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Effects of relationship functioning on the biological experience of stress and physical health

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In this paper, we outline how relationship functioning affects the biological experience of stress and its consequences for physical health. Negative relationship perceptions and processes, such as attachment insecurity, hostility, and frequent conflict, tend to heighten stress responses and generate worse health over time, whereas positive relationship perceptions and processes, such as responsiveness, support, and intimacy, are generally associated with reduced or buffered stress responses and improved health (with some caveats). Future research should focus on the mechanisms behind these effects, the extent to which they can be changed or reversed, incorporating developmental perspectives, and consider the effects of individual differences on these processes.

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Beneficial effects of close relationships for helping people cope with stressors are widely documented for not only mental well-being, but also for physical health [1]. Relationships, however, can also be a source of stress, generating deleterious health effects. In this article, we describe the biological experience of stress and its effects on physical health, review evidence regarding the impact of relationship functioning throughout this process, and discuss future research directions.

Biological experience of stress and physical health

The biological stress pathway and its effects on physical health are outlined in [Figure 1](#). When individuals experience a stressor, the hypothalamus initiates a hormone cascade resulting in the release of cortisol [2]. Cortisol

bonds to glucocorticoid receptors (GRs), which launches DNA transcription. Genes regulated in this process serve many functions, particularly immune system suppression and inflammation.

When individuals encounter frequent or chronic stress, however, the body resists hyperactivation induced by cortisol. This has two major consequences. First, following prolonged activation, cortisol drops below baseline levels. This can lead to dysregulation of the HPA-axis and flat cortisol levels throughout the day, instead of normal declines over the day [3]. Second, glucocorticoid receptor resistance (GCR) can develop. Immune cells with GCR have GRs that are desensitized to cortisol, requiring larger concentrations to begin transcription [4]. With the anti-inflammatory effects of cortisol reduced, GCR produces inflammatory factors and chronic inflammation, which is associated with myriad health risks and diseases [5]. Health outcomes fall into two categories [6**]. Clinical outcomes include disease presence (e.g., cardiovascular disease [CVD]), disease severity (e.g., hospitalization frequency), mortality, and subjective health ratings. Surrogate outcomes include biological markers of disease and mortality, such as high blood pressure and high blood sugar.

