Risk-related Personality Traits and the Liking of Spicy Foods

Nadia K. Byrnes and John E. Hayes

Department of Food Science, College of Agricultural Sciences, The Pennsylvania State University, University Park, PA.

Introduction

- Based on work done in the 1970's through the early 1990's, there is a widespread belief that personality traits like sensation seeking are related to the enjoyment and intake of spicy foods, though actual evidence supporting this is quite limited.
- Recently, we showed strong to moderate correlations between remembered liking of spicy foods and the personality measures of Sensation Seeking and Sensitivity to Reward.
- There is a hypothesized link between liking of spicy foods and risky behaviors, such as gambling.
- A number of risk-related personality measures exist that overlap with Sensation Seeking and Sensitivity to Reward and associate with risky behaviors but none fully capture the multidimensional nature of risky behavior.
- Using self-report as well as behavioral measures of risk taking, such as the BART, is the best approach, as these techniques provide complementary information.
- Research using sweet and sour stimuli show at least 4 different types of hedonic responses to increasing intensity of stimuli.
- Some researchers suggest that the liking of spicy foods is not due to desensitization, but instead that there is an affective shift to the sensation that capsaicin produces.
- It is possible that these same types of hedonic response curves exist with capsaicin.

Specific Aims

- Explore relationships between risk-related personality traits and the liking of spicy foods in a new group of participants using behavioral measures of personality and sampled capsaicin in a food matrix.
- Explore different types of hedonic response types to varying capsaicin levels

Methods

Participants – 103 participants (ages 18 – 45, 99 men) were recruited from the Penn State campus and surrounding area. All conditions, stimuli, and instructions were the same across all participants. All data were collected with the approval of the Penn State University Institutional Review Board and the informed consent of participants. Exclusion criteria included pregnancy or breastfeeding, smoking in the past 30 days, known defects of taste or smell, piercings of the lips, tongue, or cheeks, history of chronic pain, current use of prescription pain medication, a history of chocking or difficulty swallowing, or allergies to spices or food components.

Stimuli– Stock solutions of capsaicin allyl isothiocyanate (AITC) were prepared in ethanol (95%, USP, Koptec, King of Prussia, PA). Strawberry jelly samples were made using sucrose, pectin (100% natural Sure-Jell, Premium Fruit Pectin, Kraft Foods, Deerfield, IL, U.S.A.), red food color (McCormick, Hunt Valley, Maryland, U.S.A.), imitation strawberry extract (McCormick, Hunt Valley, Maryland, U.S.A.), and reverse osmosis (RO) water. All jellies for a single testing session were made in one batch. Jelly was spiked with the appropriate amount of capsaicin or AITC to produce a low and high concentration of each sample (3uM and 12uM capsaicin and 0.05mM and 2.0mM AITC).

Protocol – Samples were served in 1 oz. plastic soufflé cups, labeled with randomly-generated 3-digit blinding codes. In total, 10 samples were presented, with each concentration of capsaicin and AITC, as well as a blank, presented in duplicate. The presentation was pseudo-randomized, with participants always evaluating a blank sample first and the rest of the samples presented in a randomized and counterbalanced order. Data was collected on two computers, using Compusense to collect ratings of the participants' liking and intensity of any burning/stinging sensation in the jellies, and Compusense *five* Plus on the second computer to collect personality data and ratings of remembered liking of various foods. Participants rinsed with RO water before, and between all samples for a minimum of 3 minutes, or until no lingering sensation was perceived. Jellies were sampled in the same manner. Participants placed the jelly in their mouth, moved it around for 5 seconds, and expectorated before rating the liking and perceived intensity of any burning/stinging sensation. Participants used the general Labeled Magnitude Scale (gLMS) to rate the perceived intensity of the jelly samples and a generalized Degree of Liking scale (gDOL) to collect all liking data. Before rating any samples, participants completed an orientation and warm-up to the gLMS. Between samples, the participants completed personality questionnaires, including AISS, SPSRQ, PID-V, and the mBART, and a food liking survey that included a range of spicy and non-spicy foods, alcoholic beverages, and non-food sensations. After the testing session, participants completed a web-based follow-up survey providing demographic information and information regarding typical consumption of the foods on the gDOL.

This work was supported by funds from the Pennsylvania State University and a National Institutes of Health grant DC10904 to JEH.

Results and Discussion

No relationships were seen between the high or low AITC-spiked jellies and any personality or liking measures. Also, 12uM capsaicin-spiked jelly showed better discriminatory ability than 3uM, so results with 3uM are reported here. Sensitivity to Punishment, PID5-Impulsivity, and the mBART did not associate with measures of liking or intake of spicy foods.

