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Close Relationships and Health: The Interactive Effect of Positive and Negative Aspects

Kharah M. Ross, PhD,

Owerko Centre, Alberta Children's Hospital Research Institute, University of Calgary, Calgary, AB, Canada, kharah.ross@ucalgary.ca

Karen Rook, PhD,

Department of Psychology, University of California – Irvine, Irvine, CA, US, ksrook@uci.edu

Lauren Winczewski, PhD,

Department of Psychology, Napa Valley College, Napa, CA, US, lauren.winczewski@napavalley.edu

Nancy Collins, PhD,

Department of Psychology, University of California – Santa Barbara, Santa Barbara, CA, US, ncollins@ucsb.edu

Christine Dunkel Schetter, PhD

Department of Psychology, University of California – Los Angeles, Los Angeles, CA, US, dunkel@psych.ucla.edu

Abstract

Most health research focuses on the independent associations of positive or negative aspects of close relationships with health outcomes. A small but growing literature has begun to examine interactive effects of positive and negative aspects. These interactive effects frequently predict health independently or above-and-beyond main effects of either the positive or the negative aspects, suggesting unique relationship processes or emergent features of these close relationship patterns. Our goal in this review is to lay out the existing approaches to studying the interactive effects of positive and negative aspects of close relationships, and to review available evidence linking these interactive effects to health outcomes. We conclude by discussing important unresolved issues and highlighting critical directions for future research.

Keywords

Close relationships; health; well-being; ambivalence; indifference

The quality of close relationships is robustly associated with health, well-being, and mortality, such that people who are socially integrated and receive social support live longer than those who are less socially connected (Berkman & Syme, 1979; Holt-Lunstad, Smith, & Layton, 2010). Close relationships have both positive and negative aspects (Cohen, 2004; Rook, 2015), both of which have been linked to health. Positive aspects of close

relationships, such as intimacy and social support, predict better health outcomes, including longer survival following a breast cancer diagnosis (Mustafa, Carson-Stevens, Gillespie, & Edwards, 2013), and improved emotional well-being (Rueger, Malecki, Pyun, Aycock, & Coyle, 2016). In contrast, negative aspects of close relationships, such as conflict and interference, predict worse health outcomes (Brooks & Dunkel Schetter, 2011; Rook, 2014), including poor cardio-metabolic health (Ross, Martin, Chen, & Miller, 2011), and depressive symptoms (Ibarra-Rovillard & Kuiper, 2011).

Research to date treats positive and negative close relationship aspects predominately as independent phenomena, with relatively little attention devoted to examining their interactive effects on health. For example, some studies assess social support but not social conflict, and vice versa. Other studies assess both aspects but focus on contrasting the strength of their independent associations with health outcomes (e.g., Bookwala, 2005; Cheng, Li, Leung, & Chan, 2011; Henry, Berg, Smith, & Florsheim, 2007; Ruehlman & Wolchik, 1988). Although useful, these approaches do not capture how positive and negative close relationship aspects might interact in daily life to influence psychological or physical health. For example, conflict in a close relationship may be particularly consequential for health when support is relatively low or inconsistent. How positive and negative aspects of close relationships influence each other and their implications for health is just beginning to be investigated by researchers. The interactive effects of positive and negative aspects as they co-occur in a close relationship needs greater attention, especially if we wish to continue to advance our understanding of the health effects of close relationships (DeLongis, Capreol, Holtzman, O'Brien, & Campbell, 2004; Rook, 1990; Uchino, Holt-Lunstad, Uno, & Flinders, 2001).

In this article, we review conceptual and measurement issues that arise when investigating the interactive effects of positive and negative aspects of close relationships on health. Our focus is on close relationships between adults that are characterized by, or are expected to be, high in interdependence and subjective importance (e.g., romantic partners, parents, siblings, and close friends). All possible interactive patterns of positive and negative aspects were considered. Additionally, we discuss an assumption generally implicit in the existing theoretical work in this area: That the interactive effect of positive and negative close relationship aspects reflects unique properties and distinctive health effects *independent* of the contributions of the positive and negative aspects. Our review begins by discussing how researchers have conceptualized and analyzed the interactive effects of these two aspects; then we provide an overview of empirical work that has investigated such health effects, and conclude by highlighting unresolved issues and promising future directions for extending knowledge of the health effects of positive and negative close relationship aspects.

Conceptual Issues: How to Characterize Positive and Negative Aspects of Close Relationships

Positive and negative close relationship aspects are separate but related continua that exhibit moderate, inverse correlations, with stronger associations observed as relationship importance or closeness increases (Abbey, Abramis, & Caplan, 1985; Campo et al., 2009;

Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005; Pierce, 1994). Given that close relationships can be characterized as being relatively high or low in positive and negative aspects, four patterns of close relationships can be distinguished: high-quality, low-quality, ambivalent, and indifferent (Fincham & Linfield, 1997; Uchino et al., 2001; Figure 1, Table 1).

High-Quality and Low-Quality Close Relationships

High-quality close relationships are conceptualized as high in positive and low in negative aspects. A best friend who is supportive and trustworthy, and with whom little conflict exists illustrates a high-quality close relationship. In contrast, low-quality close relationships are low in positive and high in negative aspects. An example is a sibling who is not trustworthy and who constantly undermines one's efforts. These patterns of close relationship quality have not been a focus of theories on the interactive effects of close relationship quality (Fincham & Linfield, 1997; Fingerman, Pitzer, Lefkowitz, Birditt, & Mroczek, 2008; Uchino et al., 2001), presumably because they tend to be associated with health in a manner consistent with how positive and negative aspects *individually* predict health. In other words, because high positive aspects independently predict good health outcomes, and low negative aspects also independently predict good health outcomes, the combination of high positive and low negative in a close relationship (i.e., high-quality relationships) is also expected to predict good health outcomes.

