

College Students with Negative Humor Types have Higher Peripheral IL-6 and CRP Levels

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Introduction

The state of being stressed for extended periods of time is linked to an increase in pro-inflammatory cytokine levels in the body. Chronic stress can have long-term repercussions on an individual's health and influence susceptibility to physiological and psychological disorders, specifically neurodegenerative disorders. College students have been known to experience high stress levels, and studies have found that being stressed for an extended period of time negatively affected academic performance in school as well as caused students to be more susceptible to disorders such as depression and anxiety. **Humor and laughter have mitigating effects on our stress response and can attenuate the inflammatory response under acute and chronic conditions.** In fact, studies have shown that mirthful laughter can decrease both c-reactive protein (CRP) and cortisol levels. However, humor varies across individuals in both magnitude and type, and humor can greatly impact stress responses as a result of distinct coping mechanisms (Figure 1).

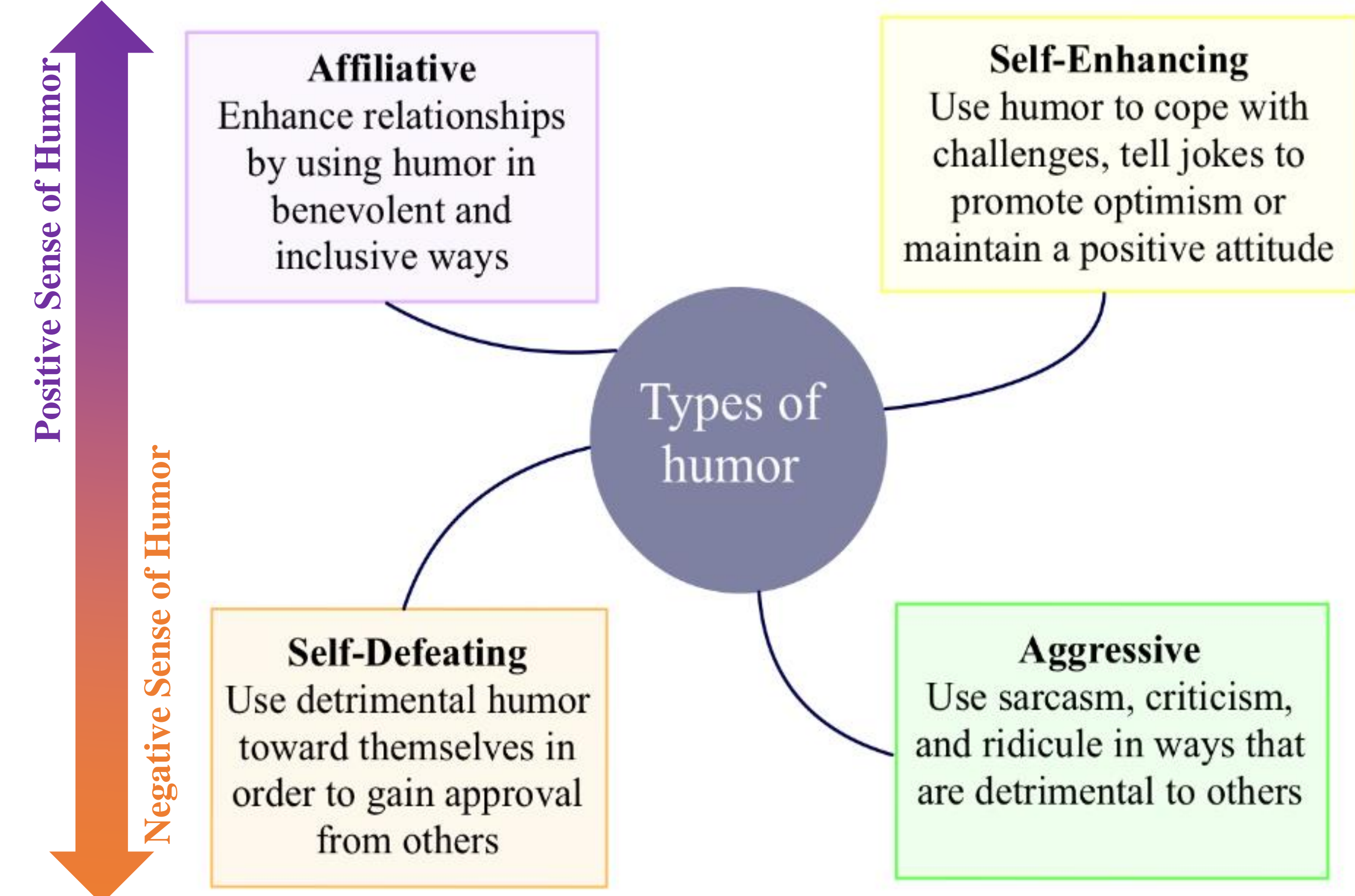


Figure 1. University of Western Ontario defined 4 types of humor people generally display. These 4 types of humor that people generally display are as follows: affiliative, aggressive, self-defeating, or self-enhancing. These types of humor each have negative (self-defeating, aggressive) or positive (affiliative, self-enhancing) traits.

It is unknown whether the type of humor an individual displays can mediate proinflammatory markers interleukin-6 (IL-6) and CRP levels in college-aged individuals. Therefore, we **hypothesized that there would be significant differences in basal levels of IL-6 and CRP, which indicate low-grade inflammation, among humor types. Specifically, we expected those with negative humor types to have higher levels of IL-6 and CRP.**