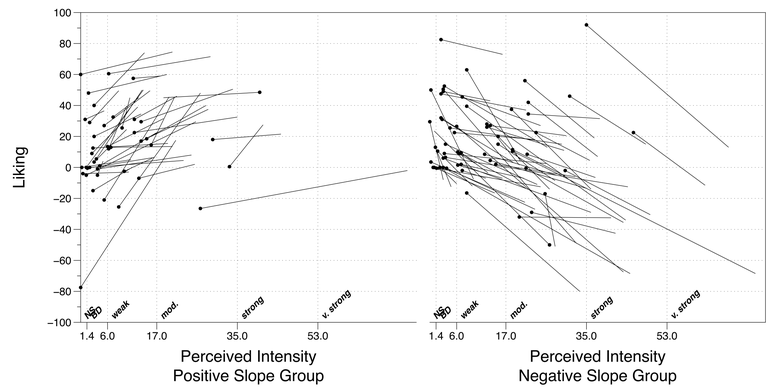
Finding 1. Remembered liking and sampled liking of capsaicin-containing foods both showed significant correlations with reported yearly intake of spicy foods. Sampled liking of 12uM capsaicin-spiked jellies shows strong correlations with both overall liking of a spicy meal and with liking of the burn of a spicy meal.

Table 1. All personality measures associated in the direction expected. While most personality traits associated significantly with each other, the measures are not interchangeable, and the differences between the scales may be the reason for the different relationships observed between personality traits and liking and intake of spicy foods.

	AISS	SP	SR	PID5-I	PID5-RT	Ave. adj. pumps
AISS	---	-0.23*	0.44***	0.39***	0.61***	0.30**
SP		---	-0.03	-0.15	-0.36***	-0.13
SR			---	0.36***	0.50***	0.18
PID5-I				---	0.71***	0.18
PID5-RT					---	0.30**

Figure 1. Different response styles to capsaicin-spiked jellies were noted. There was no significant difference in the liking, or perceived intensity, of the 3uM capsaicin-spiked jelly between the positive slope group (higher liking for 12uM than for 3uM capsaicin; capsaicin-likers) and the negative slope group (lower liking for 12uM than for 3uM capsaicin; capsaicin-dislikers). Capsaicin-likers rated the intensity of 12uM capsaicin significantly lower than capsaicin-dislikers, while capsaicin-likers rated the liking of 12uM capsaicin significantly higher than the capsaicin-dislikers.

Figure 1. Perceived Intensity vs. Liking for 3uM and 12uM capsaicin-spiked jellies



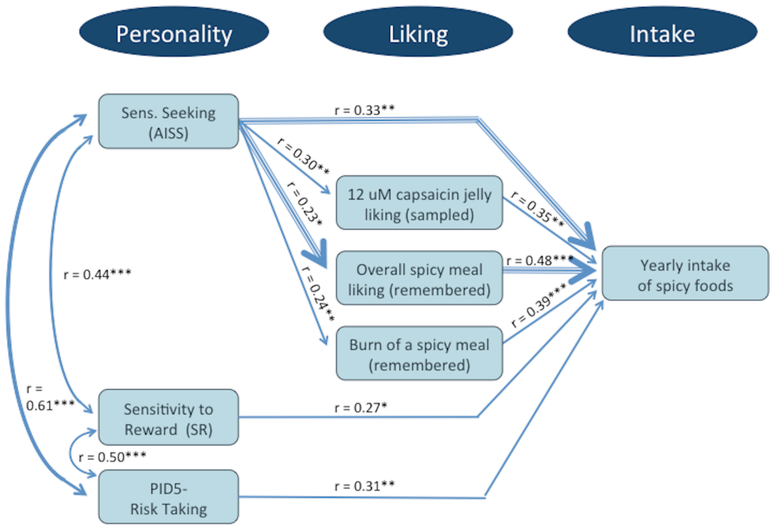


Figure 2. Proposed Model for Variables. PID5-RT and SR were associated with yearly intake of spicy foods but did not show any correlation with measures of liking of spicy foods. AISS was the only personality measure that associated with liking and intake of spicy foods. We suggest that AISS and SR and PID5-RT act through different mechanisms to influence intake of spicy foods. The relationship between SR and PID5-RT and intake of spicy foods may reflect a more extrinsically-based motivation for consuming spicy foods. We propose that the effect of AISS on intake of spicy foods may act through liking, reflecting a more intrinsically-based motivation for consuming spicy foods.

Conclusions and Future Work

- Trait impulsivity and sensation seeking are related constructs but impulsivity has to do with the failure to inhibit behaviors that may produce negative consequences. Agreeing with previous literature, measures of impulsivity and sensation seeking are not interchangeable as they show differential effects when measuring different behaviors. Similarly, the mBART and PID5-RT are both measures of risk taking but only the PID5-RT associated with intake of spicy foods. The risk associated with procuring and consuming spicy foods is not comparable to the risk associated with behaviors such as procuring and using illicit substances, binge drinking, and speeding while driving a car, all behaviors that have previously been associated with the risk measures used here.
- It is possible that while the personality measures show moderate to strong correlations with each other, that the differences observed in the associations between personality traits and liking and intake of spicy foods reflects what might be called "domain specificity".
- The proposed model highlights the possibility that AISS and SR and PID5-RT tap different motivations for the intake of spicy foods.
- Desensitization may not be a factor in this sample, but it is likely that high sensation seekers have experienced a wider range of sensation, specifically burning from foods. It may be possible that because of this, the 12uM capsaicin is comparatively less intense then the "strongest imaginable sensation of any kind" to the high sensation seekers versus the low sensation seekers.