

# Hostile Social Interactions May Increase Inflammation

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January 31, 2012 — Negative social interactions may increase proinflammatory cytokine reactivity, new research suggests. When chronic, this reactivity has been associated with hypertension, diabetes, coronary heart disease, depression, and some cancers.

In a prospective study of more than 100 healthy young adults, stressful or "hostile" interactions during daily living were associated with increased levels of the cytokines IL-6 and soluble receptor for tumor necrosis factor- $\alpha$  (sTNF $\alpha$ RII).

Significant levels of increased inflammation were also found after the participants engaged in competitive interactions, such as in school, the workplace, or even for another's attention, but not in leisure-time activities such as sports.

"Our findings about negative and competitive interactions were pretty much what we expected. But when we broke down the types of competitive activities, we were surprised that leisure activities didn't fall into this heightened inflammation group,"

lead author Jessica Chiang, doctoral student in health psychology at the University of California, Los Angeles, told *Medscape Medical News*.



**Jessica  
Chiang**

She noted that having a few of these negative or competitive social interactions "is not going to be detrimental to health."

However, if these interactions are experienced day in and day out, they can add to a patient's stress burden.

"Interpersonal stressors are a very common form of stress in people's lives. So it would be advisable to have clinicians ask

their patients about these stressors, and to tell patients that they should reevaluate how they deal with these situations," said Chiang.

The study [was published](#) online January 23 in *Proceedings of the National Academy of Science (PNAS)*.

## **Real-World Study**

According to investigators, previous research has shown that social relationships and physical health are interrelated.

"People who are more socially integrated live longer and are less likely to experience specific disease outcomes, including heart attacks and upper respiratory illness," they write.

Inflammation is a "natural, early response of the immune system that is essential to fighting infections and repairing injured tissue." Proinflammatory cytokines act as communication molecules during the inflammatory process.

Although acute inflammation is not a cause for concern, chronic reactivity can lead to several adverse health outcomes.

"Most of these types of studies have looked at negative or positive interactions and their possible relation to physical health. But there hasn't been a lot of work looking at competitive interactions," said Chiang.

"It was also important for us to take the study outside of the lab because many of the past studies have been conducted within the lab. Although that adds a lot to the literature, we wanted to see if we could find these same effects in everyday life."

The investigators enrolled 122 healthy students and employees from a large university (56.5% women; 61.5% Asian American; 38.5% European American).

None were taking any cardiovascular, neuroendocrine, or mental health medications.

All participants filled out diaries for 8 days about the positive, negative, and competitive interactions they experienced. Within the first 4 days, they reported to a laboratory to fill out health questionnaires and undergo the Trier Social Stress Test (TSST).

Oral mucosal transudate samples were collected to assess levels of IL-6 and sTNF $\alpha$ RII at baseline and at 25 minutes and 80 minutes after the TSST stressor was given.

In addition to hypothesizing that both negative and competitive interactions would elevate cytokine responses to the laboratory stressors, the investigators predicted that positive interactions would reduce cytokine responses.

## **Deleterious Over Time**

At baseline, elevations in the level of sTNF $\alpha$ RII was significantly associated with both negative social interactions ( $P = .014$ ) and competitive interactions ( $P = .050$ ). The relationship between elevated IL-6 levels and competitive interactions approached significance ( $P = .054$ ).

At the 25-minute post-stressor point, negative social

interactions predicted higher levels of both IL-6 ( $P = .032$ ) and sTNF $\alpha$ RII ( $P = .043$ ). However, competitive social interactions were not found to be significantly related to "stress-induced reactivity" at that time point.

"Although positive interactions were not correlated with any cytokine measure, in analyses that controlled for baseline, [the] interactions were related to higher sTNF $\alpha$ RII 25-minutes post-stressor" ( $P = .034$ ), report the investigators, adding that that did not match their original hypothesis.

Still, "it is possible that this finding is not reliable," they write.

Negative social interactions significantly predicted total output of sTNF $\alpha$ RII ( $P = .021$ ), whereas competitive interactions predicted total output of both sTNF $\alpha$ RII ( $P = .037$ ) and IL-6 ( $P = .035$ ). Positive interactions were not found to predict total output of either cytokine.

In further analyses, the researchers divided competitive interactions into 3 subcategories: leisure (including sports), academic- or work-related, and competing for a friend's or loved one's attention.

Academic- or work-related competitive activities significantly predicted baseline levels of sTNF $\alpha$ RII ( $P$

= .026), and competing for attention significantly predicted baseline levels of IL-6 ( $P = .014$ ). Leisure activities/sports were not significantly related to any of the cytokine measures.

"This could be because leisure activities are often seen as more challenging, not threatening. But the stakes seem much higher when it comes to school, work, or gaining attention. Wondering 'what does my boss think of me?' could be a blow to the ego or self-esteem," explained Chiang."

The researchers note that although some inflammation can be beneficial, repeated activation is "deleterious" over time.

"Thus, cumulatively, a greater number of daily negative and competitive social interactions may... predict inflammation-related disorders and exacerbate existing illnesses," they write. "This is an important direction for future research."

Chiang notes that she hopes the next step is to "dig deeper and find out 'what is the quality of these relationships that people are having?' And then find out if that predicts inflammation as well."

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