Ambivalent Relationships and Indifferent Relationships

Ambivalent close relationships are characterized as *high* in both positive and negative aspects. Indifferent close relationships are characterized as *low* in both positive and negative aspects. Although these two relationship patterns are less intuitive, they are not rare, with ambivalent social ties estimated to represent up to 15% of social network members, and indifferent ties up to 12% (Ross, Guardino, Hobel, & Dunkel Schetter, 2018; Ross, Miller, et al., 2017), depending on methodologies and definitions used.

Ambivalent close relationships have attracted considerable attention among researchers (Fincham & Linfield, 1997; Fingerman, Hay, & Birditt, 2004; Rook, 1992, 2014; Uchino et al., 2001). Examples of ambivalent relationships are volatile romances or relationships with highly competitive or critical friends. Ambivalent close relationships are posited to have unique dynamics and properties that adversely affect health. Theories of *intergenerational ambivalence* suggest that ambivalence results from clashes between social roles, such as being a parent who requires care by a grown child. Such unresolved tension or ambivalence can be a significant source of stress that detracts from health and well-being (Luescher & Pillemer, 1998). *Marital satisfaction theories* posit that an ambivalent pattern represents a less-than-optimal marital relationship, and a step along the road towards marital dissolution (Fincham & Linfield, 1997). Poor marital function is a source of distress, with repercussions for health and well-being.

Two *health and stress* theoretical approaches have arisen more or less independent of each other. *Within-domain stress exacerbation* models (sometimes referred to as “*reverse buffering*”) propose that within a single relationship, high positive or supportive aspects of

ambivalent relationships exacerbate the effects of high negative, conflictual or stressful aspects of the relationship (Duffy, Ganster, & Pagon, 2002; Hobman, Restubog, Bordia, & Tang, 2009; Major, Zubek, Cooper, Cozzarelli, & Richards, 1997). The second *health and stress* theoretical approach is specific to support-seeking contexts, in which ambivalent relationships are both highly helpful (positive) and highly upsetting (negative) when coping with stress generally (Uchino, Holt-Lunstad, Uno, Campo, & Reblin, 2007). Ambivalent close relationships are hypothesized to amplify the experience of stress due to a lack of predictability or reliability, which in turn reduces support effectiveness and ability to cope (e.g., Uchino et al., 2012). As such, both stress and health theoretical approaches view ambivalent social ties as sources of interpersonal stress, with downstream implications for health and well-being.

Indifferent close relationships are characterized by a relative *lack* of both positive and negative aspects, and can be considered the opposite of ambivalent relationships (Fincham & Linfield, 1997; Uchino et al., 2001). An example of an indifferent relationship is a disengaged partner, with whom there is neither conflict nor intimacy. Indifferent close relationships are understudied in the context of health, in part because they have received less theoretical attention in the literature. Only one *health and stress* theoretical approach discusses indifferent relationships, and argues that indifferent social ties should not actually be considered close relationships because they could primarily exist at the periphery of social networks (Uchino, Holt-Lunstad, Smith, & Bloor, 2004; Uchino et al., 2001). From this perspective, indifferent relationships are viewed as unlikely to influence health. In contrast, *marital satisfaction theories* note that indifference is not uncommon in partner relationships. They posit that indifferent marital relationships indicate less-than-optimal marital quality, despite the relative lack of conflict (Fincham & Linfield, 1997; Rogge, Fincham, Crasta, & Maniaci, 2016), and such a pattern could appear prior to a separation or divorce (DeLongis et al., 2004). Indifference in a close relationship, such as a marital relationship, could indicate withdrawal, apathy, neglect, or disengagement (DeLongis et al., 2004). From this perspective, indifferent relationships are expected to be distressing and thus detrimental to health and well-being.

Interactive Effects of Positive and Negative Aspects and Emergent Properties

All theories concerning the interactive effect of positive and negative close relationship aspects at least implicitly hypothesize that these patterns affect health through emergent properties – that is properties that are grounded in *but not fully accounted for by* the separate positive and negative aspects (Mayr, 1982; O'Connor, 1994). None of the theoretical approaches propose that, for example, the detrimental impact of ambivalent relationships on health is simply driven by negative aspects that overpower any effect of positive aspects. Instead, these theories argue that ambivalent relationships are characterized by emergent properties that arise from co-occurring positive and negative aspects. Ambivalent relationships, for example, may be characterized by unpredictability, an emergent source of stress that would be present to a lesser extent, if at all, in low-quality relationships that are primarily negative. A key focus of this review, therefore, will be to consider whether the four patterns of relationship quality predict health over the independent effects of positive and

negative aspects alone, which would be consistent with the hypothesis that interactive effects indicate unique, emergent properties that are relevant to health.

Measurement and Analysis of the Interactive Effects

A first challenge facing researchers who wish to examine the interactive effects of positive and negative close relationship aspects is to consider how to capture this phenomenon. This challenge plays out in decisions about both measurement and data analysis. The literature is generally divided into two broad analytic strategies that are used to model the interactive effects of positive and negative aspects, and are reviewed below: Categorical approaches and linear regression approaches¹. Categorical approaches are more intuitive in some ways, producing a variable calculated by coding relationships into types based on the combination of positive and negative aspects, and that can be interpreted without statistical modeling. Linear regression approaches, on the other hand, are inferential. They model the interactive effect through calculation of a positive-by-negative interaction term that is *only* interpretable through statistical modeling or analysis.

At the same time, the literature is also broadly divided into two conceptual approaches used to measure positive and negative aspects. The most common one is based on evaluations of a relationship partner's helpfulness and upsettingness in support-seeking contexts (Uchino et al., 2001). The others focus on evaluations of frequency or perceptions of positive (e.g., supportive) and negative (e.g., conflictual) relationship aspects.

