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Case Report

You are what you eat: An empirical investigation of the relationship between spicy food and aggressive cognition

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ABSTRACT

The popular saying "you are what you eat" suggests that people take on the characteristics of the food they eat. Wisdom from ancient texts and practitioners of alternative medicine seem to share the intuition that consuming spicy food may increase aggression. However, this relationship has not been empirically tested. In this research, we posit that those who consume "hot" and "spicy" food may be more prone to thoughts related to aggression. Across three studies, we find evidence for this proposition. Study 1 reveals that those who typically consume spicy food exhibit higher levels of trait aggression. Studies 2 and 3 reveal, respectively, that consumption of, and even mere exposure to spicy food, can semantically activate concepts related to aggression as well as lead to higher levels of perceived aggressive intent in others. Our work contributes to the literature on precursors of aggression, and has substantive implications for several stakeholders, including marketers, parents and policy makers.

1. Introduction

Imagine that you have an upcoming meeting with a confrontational colleague. You need to be at your aggressive best in order to not be run over during the meeting. What type of food do you think would help you best prepare for this meeting?

a. Hot & spicy food
b. Neither hot & spicy, nor bland & mild food
c. Bland & mild food

We posed this question to a set of participants ($N = 54$) and found that people believe that consuming spicy (vs. bland) food would better prepare them for aggression. Whereas 18.5% of the respondents felt that consuming spicy food would enhance aggressiveness, only 5.5% ($z = 2.45$; $p = 0.01$) felt this about consuming bland food, with the rest falling in between. These results suggest that people believe that consumption of spicy food promotes aggression. Other anecdotal accounts, too, suggest that consumption of spicy food promotes aggression. The Malaysian health ministry, for example, administers a predominantly bland diet to prison inmates to keep their aggression in check. Likewise, practitioners of Asian medicine believe that consuming spicy food promotes aggression by raising acidity and blood pressure (Matthews, 2014; The Star Online, 2013).

Given the prevalence of the belief that consuming spicy food increases aggressiveness, a question arises: *Does consumption of spicy food promote aggression?*

Somewhat surprisingly, the relationship between consumption of spicy food and aggressiveness has not yet been put to an empirical test. The present research attempts to bridge this gap by addressing a related, but more basic, question: Do spicy food and aggression share a semantic overlap? For example, will exposure to spicy food prime aggression-related thoughts? Finding that spicy food does share semantic overlap with aggression would provide evidence consistent with the seemingly prevalent belief that spicy food promotes aggression, and thus make an important contribution to the literature.

The rest of the paper is structured as follows. We first review relevant research to support our proposition that spicy food and aggression share semantic overlap. We then report results from three studies testing the relationship between spicy food and cognitions related to aggression. We conclude with a discussion of our contribution and limitations.

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2. Effects of spicy food consumption: extant research

Findings from at least three streams of research are consistent with the idea that spicy food and aggression may share semantic overlap. First, the literature on embodied cognition (Krishna & Schwarz, 2014; Xu & Labroo, 2014) documents that sensory experiences can shape and, in turn, be shaped by cognitive processes. For example, priming participants with words associated with hot temperature has been found to increase aggressive thoughts and hostile intentions (Dewall & Bushman, 2009). This is because words used to refer to warmer environments (e.g., "hot") and the sensations associated with being in one (a rise in body temperature) are also those associated with aggressive intent (Dewall & Bushman, 2009; Xu & Labroo, 2014). In a similar vein, because both spicy food and aggressive intent are associated with a common set of words (e.g., "hot"), images (e.g., the color red, which is often the color used to depict violence or blood) and sensations (e.g., increase in body temperature), one may expect that spicy food and aggression share semantic overlap.

Second, certain individual difference variables associated with aggression have been found to be associated with a preference for spicy food. Males with higher levels of salivary testosterone—a hormone widely acknowledged to promote aggression— have been found to prefer spicy food (e.g., Bègue et al., 2015; Dabbs & Dabbs, 2000, Mazur & Booth, 1998, Stanton & Schultheiss, 2009). Studies have also found a preference for spicy food among those prone to masochistic behaviors (Rozin, 1990). Since those with higher testosterone levels or otherwise prone to aggression prefer spicier food, it is plausible that, through a process of conditioning, spicy food can come to be associated with aggression in people's minds (Bouton 1994; Stuart, Shimp & Engle, 1987; Lewicki 1986).