Results

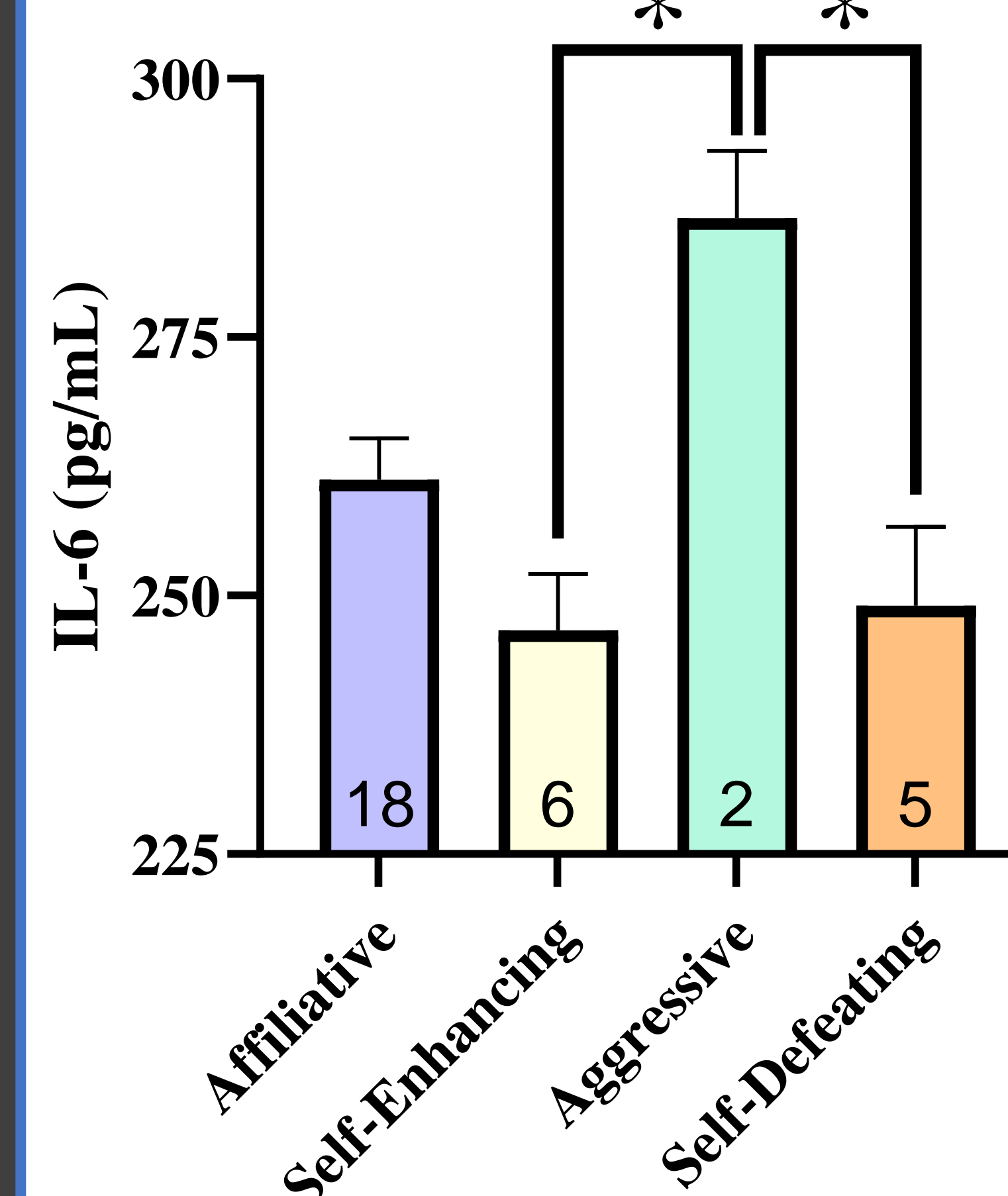


Figure 3. Individuals with an aggressive humor type have higher levels of IL-6. Results indicate that peripheral plasma IL-6 levels were significantly impacted by humor type, $F(3, 27) = 3.825(3), p = 0.021$. Follow-up analyses indicate that individuals with an aggressive humor type displayed the highest levels of IL-6 and were increased significantly relative to self-enhancing and self-defeating humor types, p 's = 0.026 and 0.046, respectively. These results suggest that the use of aggressive humor may influence and increase plasma inflammatory markers such as IL-6 in college students.