Categorical Approaches

Helpfulness and upsettingness.—The most commonly used approach to measuring the interactive effects of positive and negative relationship aspects asks people to rate how helpful (positive) and upsetting (negative) a social partner is *specifically in a support-seeking context* (Social Relationships Index; Campo et al., 2009). Close relationships are then grouped into categories based on those ratings using validated cut-offs. Four possible categories are generated (Figure 1, Table 1). Indifferent relationships are those rated as 'not at all upsetting' and 'not at all helpful' in support-seeking contexts; ambivalent relationships are those rated as at least 'a little upsetting' and at least 'a little helpful;' high-quality relationships as 'not at all upsetting' and at least 'a little helpful;' and low-quality relationships as at least 'a little upsetting' and 'not at all helpful.' Other thresholds have also been used (e.g., Holt-Lunstad, Uchino, Smith, & Hicks, 2007).

Positive and negative relationship qualities.—Another approach asks people to rate the positive (e.g. enjoyable, good) and negative (e.g. boring, bad) qualities of a relationship, without reference to support-seeking contexts per se. Relationships are then categorized relative to sample means or medians on those positive and negative qualities (Fincham & Linfield, 1997). Again, four categories are produced. Ambivalent relationships are above-average on both positive and negative qualities, whereas indifferent are below-average on

¹A third conceptual and analytic approach captures conflicted sentiments towards a relationship partner (Luescher & Pillemer, 1998) using an ambivalence index (Thompson, Zanna, & Griffin, 1995). This approach is not considered here because it is rarely used in the study of health, and questions have emerged regarding its analytic validity (Gilligan, Sutor, Feld, & Pillemer, 2015; Ullrich, Schermelleh-Engel, & Botcher, 2008).

both qualities. High-quality relationships are above-average in positive and below-average in negative qualities, and vice versa for low-quality relationships.

Positive and negative social exchanges.—Yet a third categorical approach is based on the extent to which social network members engage in positive (e.g. support, companionship) and negative (e.g. conflict, rejection) behaviors with the participant (Barrera, 1980; Newsom et al., 2005). Participants are asked to indicate which of a set of positive and negative social exchanges were experienced recently, and then indicate the specific social network members with whom the exchange occurred. Each named social network member is categorized into one of three groups as a function of whether they served as source of positive exchanges only (high-quality relationships), negative exchanges only (low-quality relationships), or both positive and negative exchanges (ambivalent relationships). This strategy produces three categories. Because this approach captures only individuals with whom the participant engages in positive and/or negative exchanges, social ties characterized by an *absence* of both positive and negative social exchanges (i.e. indifferent ties) are not captured.

Commentary.—All of the approaches discussed above yield categorical classifications of individuals' close relationships, which has the advantage of offering an intuitive way to understand the co-occurrence of positive and negative aspects within close relationships. At the same time, categorical approaches can make it difficult to tease apart the independent versus interactive effects of positive and negative relationship aspects on health. This is because categorical approaches can mask underlying differences in the degree of positive or negative aspects across the relationship categories. For example, high-quality social ties could have more positive aspects, and low-quality social ties could have more negative aspects, compared to ambivalent social ties. If group differences emerge, then, it is difficult to determine if they are due to an interactive effect or, instead, independent effects of positive or negative aspects (e.g., high-quality relationships have more positive aspects than low-quality, indifferent and ambivalent categories). This is particularly problematic when comparing only two social tie categories (e.g. high-quality and ambivalent marital relationships). For example, if ambivalent ties predict worse health outcomes than high-quality ties, it is unclear whether differences are due to emergent properties of ambivalent ties (interactive effects) or because, by definition, ambivalent ties have more negative aspects than high-quality ties (independent effects, or driven by group differences in negative aspects).

Many studies do not test for such differences. If potential differences are tested and detected (e.g., the support provided by high-quality relationships exceeds the support provided by ambivalent relationships), one strategy is to adjust statistically for continuous measures of the positive and negative aspects (Uchino, Smith, & Berg, 2014). Because of these issues, some researchers have advocated for the use of linear regression approaches to examine the interplay of positive and negative aspects of close relationships.

Linear Regression Approaches

Linear regression techniques provide a strong strategy for modeling the interactive effect of positive and negative close relationship aspects. Health outcomes are predicted by the positive aspect, the negative aspect, and a linear regression *interaction term*² (i.e., the product of the positive and negative aspects). This approach has the advantage of using continuous measures of positive and negative aspects, is quantitatively elegant, and avoids the interpretational ambiguity involved in distinguishing between interactive versus independent effects when categorical approaches are used (Hayes, 2018). However, as noted by Uchino et al. (2001), a possible risk of using linear regression models is that they can estimate trends that go beyond observed ranges in the data (i.e. a trend is estimated where there are no actual data points to support estimates of a trend). As a consequence, researchers might conclude that a trend exists in the absence of actual data points to support it. Results of linear regression interaction models, therefore, should only be interpreted within the range of the available data (Hayes, 2018).

Evidence on Interactive Effects of Positive and Negative Close Relationship Aspects and Health

Our literature review identified 52 studies that tested associations between the interactive effect of positive and negative close relationship aspects within specific close relationships, and with either a psychological or physical health outcome (see Supplemental Table 1). The literature was diverse, encompassing a variety of measures, diversity of study populations and broad range of health indicators. An exhaustive review of all 52 studies is beyond the scope of the current report, and so we focus only on the 15 studies that (1) considered *both the interactive and independent effects* of positive and negative close relationship aspects, and (2) provided a full description of the study methodologies and data analyses.

