



Thoughts after marital conflict and punch biopsy wounds: Age-graded pathways to healing



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ABSTRACT

Thoughts and emotions following marital conflict have received little attention but almost certainly contribute to marriage's long-term health effects. Consistent with emotion theories of aging, we expected the effects of post-conflict thoughts on important neuroendocrine and immune outcomes, cortisol levels and full-thickness wound healing, to differ by age. An age-diverse sample of married couples received a punch biopsy wound and discussed a marital problem, then privately recorded their thoughts and rated their mood. Salivary cortisol was sampled throughout the day, and wound healing was measured for 32 days. Older adults reported more positive mood post-conflict than younger adults. Thoughts with more positive emotional content related to lower subsequent cortisol levels. Only older adults who expressed more positive thoughts after conflict experienced faster wound healing, not younger adults. These findings point to the increased physiological importance of regulatory post-stressor processes in older age, and broaden our understanding of social-emotional age differences in close relationships. These data also stimulate questions of whether marriage has more widespread health consequences for older partners, undetected in studies of short-term outcomes.

1. Introduction

Marital quality influences long-term health and longevity, similar to the effect sizes reported for regular exercise and healthy eating (Robles et al., 2014). Mechanistic studies have focused on cardiovascular, endocrine, and immune reactivity to hostility during marital disagreement (Robles et al., 2014). Similar to other stressors' disruption of wound repair (Broadbent et al., 2003), behaving more negatively during conflict slowed married couples' blister wound healing (Kiecolt-Glaser et al., 2005). Little is known about the health significance of thoughts and emotions following marital conflict, though improving couples' conflict reappraisal can successfully curb marital quality decline (Finkel et al., 2013). The current study examined the roles of post-disagreement mood and thoughts in punch biopsy wound healing. Compared to superficial blisters, full-thickness punch biopsy wounds require more time to heal and serve as an important clinical endpoint, particularly for older adults who are more likely to develop chronic wounds and face more serious wound-related consequences (Gould et al., 2015).

1.1. Negative and positive thoughts, stressor reactivity, and health

Thoughts and appraisals can amplify reactivity to a stressful event, expedite recovery, and even trigger a stress response in the absence of an external event. Whether a thought is positive or negative, its valence partially determines how constructive it is (Watkins, 2008). More negative thoughts are typically considered unconstructive because they can perpetuate a stressor's noxious effects (Kashdan and Roberts, 2007; Watkins, 2008). Indeed, a meta-analysis of 60 studies showed that rumination heightened cardiovascular and neuroendocrine reactivity in the lab and in daily life (Ottaviani et al., 2016). People prompted to ruminate after a stressful speech had elevated cortisol one hour later (Zoccola et al., 2014). Higher salivary cortisol accompanied people's everyday worries about work (Slatcher et al., 2010); cardiovascular reactivity was sustained up to two hours after worry episodes (Pieper et al., 2010).

Conversely, positive thoughts may hasten physiological recovery and protect health. People with human immunodeficiency virus (HIV) who reframed the illness more positively had higher 5-year survival

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rates and slower HIV progression than less positive thinkers (Ickovics et al., 2006). Low socioeconomic status parents and children who *shifted and persisted*, i.e. found greater meaning and positively reframed stressors, had lower inflammation and less glucocorticoid insensitivity than those who reframed less (Chen et al., 2015).

Because rumination reactivity has only been examined one to two hours post-stressor (Ottaviani et al., 2016) and positive-thought studies have focused on general self-report measures, studies linking acute post-stressor thoughts to later outcomes will help to assess the viability of thoughts as an explanation for long-term stress-related health risks.

1.2. Age differences and their effects on stressor reactivity

According to aging theories, changes in time perspective, motivation, and physiology across adulthood alter affect and stressor reactivity. Socioemotional Selectivity Theory (SST) posits that older adults increasingly value and invest in close relationships to optimize emotional well-being (Carstensen, 1995). According to the Strength and Vulnerability Integration (SAVI) model, through experience, older adults hone the ability to positively reframe challenges, and, thus, can maintain positive affect, minimize negative mood, and circumvent stressor-related health risks (Charles, 2010).

Consistent with SAVI, older adults reported ruminating less and using more positive appraisal compared to their younger counterparts (Scheibe et al., 2016). Furthermore, when older adults were instructed to ruminate, their blood pressure remained higher than younger adults' and older adults' in the control condition (Robinette and Charles, 2016). On the other hand, when asked to focus on the positive aspect of upsetting films, older adults did so more successfully and reacted less physiologically compared to a neutral condition (Lohani and Isaacowitz, 2014). Studies addressing age differences have relied largely on emotion-provoking lab tasks, such as showing emotional films, that may lack active engagement and personal relevance for older adults, a disconnect known to produce variable results (Stanley and Isaacowitz, 2015). Marital disagreement, a potent stressor, is an active, personal task that can inform our understanding of age differences in post-stressor processes.