Data are displayed as mean \pm SEM. * $p < 0.05$

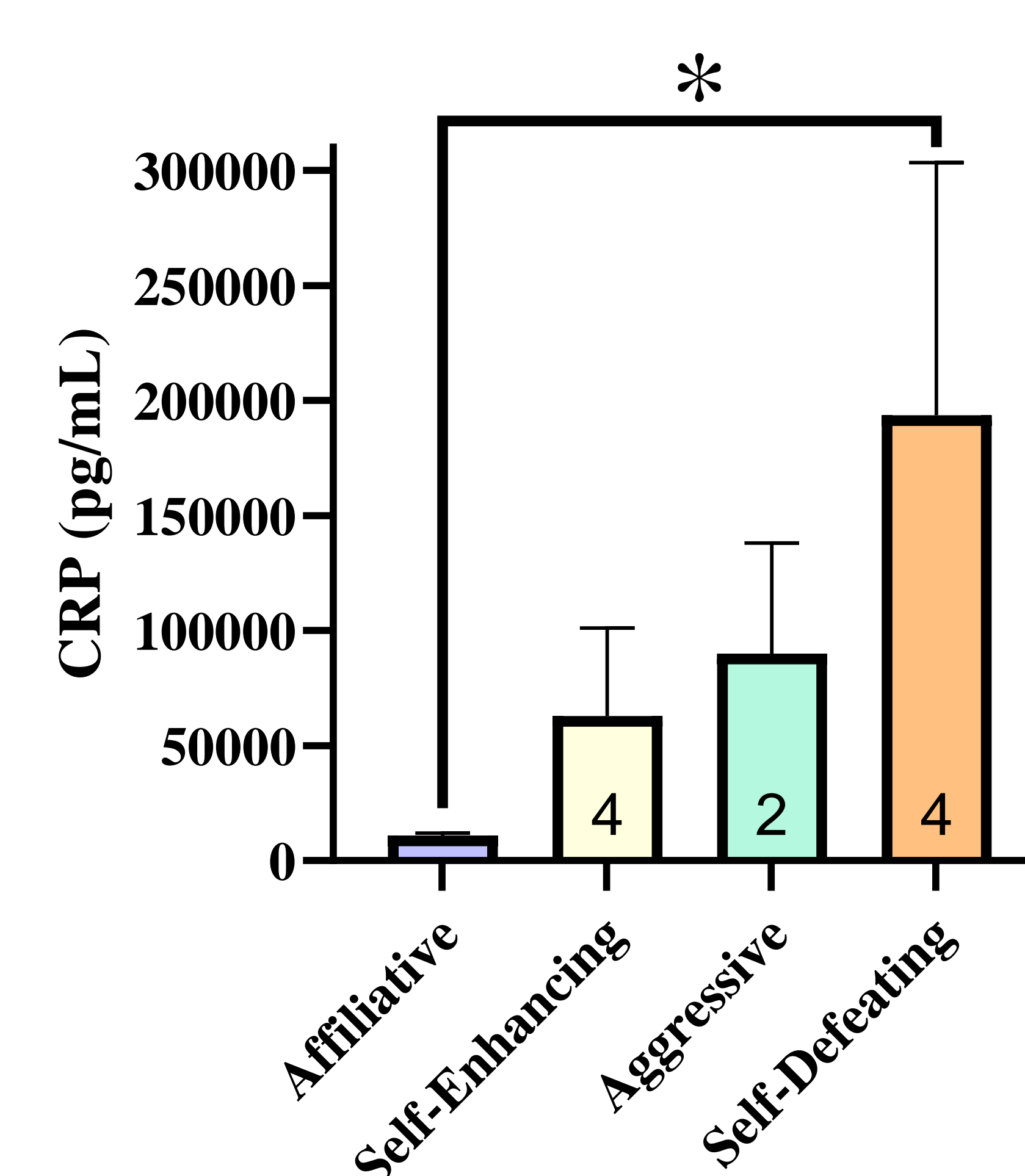


Figure 4. CRP is elevated in individuals with predominantly self-defeating humor. Results indicate that peripheral plasma CRP levels were significantly impacted by humor type, $F(3, 22) = 4.868(3), p = 0.010$. Follow-up analyses indicate that individuals with a self-defeating humor type displayed the highest levels of CRP and were increased significantly relative to the affiliative humor type, $p = 0.006$. These results suggest that self-defeating humor may adversely impact circulating levels of the liver acute phase protein, CRP.