Cardio-Metabolic and Immune Indicators

Ambivalent partner relationships were found to be associated with immune and cardio-metabolic health indicators. For example, using a categorical approach and controlling for separate positive and negative aspects, individuals in ambivalent marital relationships had higher levels of inflammation (i.e., interleukin-6, fibrinogen and C-reactive protein) compared to those in high-quality relationships (Uchino, Bosch, et al., 2013). Similarly, using actor-partner interdependence models, a study of ambivalent and high-quality marital relationships found that individuals who viewed *and* were viewed by their partner as ambivalent (i.e., both helpful and upsetting) had greater coronary artery calcification, compared to all other dyadic quality combinations (Uchino et al., 2014). Another study found that, compared to individuals in high-quality partner relationships, those in ambivalent relationships had higher ambulatory blood pressure (Birmingham, Uchino, Smith, Light, & Butner, 2015).

²Note that “interaction term” or “linear regression interaction” refers to a statistical test within a linear regression framework, whereas “interactive effect” refers to the broader phenomenon by which positive and negative aspects together interact to predict health (e.g. ambivalence, indifference, low-quality, high-quality relationships).

Two other studies detected health effects of ambivalent close relationships using a linear regression interaction approach. Positive and negative social encounters were assessed using daily diaries in a sample of 102 adults (Holt-Lunstad, Uchino, Smith, Olson-Cerny, & Nealey-Moore, 2003). A significant interaction term emerged, such that when social encounters were highly negative (upsetting), highly positive (helpful) encounters were associated with greater ambulatory blood pressure, which is consistent with an ambivalent pattern. In contrast, when social encounters were low in positive aspects, the association between negative social encounters and ambulatory blood pressure was non-significant (Holt-Lunstad et al., 2003). The second study tested whether partner relationship quality during pregnancy could be a developmental programming “cue” transmitted from the mother to the fetus that, in turn, contributes to inflammation in a sample of 113 infants. A significant interaction term was detected, independent of the positive and negative aspects. When the interaction was probed, it was found that, when prenatal partner positive aspects (helpfulness) were high, higher partner negative aspects (upsetting) were associated with higher infant inflammatory markers -- also consistent with an ambivalent pattern. In contrast, when prenatal partner positive aspects were low, no significant association between partner negative aspects and infant inflammatory markers emerged (Ross, Thomas, Campbell, Letourneau, & Giesbrecht, 2018). These two studies provide evidence that ambivalent close relationships are associated with cardio-metabolic and immune indicators independent of any main effects of positive and negative aspects.

Two studies detected an effect of indifferent partner relationships using a linear regression interaction approach. In a sample of 90 pregnant women, partner relationships low in positive (support) and negative (conflict) aspects were associated with greater maternal inflammation (Ross, Miller, et al., 2017). Similarly, among 778 postpartum women, when satisfaction with a partner was low, lower conflict was associated with poor postpartum cardio-metabolic health (Ross, Guardino, et al., 2018). These studies suggest that indifference in the context of the partner relationship is associated with worse inflammatory and cardio-metabolic indicators, independent of the positive and negative aspects.

Only one study reported an effect of low-quality marital relationships on an immune outcome using a linear regression interaction approach. In a sample of 78 parents, when frequency of positive partner social interactions was low, higher frequency of negative partner social interactions was associated with shorter leukocyte telomere length, an indicator of immune system biological aging (Price, Repetti, Robles, & Carroll, 2018). This is evidence that low-quality close relationships, characterized by both low positive and high negative aspects, are associated with poorer health indicators.

Psychological Distress and Self-Reported Health

Several studies using linear regression approaches report associations between ambivalent supervisor relationships and more employee psychological distress and self-reported somatization symptoms (Alexander, 2011; Duffy et al., 2002; Hobman et al., 2009; Joyce, 2013). For example, a significant linear regression interaction between supervisor support and supervisor undermining was detected in a sample of 685 police officers (Duffy et al., 2002). Specifically, when supervisor support was high, higher supervisor undermining was

associated with worse self-reported health (as indexed by reported somatization symptoms), a pattern that is consistent with ambivalent relationships. In contrast, when supervisor support was low, there was no significant association between supervisor undermining and somatic symptoms (Duffy et al., 2002). Collectively, these studies suggest that ambivalent relationships, particularly within a supervisor-employee relationship, predict greater psychological distress and poor self-reported health.

Another study of older adults, in contrast, used a categorical approach to define three types of close relationships (high-quality, low-quality, or ambivalent), and then examined their associations with participants' reported functional impairment. This study also examined whether the positive exchanges and negative exchanges that occurred within these different categories of relationships were differentially related to functional health. More positive social exchanges within high-quality social ties, but not within ambivalent social ties, were found to be related to less functional impairment. In contrast, more negative social exchanges within ambivalent social ties, but not with low-quality social ties, were related to greater functional impairment (Rook, Luong, Sorkin, Newsom, & Krause, 2012). The findings were qualified, to some extent, by the kin vs. non-kin status of participants' social network members, but they provide clues that the positive aspects of ambivalent social ties may not be health-protective, and the negative aspects of ambivalent social ties may be health-damaging (possibly even more so than is true for low-quality social ties.) The consequences of positive and negative social exchanges may vary depending on the overall quality of a close relationship, with ambivalent social ties being potentially more detrimental than beneficial to older adults' functional health.

Only one study reported an effect of indifferent spousal relationships on emotional well-being. In a daily diary study of 83 couples, a pattern of low negative social exchanges and low positive exchanges with the spouse predicted higher next-day negative affect (DeLongis et al., 2004). Thus it is not only high negative exchanges that may detract from emotional well-being; rather, partner indifference may also be a risk factor for lower well-being.