Finally, spicy foods contain higher levels of capsaicin, an ingredient that has been shown to evoke discomfort, irritation, and even pain (Bègue et al., 2015; Byrnes & Hayes, 2013). Prior research shows that discomfort and pain can evoke aggression (Berkowitz, 1989, 1990, 1993a, b). Thus, it is plausible that the aversive physiological reactions evoked by consuming spicy food can, in turn, trigger aggressive intent (Anderson & Bushman, 2001; Berkowitz, 1993a, b). As such, spicy food can—again through conditioning—come to be associated with aggression in people's minds.

In summary, there are at least three distinct mechanisms by which people could have learned to associate spicy food with aggression. We report results from three studies that tested for the possibility of a semantic overlap between spicy food and aggression.

3. Study 1

The objective of Study 1 was to provide a preliminary test for the association between spicy food and aggression. Toward this objective, we assessed the relationship between people's self-reported consumption of spicy foods and their self-reported aggression levels measured using Forgays et al.'s (1997) trait-aggression scale.

3.1. Method

3.1.1. Participants and procedure

Participants ($N = 105$), who completed the study for a chance to win gift certificates, were told that they would take part in two "unrelated" studies. The real objective of the "first study," portrayed as an exploration of participants' food consumption habits, was to elicit our independent variable: spiciness of food typically consumed. We did so through the following question: "On a scale of 1 to 100, where 1 = '*Not at all spicy*' and 100 = '*Very spicy*,' how spicy is the food that you typically consume?"

In Study 2, portrayed as a "personality study," participants rated themselves on seven items related to aggression using Forgays et al.'s (1997) trait-aggression scale ("I consider myself to be: hot-headed, aggressive, short-tempered, easily upset, easily lose my temper, easily irritated, easily angered," $\alpha = 0.89$) and, to mask the true purpose of the study, five items unrelated to aggression (considerate, impulsive, dependable, reliable, interesting). Participants rated their agreement with each item on a scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). Participants also completed the PANAS scale (Watson, Clark & Tellegen, 1988) to assess any potential mood effects. At the end of the survey, participants were asked to guess the true purpose of the studies, which no one was able to.

3.2. Results

To assess whether spicy food is associated with aggressive traits, we conducted a linear regression using consumption of spicy food as the predictor, gender and mood-ratings as covariates, and self-reported trait aggression as the dependent variable. Results revealed a significant positive correlation between spicy food and trait aggression ($\beta = 0.30$, $t(101) = 3.31$, $p = 0.001$; $\omega^2 = 0.19$), consistent with our prediction. The only significant covariate was negative mood. Consistent with some prior findings (Berkowitz, 1990), those who reported higher levels of negative mood also reported higher levels of trait aggression ($\beta = 0.36$, $t(101) = 3.89$, $p < 0.001$).

3.3. Discussion

Results from Study 1 suggest that consumption of spicy food may be associated with aggression: participants who reported consuming spicier food also reported higher levels of aggression. To rule out the possibility that those who consume spicy food rate themselves higher on *all* traits, a follow-up analysis was conducted using the other five "personality traits" (e.g., considerate) as the dependent variable. None of these traits were significantly correlated with the consumption of spicy food (all ts < 0.13, all ps > 0.15).

Although Study 1 provides preliminary evidence in support of our central prediction, it suffers from an important limitation. Because preference for spicy food was measured rather than manipulated via random assignment, there is a possibility that a third variable—e.g., sensation-seeking—may underlie both a preference for spicy food and aggressive intent. In addition to this limitation, Study 1 raises the possibility that negative mood may play a significant role in the link between spicy food and aggressive cognitions. Studies 2 and 3 address these issues.

4. Study 2

Having documented preliminary evidence that spicy food may be associated with aggressive intent, we turned our attention to further exploring this relationship in Study 2. Specifically, the main objective of this study was to assess whether the *consumption* of more (vs. less) spicy food primes thoughts related to aggression. A secondary objective was to address an important limitation of Study 1, that a "third variable" may underline both preference for spicy food and aggressive intent. Toward these objectives, we randomly assigned participants to consume spicy or non-spicy food, and later measured aggressive cognition. If spicy food is associated with aggressive intent, we should find that aggression-related thoughts are more salient among those assigned to consuming spicy (vs. non-spicy) food.

Salience of aggression-related thoughts was assessed through a semantic activation task, described subsequently, as well as by measuring perceived aggressive intent. To measure perceived aggressive intent, we exposed participants (after they had consumed either the spicy or the non-spicy food) to a vignette in which a protagonist behaves in an ambiguously aggressive manner (see Appendix A). Participants were then asked to indicate extent to which the protagonist had exhibited aggressive intent. Past findings reveal that those who perceive higher levels of aggressive intent in others are prone to exhibiting aggressive intent