Data are displayed as mean \pm SEM. * $p < 0.05$

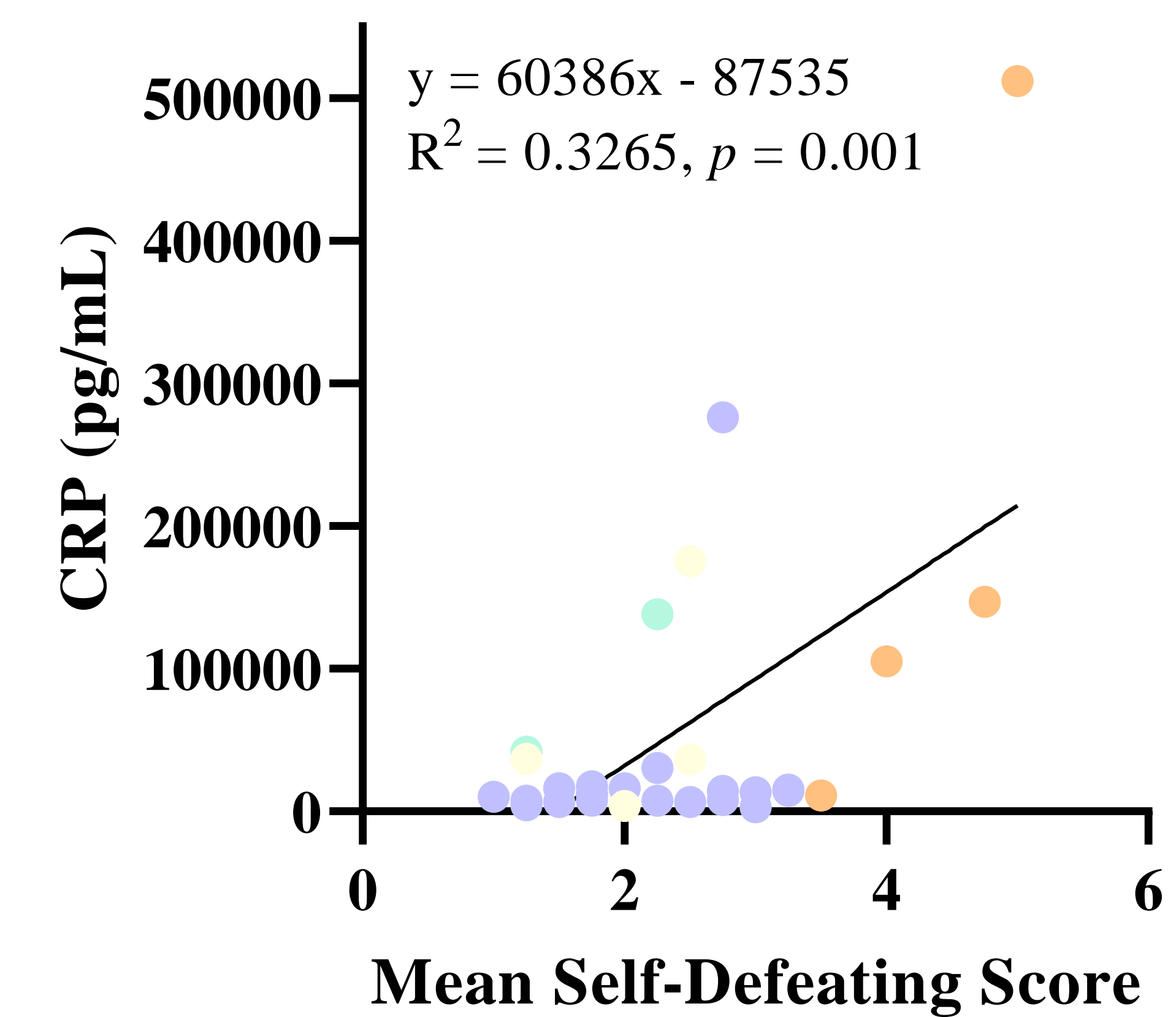


Figure 5. Increases in the use of self-defeating humor is positively correlated with increases in CRP. Results indicate that peripheral plasma CRP levels were significantly impacted by the degree to which an individual used self-defeating humor, $r(30) = 0.574, p = 0.001$. These results suggest that peripheral inflammation in relation to humor is not discrete. The degree to which a humor type is used, specifically self-defeating humor, could possibly be used to predict peripheral inflammation.

Data are displayed as mean \pm SEM. * $p < 0.05$

Methods

Participants

We collected blood samples from 30 undergraduate student volunteers at UNC Chapel Hill from NSCI 439 as part of a Course-based Undergraduate Research Experience (CURE). Participation was entirely voluntary. For demographic information, see **Table 1**.

Questionnaire

Student volunteers also took a 16-question survey (8 questions from IDR labs Humor Styles Test and 8 questions from a Humor questionnaire in the *Journal of Research in Personality*) with 6 answer choices ranging from strongly disagree (1) to strongly agree (6). We averaged ratings from each question to determine each individual's primary humor type: affiliative, aggressive, self-defeating, and self-enhancing. An example question used to assess self-enhancing humor type is below:

"If I am feeling upset or unhappy, I usually try to think of something funny about the situation to make myself feel better."

Blood Collection and Analysis

We assessed basal CRP (1:20 dilution, Simple Plex C-Reactive Protein/CRP Cartridge, Catalog #SPCKB-PS-000200) and IL-6 (1:1 dilution, Simple Plex Human IL-6(2nd Gen) Assay Cartridge, Catalog #SPCKB-PS-003028) levels through the blood samples using an ELISA assay on an Ella Platform.

Statistics

We assessed data using a one-way ANOVA with 4 groups: Affiliative, Self-enhancing, Self-defeating, and Aggressive. We ran a Tukey *post-hoc* follow-up assessment when appropriate. We ran a bivariate correlation comparing mean self-defeating scores and CRP levels. For all data $\alpha = 0.05$.

Participant Demographics	
Gender	21 - female 10 - male
Race	15 - White 2 - Black 0 - American Indian or Alaska Native 10 - Asian 0 - Native Hawaiian or Pacific Islander 4 - Other
Ethnicity	3 - Hispanic or Latino 28 - Not Hispanic or Latino
Year in School	0 - Year 1 0 - Year 2 7 - Year 3 24 - Year 4