Finally, a number of studies have reported health-protective effects of high-quality close relationships. For example, a study of 615 women who underwent an abortion examined how the quality of their close relationships (specifically, with their mother or a friend) predicted post-abortion distress. The lowest post-abortion distress was found among participants whose close relationships were characterized by high support and low conflict (i.e., high-quality relationships) (Major et al., 1997). And in a sample of 129 students, the linear regression interaction of academic advisor support and academic advisor abuse predicted student psychological well-being. Specifically, when advisor support was high, lower abuse by advisors was associated with higher well-being, consistent with a high-quality pattern. In contrast, when advisor support was low, the association between supervisor abuse and self-esteem was not significant (Hobman et al., 2009). Lastly, in the study of 83 couples noted above, spousal interactions characterized by low negative exchanges and more positive exchanges predicted lower next-day negative affect (DeLongis et al., 2004). Together, these studies suggest that high-quality close relationships could protect mental health.

Unresolved Questions and Future Directions

A growing body of evidence suggests that the interactive effects of positive and negative close relationship aspects have unique effects on health outcomes, particularly for cardio-metabolic and immune indicators and psychological and self-reported health. The fact that relatively consistent patterns are observed across conceptual, measurement, and analytic approaches speaks to the strength and importance of this phenomenon. Some important questions, however, remain to be addressed. In particular, below we discuss factors that could contribute to (1) why specific close relationship quality patterns are detected in some studies and contexts but not others, and (2) what predicts the development of these kinds of close relationships (antecedents), and what emergent properties account for associations with health (consequences).

Construct Definitions and Terminology

The same terms have emerged to label potentially different constructs. For example, “ambivalent” is used to refer to social ties that are at least a little helpful and a little upsetting in support-seeking contexts (Uchino et al., 2001), marital relationships that are below average on both positive and negative relationship satisfaction (Fincham & Linfield, 1997), and close relationships with a high score on an ambivalence index (Fingerman et al., 2008). Similarly, indifference refers to social ties that are not at all helpful or upsetting during support-seeking contexts (Uchino et al., 2001), or marital relationships that are below average in both positive and negative close relationship satisfaction (Fincham & Linfield, 1997). Although convergent evidence, regardless of analytic or measurement approach, suggests a common, underlying phenomenon, it has not yet been clearly established how these different definitions relate to each other. This is all the more important because how a close relationship is labeled can depend on which analytic approach was used. For example, a social tie categorized as indifferent using the sample mean as a cut-off could be considered ambivalent using an *a priori* scale cut-off. As such, these terminology issues can lead to the assumption that the same construct is being investigated across studies when that may not be the case. Including explicit construct definitions in empirical studies, and acknowledging differences in construct definitions between studies, will enhance efforts to integrate findings across studies.

Heterogeneity of Measures

Many positive and negative aspects of close relationships are assessed in the literature, using a number of different measures (from non-validated, study-specific measures to one of seven validated questionnaires or interviews³) that encompassed social exchanges, perceptions and sentiments, and a number of theoretical taxonomies of positive and negative close relationship aspects (e.g., Fincham & Linfield, 1997; Newsom, Nishishiba, Morgan, & Rook, 2003; Uchino et al., 2001). Although this review treated all positive and negative

³Social Relationships Index (Campo et al., 2009), the Quality of Relationships Inventory (Pierce, 1994), Positive-Negative Quality Scale (Rogge et al., 2016), the Social Support Effectiveness Questionnaire (Rini & Dunkel Schetter, 2010), the Network of Relationships Inventory (Demir, Özdemir, & Weitekamp, 2006), and adapted versions of the Dyadic Adjustment Scale (Spanier, 1976), Arizona Social Support Inventory (Barrera, 1980), and the Positive and Negative Social Exchanges scale (Newsom et al., 2005).

aspects measured as equal, it is possible that some aspects may be more health-relevant than others. For example, companionship has been found in some studies to be at least as consequential for health and well-being as social support (Rook, August, & Sorkin, 2011). Additionally, the negative close relationship aspects are still incompletely understood or defined (Brooks & Dunkel Schetter, 2011; Rook, 2015). Positive aspects of close relationships have been investigated more extensively than have negative aspects, and debate remains regarding terminology, construct definitions, and the conceptual or dimensional structure of negative close relationship aspects (Brooks & Dunkel Schetter, 2011). Thus, our ability to study the interactive effects of positive and negative aspects will depend on continued theoretical progress in the study of negative close relationship aspects.

Identifying Emergent Properties: Exploring the Characteristics of the Close Relationship Patterns

A growing body of evidence exists to show that the interactive effect of positive and negative close relationship aspects predicts health independent of the main effects of positive and negative aspects, which is consistent with the hypothesis that each of these close relationship patterns are characterized by emergent properties not fully explained by their independent positive and negative aspects. Relatively little research has explored how these close relationships and emergent properties develop (antecedents), or the processes by which they influence health (consequences). Below we draw upon relevant research and theory to propose possible relationship processes that act as antecedents and consequences for each pattern of close relationship quality.

Ambivalent close relationships.—Theoretical perspectives on stress and health, especially those by Uchino and colleagues, provide rich insights into properties of ambivalent close relationships that could affect health. One hypothesis posits that ambivalent social relationships contribute to poor health outcomes by interfering with support during times of need (for example, resulting in support provided by ambivalent ties to seem insincere or miscalibrated; Uchino et al., 2007). Another hypothesis suggests that ambivalent ties increase stress through their unpredictability, which may arouse protracted emotional responses and ruminative thoughts (Uchino et al., 2007; Uchino et al., 2001). The health-damaging effects of ambivalent close relationships could also reflect negative past experiences when individuals were seeking to cope with stressful events. Consistent with this idea, college students who were assigned to give a speech about a previously experienced stressful event in the presence of an ambivalent friend exhibited greater cardiovascular reactivity, and this was explained by the extent to which that friend had been upsetting in past discussions of the same event (Holt-Lunstad et al., 2007).