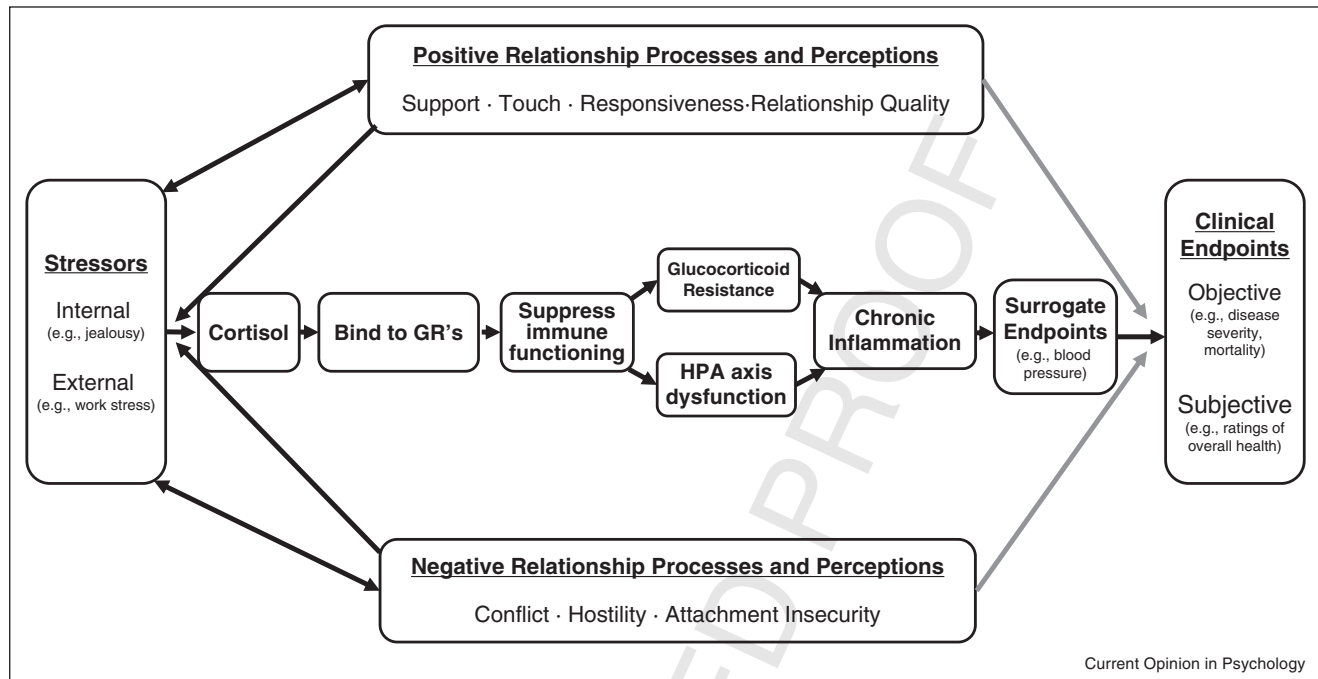
Relationship processes affecting health

The effects of positive and negative relationship perceptions and processes have been documented throughout the biological experience of stress leading to physical health outcomes. Negative relationship perceptions/processes generally intensify stress responses leading to worse health outcomes (see the bottom of [Figure 1](#)). For example, being insecurely attached or having a relationship with an insecure partner are associated with several health risks [7**]. Attachment insecurity, which involves having negative expectations for relationships which lead to unconstructive reactions under stress, predicts perceiving relationship situations as more stressful [8], having higher cortisol levels, and experiencing slower return to cortisol baselines [9]. Insecurely attached individuals also have flatter diurnal cortisol patterns [10], fewer and less effective immune cells [10], and higher inflammation [11]. The toll of insecure attachment is also seen in endpoint measures, such as more inflammation-related symptoms [12] and higher incidence of strokes, heart attacks, and ulcers [13].

Hostility is another major negative relationship process. Individuals who express more hostility to their partners

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Figure 1



This model outlines the biological experience of stress, both acutely and over time, and its effects on health. Well-documented relationship processes and perceptions known to affect stress responses and health are listed in the upper (positive) and lower (negative) portions of the model. Relationship processes are known to directly affect the perception and impact of stressors, as signified by the black diagonal arrows on the left side of the model; they are also likely to impact the extent to which surrogate endpoints lead to clinical endpoints, but this requires further study (as signified by the gray arrows on the right side of the model).

(or are the targets of greater hostility) show greater cortisol reactivity during conflict discussions [14] and worse immune functioning following conflict [15]. Negative marital interactions are also associated with delayed wound healing, an effect mediated by overproduction of pro-inflammatory factors [16]. Greater anger and hostility have also been tied to more arterial calcification [17]. Conflicts do not have to be overtly hostile to generate adverse health outcomes, however. The frequency of conflict and marital distress also predict worse immune functioning [18], higher infection rates after virus exposure [19], flatter diurnal cortisol patterns [20], higher blood pressure [21], and worse asthma [22]. Moreover, frequent conflict and marital distress forecast greater risk for developing CVD [24] and experiencing recurrent cardiac problems [25**].

In addition, positive relationship perceptions/processes are systematically related to smaller stress responses and better overall health outcomes (see the upper portion in Figure 1). Higher quality relationship partners buffer us from stress [25**]. For example, individuals experiencing external stressors who self-disclose more to their partners [26] or whose partners touch them [27] display less cortisol reactivity. Children at risk for poor health due to low SES [28] or high life stress [29] are buffered by warm/sensitive parental

care and experience relatively better health outcomes in adulthood. Higher quality relationships characterized by greater intimacy and responsiveness predict steeper (healthier) diurnal cortisol slopes [30,31*]. These individuals also have lower blood pressure and healthier overnight dips in blood pressure [32], and are less likely to be re-hospitalized [33] or die from CVD [34].