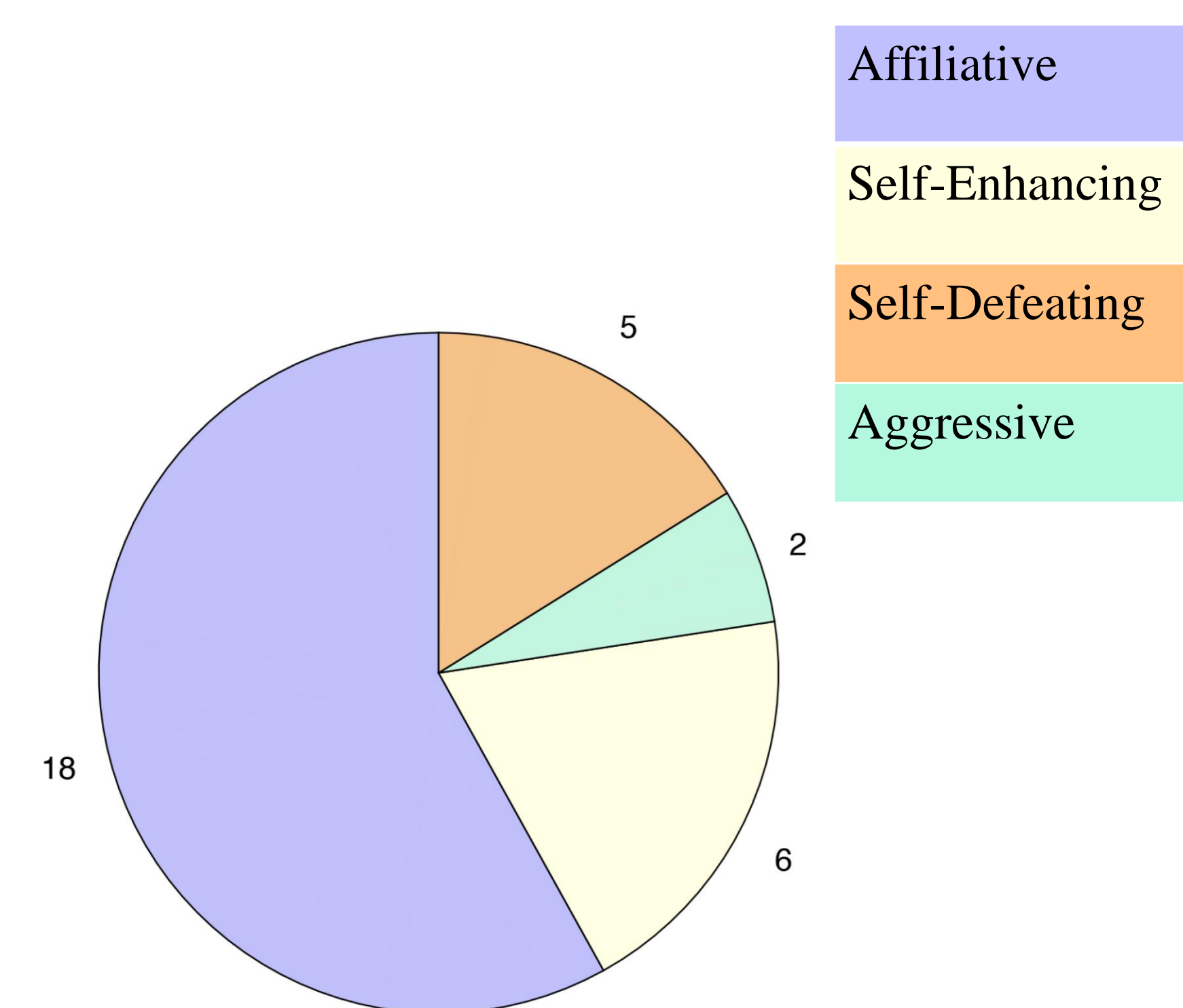


Figure 2. Breakdown of humor types in the current sample. In the current sample, most participants aligned with positive humor types. Seventeen individuals were categorized as exhibiting predominantly affiliative humor. Six individuals exhibited predominantly self-enhancing humor. Of the negative affective humor types, self-defeating was the most common with five individuals exhibiting this humor type. Lastly, the fewest individuals displayed an aggressive humor type (2).

Conclusions

- These preliminary data indicate that type of humor may influence basal expression of the proinflammatory markers IL6 and CRP in college-aged young adults.
- Negative humor types- specifically aggressive and self-defeating humor – are associated with higher levels of IL-6 and CRP, respectively.

Future Directions

- Increasing sample size will allow a more robust and complex analysis across gender, race, and other mediating factors such as stress, alcohol intake, and age.
- Test whether interventions aimed at altering humor coping style towards more positive forms mitigates proinflammatory markers.
- Whether anti-inflammatory factors are also impacted by humor type is unknown.
- Inflammation may differ among genders in a larger sample size–both within a culture like the US where men and women regularly interact, and among other cultures where those of different gender are kept more separate.

References

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- Jacobson R. Test yourself: Psychologists created a quiz to define your sense of humor. The cut. <https://www.thecut.com/article/whats-your-humor-style.html>. Published April 4, 2017.
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