Co-occurring high positive and negative aspects in ambivalent relationships have also been cited as a source of stressful cognitive dissonance (Duffy et al., 2002; Hobman et al., 2009), or a state of inconsistent thoughts, beliefs or attitudes towards the other person. Resolving these contradictions requires emotional and cognitive resources to be expended and results in confusion, uncertainty and a perceived lack of predictability. It has also been suggested that negative experiences in close relationships are more stressful, and therefore more detrimental to health, precisely when they occur against a backdrop of positive experiences,

which would typify ambivalent relationships (Major et al., 1997; Rook & Pietromonaco, 1987).

Others have proposed that the unpredictable nature of ambivalent close relationships could be driven by personality characteristics, such as avoidant attachment orientation. Individuals high in attachment avoidance, for example, are more likely to perceive close relationship partners as ambivalent (Uchino, Bosch, et al., 2013). Attachment avoidance, in turn, is associated with poorer health outcomes (Pietromonaco, Uchino, & Dunkel Schetter, 2013). Although participants higher in attachment avoidance were more likely to be in an ambivalent relationship, *controlling* for attachment orientation did not affect associations between ambivalent relationships and inflammation (Uchino, Bosch, et al., 2013), suggesting that attachment avoidance does not fully explain associations between ambivalent social ties and health. Partner responsiveness (Reis & Gable, 2015) could be another emergent property, with ambivalent close relationships reflecting a lack of partner responsiveness. Only one study examined partner responsiveness and found that, while ambivalent partners were less responsive than high-quality partners, responsiveness did not mediate links between ambivalent marital relationships and greater ambulatory blood pressure (Birmingham et al., 2015).

Consistent with a discussion of antecedents and consequences of ambivalent relationships, how this kind of relationship develops and persists over time is just beginning to be investigated. Evidence suggests that intentional effort is expended to continue these relationships, despite their high negative aspects. Compared to negative exchanges with low-quality social ties, negative exchanges with ambivalent social ties aroused less distress and elicited coping responses that were more focused on preserving good will and engaging in conciliatory behaviors in a study of older adults (Rook et al., 2012). A study of young adults revealed that ambivalent friendships were maintained primarily due to relationship commitment and appreciation of the positive aspects of the relationship. At the same time, ambivalent relationships were characterized by more distancing (Bushman & Holt-Lunstad, 2009). Building on these clues in the literature, useful directions for future research include investigating the nature of ambivalent close relationships, why they are maintained, and how they affect health.

Indifferent close relationships.—Research on marital relationships suggests that indifference could be one pathway to deteriorating marital quality (Mattson, Rogge, Johnson, Davidson, & Fincham, 2013), potentially indicating disengagement, apathy, or neglect that precedes the end of a relationship (DeLongis et al., 2004). Thus, indifferent close relationships could indicate a form of relationship distress, with downstream implications for health and well-being. To date, however, few studies have directly examined whether indifference in close relationships predicts relationship instability, why indifferent relationships are maintained, or the circumstances in which such indifference detracts from health.

Of note, most of the existing research on indifference has focused on marital relationships. Although studies of the number of indifferent social ties across a social network have shown associations with health outcomes (e.g., Uchino et al., 2012; Uchino, Smith, Carlisle,

Birmingham, & Light, 2013), more research is needed to understand how indifference in other, specific relationship contexts (e.g. parental, friendships, sibling) is associated with health.

Low-quality and high-quality close relationships.—If emergent properties are indicated by an interactive effect of positive and negative aspects predicting health independent of any main effects, then high-quality and low-quality close relationships must also be characterized by emergent properties not fully accounted for by their positive and negative aspects. Interestingly, because high-quality and low-quality relationships predict health in a manner consistent with the independent effects of the positive and negative aspects (i.e. high positive is health beneficial, low negative is health beneficial, and so high-quality relationships should also be health beneficial), relatively little work has explored what emergent processes and features could characterize these kinds of close relationships.

High-quality close relationships are the only pattern that emerged as *health beneficial*. It is possible that this pattern indicates higher quality interpersonal processes (e.g., partner responsiveness) or individual differences (e.g. secure attachment style) that are possibly health protective. For example, high-quality relationships could indicate that a couple has highly developed interpersonal strategies that promote conflict resolution, or that reframe conflict into opportunities to increase closeness. It is also possible that high quality relationships act as a buffer against the deleterious consequences of chronic stress from sources external to the relationship. Additional theory and research are required to develop and test these ideas.

Low-quality close relationships also predict poor health outcomes (e.g., Price et al., 2018; Rook, 1984). Such relationships are viewed as sources of interpersonal stress, with downstream implications for health and well-being (Rook, 2015). How such detrimental relationships develop and why they persist despite having relatively few redeeming qualities are not yet well understood. Individual differences, such as attachment insecurity or low self-esteem may lead some people to forge and remain in unsatisfying relationships (Newsom, Mahan, Rook, & Krause, 2008; Rook, 2015). Situational factors can also play a role, particularly for relationships that are difficult to avoid (such as a conflictual relationship with a co-worker or neighbor) or that cannot easily be abandoned because they provide needed, if grudging, assistance (such as relationships with a family member on whom one depends for day-to-day care) (Newsom et al., 2008; Rook, 2015). Lack of skill in resolving disagreements or an interaction partner's lack of responsiveness to such resolution efforts may also perpetuate low-quality relationships (Rook et al., 2012). Difficult life circumstances, such as chronic illness or enduring financial hardship, can overwhelm the support-providing capacities of close social ties and can contribute to strained relationships (Rook, 2015). More needs to be understood about the mix of individual differences, interpersonal processes, and life circumstances that lead some people to have low-quality close relationships that persist over time.

