the degree of involvement that you have in your friendship at this time. Please indicate your responses using the scale below.

Completely or almost completely uncertain	Mostly uncertain	Slightly more uncertain than certain	Slightly more certain than uncertain	Mostly certain	Completely or almost completely certain
1	2	3	4	5	6

How certain are you about...

1. What you can or cannot say to each other in this friendship?	1	2	3	4	5	6
2. The boundaries for appropriate and/or inappropriate behavior in this friendship?	1	2	3	4	5	6
3. The norms for this friendship?	1	2	3	4	5	6
4. How you can or cannot behave around your friend?	1	2	3	4	5	6
5. Whether or not you and your friend feel the same way about each other?	1	2	3	4	5	6
6. How you and your friend view this friendship?	1	2	3	4	5	6
7. Whether or not your friend likes you as much as you like him or her?	1	2	3	4	5	6
8. The current status of this friendship?	1	2	3	4	5	6
9. The definition of this friendship?	1	2	3	4	5	6
10. How you and your friend would describe this friendship?	1	2	3	4	5	6
11. The state of the friendship at this time?	1	2	3	4	5	6
12. Whether or not this is a close or casual friendship?	1	2	3	4	5	6
13. Whether or not you and your friend will remain friends?	1	2	3	4	5	6
14. The future of the friendship?	1	2	3	4	5	6
15. Whether or not this friendship will end soon?	1	2	3	4	5	6
16. Where this friendship is going?	1	2	3	4	5	6

1. Considering how much you and your friend put into your friendship, and how much you and your friend get out of it: (circle one number below)

I am getting a much better deal than my friend.							My friend is getting a much better deal.
1	2	3	4	5	6	7	

2. Consider all the times when your friendship has become unbalanced and one partner has contributed more for a time. When this happens, who is more likely to contribute more? (circle one number below)

My friend is much more likely to be the one to contribute more.							I am much more likely to be the one to contribute more.
1	2	3	4	5	6	7	

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ABSTRACT

ENTROPY AS AN EXPLANATORY MECHANISM FOR RELATIONAL MAINTENANCE BEHAVIORS IN FRIENDSHIPS

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Building from prior relational maintenance scholarship (Stafford and Canary, 1991), this manuscript presents *entropy*, the natural tendency of the world to move from a state of order to a state of disorder, as a construct that might explain the central *function* of relational maintenance behavior in friendships. Study 1 explored the conceptual domain of entropy and Study 2 tested a measure of entropy in the context of friendships marked by religious (dis)similarity. The results indicated that religious similarity was positively associated with positivity, openness, interaction, and supportiveness. Religious similarity and relational maintenance were negatively associated with relational entropy. Exploratory factor analysis revealed two distinct dimensions of relational entropy: *drift entropy* and *emotional entropy*. *Positivity* and *supportiveness* mediated the association between religious similarity and drift entropy, and in a similar fashion, *openness* and *interaction* mediated the association between religious similarity and emotional entropy. Theoretical, methodological, and practical implications are discussed.

Keywords: relational maintenance, entropy, friendship, religious similarity