1.3. Age differences and marital conflict

Some evidence exists for age differences in conflict, but we know less about post-conflict thoughts, emotions, and their physiological sequelae. Consistent with theory, older couples express less hostility than middle-aged couples during disagreement (Carstensen et al., 1995), but it is unclear whether they reap health benefits from this relative positivity. In two studies, older couples exhibited lower heart rate reactivity to conflict, but not in other peripheral measures (Levenson et al., 1994; Smith et al., 2009). Older partners may enjoy a larger advantage in their post-conflict thoughts and mood, more controllable than the course of a marital discussion.

1.4. The current study

To assess the immune effects of post-stressor marital processes, we examined partners' post-conflict self-reported mood and emotional content of thoughts as predictors of wound healing in an age-diverse sample of married couples who received a punch biopsy and discussed a marital problem. Cortisol disrupts healing by inhibiting inflammation at the wound site (Ebrecht et al., 2004); thus, we also tested effects on afternoon-evening cortisol, as an intermediate indicator of wound healing relevance. The parent study documented marital conflict's disruptive effects on blister wound healing (Kiecolt-Glaser et al., 2005). The full-thickness punch biopsy wound was better suited to test the longer-term immune relevance of post-conflict thoughts and feelings, and to probe age differences.

Our first objective was to examine age differences in post-conflict

self-reported mood and emotional content of thoughts. Consistent with theory and past empirical evidence (Scheibe et al., 2016), we hypothesized that older adults' mood would be more positive and less negative; they would also express more positive and fewer negative emotion words post-conflict. The next objective was to examine the effects of post-conflict mood and thoughts on cortisol and wound healing, as well as age differences in these associations. We predicted that more positive and less negative mood and thoughts would relate to lower cortisol levels, as well as faster wound healing (Kiecolt-Glaser et al., 1998). Stronger effects were expected in older adults than younger adults (Lohani and Isaacowitz, 2014; Robinette and Charles, 2016).

2. Method

2.1. Participants

Heterosexual married couples (N = 42; 84 individuals) were recruited for a larger study on marital stress and wound healing through newspaper and radio ads, notices posted on campus and in the community, and referrals from other participants. Couples married fewer than 2 years were ineligible. We excluded couples if either spouse took blood pressure medication, smoked, or used excessive alcohol or caffeine. We also excluded couples with health problems that involved immunological or endocrinological dysfunction, or otherwise had consequences for wound healing (e.g., cancer, recent surgeries, strokes, diabetes mellitus, peripheral vascular disease, conditions such as asthma or arthritis that required regular use of antiinflammatories, etc.). In total, 224 couples were excluded because at least one spouse did not meet our stringent health criteria. The Ohio State University Biomedical Research Review Committee approved the project; all subjects gave written informed consent prior to participation.

The sample ranged in age from 22 to 77 years old (M = 37.0, SD = 13.0) and had been married for 2–52 years (M = 12.2, SD = 10.8). More than half were college-educated (66.67%), and most were employed (84.5%) and white (88.1%). Most couples were in their first marriage (85.7%) and had at least one child (70.7%; M = 1.6, SD = 1.3). The parent study was powered to detect the association between marital quality and neuroendocrine and immune outcomes. Specifically, a sample of 76 subjects was required for detecting small to moderate effect sizes (a population squared multiple correlation of 0.20), using multiple regression analyses with 10 independent variables, a 0.01 significance level, and a desired power of 0.80. Past wound healing studies had shown relatively large stress-related effects (Kiecolt-Glaser et al., 1998).

2.2. Data collection procedure

Participants completed two full-day study visits at the Clinical Research Center (CRC), a hospital research unit. The procedures and timetable were similar across these two admissions. We asked couples not to drink or eat anything after midnight before admission; all couples were served the same meals in the CRC, thus controlling for dietary factors such as sodium. To assure consistent physical activity across dyads and admissions, couples remained together in the same room.

At the first visit, nurses raised suction blisters on both partners' arms, then couples engaged in two social support discussions and an oral history interview about their relationship. Biological samples were collected throughout the day. These data are not of direct interest to the current study and are described in detail elsewhere (Kiecolt-Glaser et al., 2005).

At the second visit (M = 2.37 months later), couples arrived at the CRC at 7 AM, and at 9:45 AM received a 2-mm dermal punch biopsy on the upper arm, near the shoulder, a common dermatological research procedure (Nemeth et al., 1991). Trained staff nurses prepared the skin with 70% isopropyl alcohol before injecting lidocaine hydrochloride

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