Moderators of the Interactive Effect of Positive and Negative Close Relationships Aspects on Health

It is also not clear why some close relationship quality patterns are detected in some contexts and studies, and not in others. It is possible that differences are due to between-study differences in construct definitions and analytic approaches. But it is also possible that the strength and form of the interactive effect of positive and negative aspects of close relationships could also be moderated by other factors. For example, age (Fiori, Windsor, Pearson, & Crisp, 2013; Okun & Keith, 1998) and gender (Birmingham, Uchino, Smith, Light, & Sanbonmatsu, 2009; Fiori et al., 2013) have been shown to moderate how close relationship patterns predicts health outcomes, although how age and gender act as moderators varies from study to study. The impact of close relationship quality on health also varies by relationship type, such as marital relationships, friendships, or kin relationships (Major et al., 1997; Rook et al., 2012), but again the specific effect varies across studies. Future research should consider age, gender and relationship type more closely.

Other potential moderators have not yet been fully explored but may be important to health outcomes and relationship quality broadly. For example, socioeconomic status is a powerful predictor of both health outcomes (Demakakos, Nazroo, Breeze, & Marmot, 2008) and of close relationship quality (Jackson, Krull, Bradbury, & Karney, 2017), and presumably might moderate the interactive effects of positive and negative close relationship aspects and health. One study did report that close relationship quality moderated associations between socioeconomic status and ambulatory blood pressure. Lower socioeconomic status was associated with higher ambulatory blood pressure, but only among individuals in ambivalent marital relationships (Cundiff, Birmingham, Uchino, & Smith, 2016). Race/ethnicity and culture are also important health-relevant factors (Dunkel Schetter et al., 2013), and are associated with close relationship quality (Jackson, Kennedy, Bradbury, & Karney, 2014). Future research would benefit from investigating the links between positive and negative close relationship aspects in samples representing a range of socioeconomic backgrounds and race/ethnicities or cultures, in order to test generalizability and moderating effects.

Beyond a Single Close Relationship: Broader Consideration of Positive and Negative Aspects

This review focused on positive and negative aspects within a *specific* close relationship. However, positivity and negativity could be studied at the level of the entire social network, such as the *number* of different quality ties in a social network. For example, having more ambivalent social ties has been found to be associated with poorer mental health (Uchino et al., 2001), greater inflammation (Uchino et al., 2015), and greater functional impairment (Rook et al., 2012). Having more indifferent social ties has been found to be related to greater ambulatory blood pressure (Uchino, Smith, et al., 2013) and shorter telomere length (Uchino et al., 2012).

Positive and negative aspects can interact not only *within* a specific relationship but also *between* different relationships. Several studies have found evidence for *cross-domain buffering*, suggesting that support from one relationship can buffer the adverse health impact

of conflict in another relationship (e.g., Bao, Haas, & Pi, 2007; Gore & Aseltine, 1995; Lepore, 1992; Walen & Lachman, 2000).

The interplay of positive and negative close relationships characteristics has also been examined within aggregated, rather than individual, social ties. Some studies, for example, have examined how positive and negative interactions assessed across an entire social network or within specific groups (e.g., kin vs. non-kin) independently and interactively affect health and well-being (e.g., Fiori et al., 2013; Ross et al., 2011).

The health effects of positive and negative aspects of social relationships can be examined, therefore, within specific close relationships, between different close relationships, or within groups of relationships. A conceptual challenge going forward will be to evaluate and, ultimately, to integrate the insights and conclusions from work that examines the health effects of social relationships at each of these levels of analyses.

Non-significant and Underreported Interactive Effects

Finally, it warrants noting that we identified 172 studies that reported the *independent* effects of positive and negative relationship aspects but did not report interactive effects. It is possible that in some of these studies, interactions were tested but were found to be non-significant and were not reported or discussed (for exceptions, see Cranford, 2004; De Vogli, Chandola, & Marmot, 2007; Lepore, 1992; Schuster, Kessler, & Aseltine, 1990; Walen & Lachman, 2000). Accordingly, it is difficult to evaluate this literature because uncertainty exists regarding the extent to which it is impacted by unreported null interaction tests. Consistent testing and reporting of the significance of interaction terms in future studies that examine the health effects of positive and negative close relationship aspects, assuming sufficient statistical power, will be important in extending our knowledge of the interplay of these dual aspects of close relationships.

Conclusion

Close relationships are characterized by a mix of positive and negative aspects that vary in frequency and intensity over time and that affect health not only independently but interactively. Furthermore, we argue that these interactive effects suggests emergent properties or characteristics that account for ties to health, independent of the positive and negative aspects, and investigating the unique relationship processes and properties that underlie such interactive effects is a valuable goal for future research. Pursuit of this goal will be aided by efforts to grapple with the heterogeneity that exists in conceptual definitions, measurement approaches, and data analytic strategies. The emerging literature will also be enriched by efforts to examine factors that moderate and mediate the effects of such patterns across a broad range of health outcomes, to better understand how these kinds of relationships develop and persist (antecedents) and relate to health (consequences). Such research will extend our understanding of the complex links between close relationships and health and, hopefully, will help to build a base of knowledge that can inform interventions to enhance the quality of our close relationships