However, the effects of relationships on health are not always straightforward. Sometimes positive relationship processes are tied to greater health risks. The passionate, early stages of love, for instance, are associated with higher cortisol levels [35], suggesting that intensely positive relationship experiences are short-term stressors. Moreover, even though providing and receiving support typically are good for health, individuals with chronic health problems and their partner-caretakers often experience greater stress and poor health outcomes [36]. Positive and negative relationship experiences are also not mutually exclusive; individuals may behave in a hostile manner in some situations, but be responsive in others, so the relative impact of positive and negative relationship processes can be mixed. Some studies indicate that such 'ambivalent' relationships are risky [37], whereas others find positive elements protect individuals from health risks [38].

Future directions

The current literature indicates that the effects of positive and negative relationship perceptions/processes occur at every stage of the biological experience of stress and physical health model. Researchers have demonstrated *what* effects relationships have on stress; research now needs to determine *how* these effects occur, *when* these effects occur (developmentally and longitudinally), and for *whom* relationships are more versus less impactful on stress and health.

First, we need to identify how relationship functioning 'gets under the skin' to affect stress and health. When, for example, do relationships directly influence the biological experience of stress and health, and when are their effects mediated through previous stages? To be more specific, we would not expect relationship functioning to interfere with the ability of GRs to start transcription after binding with cortisol. Instead, relationships are likely to affect this process at the beginning and end of the stress-health pathway (see the diagonal arrows in Figure 1). Much is already known about how relationships affect the frequency and perception of stressors and coping styles. Relationships can affect the occurrence of potential stressors, particularly those internal to relationships. Additionally, relationship functioning can affect the extent to which a stressor generates stress. Positive relationship processes reduce stress responses through support and other forms of buffering. In contrast, individuals in poorly functioning relationships may be predisposed to find these situations more stressful (e.g., due to attachment insecurity), or they may become more stressed by their inability to successfully seek support. Relationships may also have direct effects on the degree to which surrogate endpoints influence clinical endpoints via health-relevant behaviors. The effects of relationships on health-relevant behaviors have not been studied as much as their biological effects, but relationship partners do shape the likelihood of engaging in preventative behaviors [39], screenings for health problems [40], and adherence to treatment regimens [41]. Few studies have examined the possible mediating effects of relationships across multiple stages (e.g., hostility → inflammation → CVD), so it remains unclear where specific effects are occurring (for an exception, see [16]).

By understanding these mechanisms, we can predict how the effects of relationships are maintained over time or might be reversed. Although early family experiences can have lasting effects on health into adulthood [28,29,42], we do not know how these effects are internalized. Recent findings suggest that mental representations of early experiences mediate effects for some health outcomes (e.g., weight), but not others [43]. Other potential pathways, such as biological embedding through epigenetic processes [44], should also be tested. We also know very little about when the impact of relationships may change or

be reversed. This information is critical for informing relationship-based health interventions, which can be effective [45*].

Understanding when and how relationships affect stress and health over time will require developmental models. For example, when during the life-course are different types of close relationships more versus less impactful? As other health-risk factors encountered early in life (e.g., low SES, high stress) have enduring health effects [42,44], the quality of the early parent-child relationship might exert the strongest impact on long-term health. Recent work, however, has also documented the longitudinal impact of stress occurring in adolescence and concurrently on adult health [29,46*], so the quality of close relationships at these stages may be similarly impactful. Since the most meaningful relationships often change over development, this fact must also be considered when predicting health outcomes. For example, maternal support is effective at reducing stress responses of children but not adolescents, who may rely more on peer support [47*].

Finally, key individual differences may affect for whom relationships are more versus less impactful. Early studies found stronger relationship effects on health for women than men [48], but a recent meta-analysis found evidence for gender effects only on surrogate endpoints [6]. Most prior studies have focused on married couples, but studies investigating dating couples have found similar patterns of cortisol reactivity in response to stressors [49]. Determining how long (or how close) relationships must be to have 'marital-like' effects would demonstrate how generalizable these effects are. Furthermore, work on differential susceptibility shows the impact of conflict and high quality parenting on outcomes like behavioral problems and social skills differ across individuals based on their sensitivity to environmental influences. There may be similar effects of these relationship processes on health [50]. By understanding not just what effects relationships have on stress and health, but also how, when, and for whom, we can better utilize relationship science for improving health across the lifespan.

Conflict of interest

Nothing declared.

Uncited reference

[23].

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