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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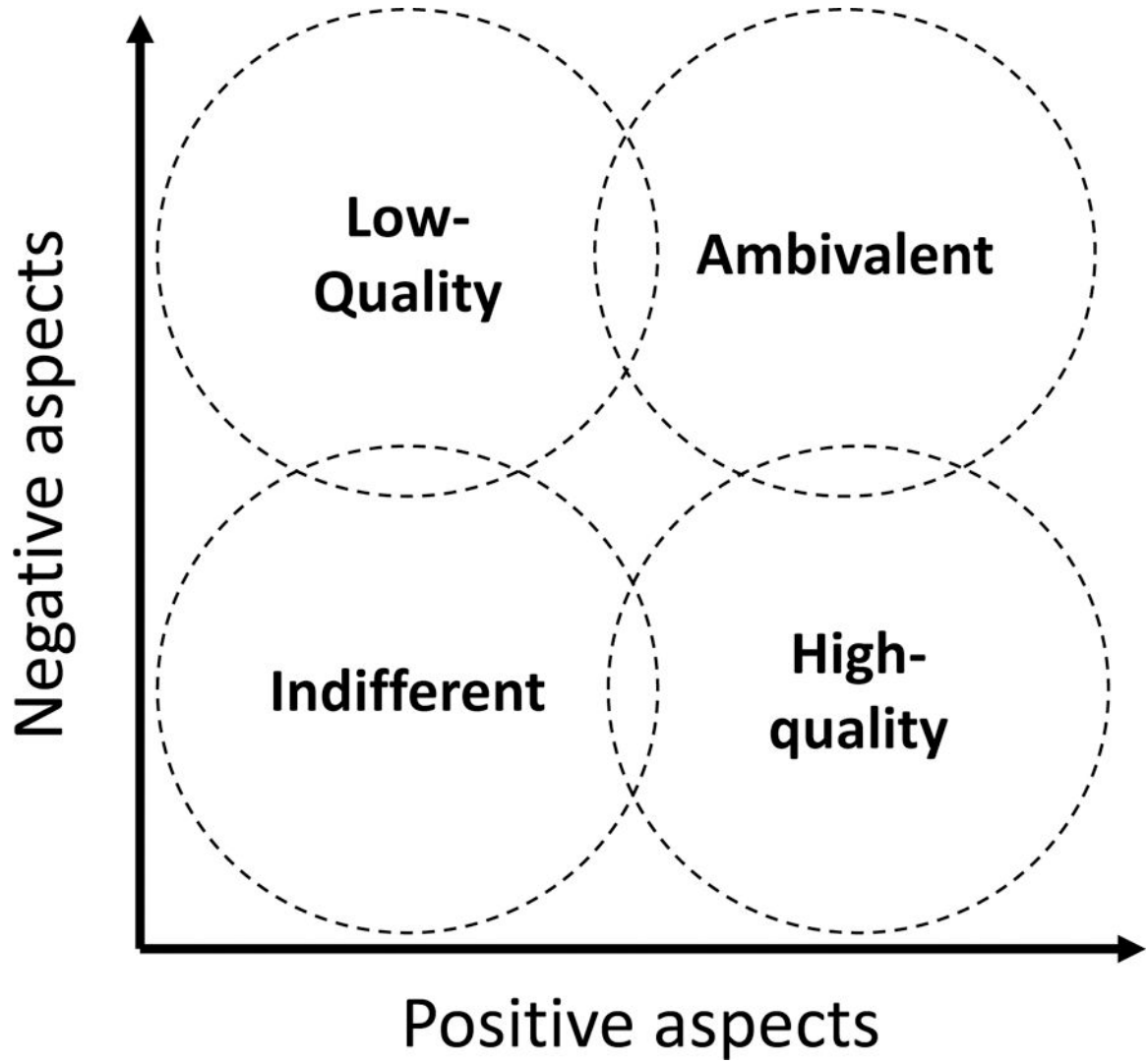


Figure 1. Two-dimensional representation of the separate positive and negative quality continuums of close relationships. Close relationships are characterized as high or low in positive and high or low in negative aspects. High-quality relationships (high positive, low negative) fall into the upper-left quadrant, and low-quality relationships (low positive, high negative) in the lower-right quadrant. Ambivalent relationships (high positive, high negative) fall into the upper-right quadrant, and indifferent (low positive, low negative) into the lower-left quadrant. (Adapted from: Fincham & Linfield, 1997; Uchino et al., 2001)

Table 1.

Definitions of key terms.

Term	Related Terms	Definition
Relationship type or pattern*		
Ambivalent	<ul style="list-style-type: none"> - Positive-negative - Conflictual-supportive - Within-domain stress exacerbation - Reverse buffering 	Close relationships characterized by presence of both positive and negative aspects, components or qualities
Indifferent		Close relationships characterized by a lack of both positive and negative aspects, components or qualities
High-quality	<ul style="list-style-type: none"> - Supportive - Positive-only 	Close relationships characterized by high positive and low negative aspects, components or qualities
Low-quality	<ul style="list-style-type: none"> - Aversive - Negative-only 	Close relationships characterized by low positive and high negative aspects, components or qualities
Analytic approaches		
Categorical	<ul style="list-style-type: none"> - Binary approaches - Researcher-determined cut-points - Sample-determined cut-points - Social tie-specific - # Social ties per category 	Analytic approach to the study of the interactive effects of positive and negative close relationship aspects that uses <u>specific criteria to categorize social ties by their positive and negative dimensions.</u>
Ambivalence index		Analytic approach to the study of the interactive effects of positive and negative close relationship aspects that uses <u>positive and negative aspects of a close relationship to calculate an ambivalence index, often using the Griffin's intensity and similarity of intensity formula</u> (Thompson et al., 1995).
Regression	<ul style="list-style-type: none"> - Buffering 	Analytic approach to the study of the interactive effects of positive and negative close relationship aspects that uses <u>interaction terms within a linear regression framework.</u>

* Note: Within the context of health research, the framework and terminology proposed separately by Uchino et al. (2001) and by (Fincham & Linfield, 1997) is most often used.