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Investigating Predictors of Hanger in Romantic Partner Pairs

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Abstract:

The term “hangry, is an adjective used to describe negative mood state and emotional-behavioral changes associated with hunger. No study to date has discretely qualified or quantified hanger. Therefore, the purpose of the present study was to assess differences in the perception of hanger based on how it is experienced and expressed in romantic partner pairs. This study also looked for predictors of hanger based on personality differences and level of dietary restraint in terms of cognitive restraint, uncontrolled eating, and emotional eating patterns. 61 romantic partners pairs (122 total participants) completed the survey. Participants and their partners each filled out an assessment on hanger, the Inclusion of Others in Self (IOS) task, the Three Factor Eating Questionnaire Revised (TFEQ-R18) and the Hunter-Wolff A/B Personality Questionnaire. Within partner pairs, hanger scores given to oneself were highly correlated with the hanger score received from one’s partner. Regression analysis indicated that uncontrolled eating patterns significantly predicted self-hanger score and emotional eating patterns significantly predicted partner-hanger scores. Cognitive restraint and personality differences were not significantly related to self- or partner- hanger score. Our findings point to a complex interplay between hanger and self-regulation of emotions and eating behavior that is still not well understood. Finally, hanger appears to be observed both intra and interpersonally, indicating that hanger could have the potential to impact relationships.

Keywords: Hangry, hunger, romantic partners, emotion, behavior, dietary restraint, cognitive restraint, uncontrolled eating, emotional eating, personality, self-regulation

1. Introduction:

1.1 Definition and Social Concept of Hanger:

The term “hangry,” a portmanteau of hungry and angry, is an adjective used to describe a negative mood state and behavioral changes associated with hunger. While widely considered a slang-term, “hangry” was officially recognized as a word by the Oxford Dictionary and the Merriam-Webster dictionary in 2015 and 2018 respectively ("Hangry," 2015; "Hangry," 2018). Both dictionaries define “hangry” as feeling angry because of hunger. Hanger is a phenomenon often referenced in pop-culture as evidenced by Snicker’s iconic ad campaign with the tagline “you aren’t you when you are hungry.” As part of this campaign, Snickers manufactured special candy wrappers labeled with a “hunger symptom” such as grouchy, whiny, impatient, and snippy, all of which suggest hanger (Parker, 2015). Despite colloquial use, there is limited mention of hanger in the scientific community, as only a few studies to date have directly referenced the term hangry (Ackermans et al., 2022; MacCormack & Lindquist, 2019). There is, however, a larger body of evidence that has explored emotional-behavioral changes associated with hunger, many of which coincide with the hanger phenomenon.

1.2 Proposed Biological Mechanisms Behind Hanger:

Existing research suggests that hanger may stem from acute physiological changes and hormone fluctuations that occur with the onset of hunger. In healthy individuals, the hunger response is triggered in part by vagus nerve signaling (Browning et al., 2017; Cork, 2018) and a decline in blood glucose levels (Woods et al., 1998). When blood glucose drops, hunger signals are relayed to the brain through a series of neuroendocrine cascades that encourage feeding (Woods et al., 1998), ultimately engaging the conscious brain to seek out food. Endocrinology

and hypothalamic researchers Mani & Zigman propose that activation of the ghrelin system during the hunger response induces “antidepressant-like” and “anxiolytic behaviors,” perhaps as an instinctive mechanism to search for food despite low-energy levels (Mani & Zigman, 2017). The ghrelin system also activates neurons of the arcuate nucleus of the hypothalamus that express agouti-related protein (AgRP), which is thought to drive food seeking behavior though negative-valence teaching signals (Betley et al., 2015). By associating hunger with an intrinsic aversiveness or discomfort that can only be alleviated with food, Betley (2015) suggest that stimulation of AgRP may contribute to hanger.

Yet as certain cognitive and behavioral functions may be enhanced to promote refeeding, other functions may be inhibited as a direct effect of reduced glucose availability. Given the brain’s dependence on glucose as its main fuel source, it is well understood that any prolonged compromise of glucose to the brain will impair its ability to function properly resulting in a variety of neurological deficits and cognitive changes like bizarre behavior, personality change, confusion, and anxiety (Gailliot & Baumeister, 2007). There is substantial evidence of related mood and behavior in diabetic patients experiencing hypoglycemia (Gailliot & Baumeister, 2007; Gold et al., 1995) as well as non-diabetic patients in which hypoglycemia is artificially induced (Gold et al., 1995). It is important to emphasize that episodes of severe hypoglycemia are unlikely to occur under normal metabolic conditions due to the mobilization of glucose stores that occurs as needed between meals. Assuming blood glucose is maintained within homeostatic range, acute hypoglycemia would not explain emotional-behavioral changes associated with the onset of hunger in much of the population. That is not to suggest that glucose levels do not fluctuate over the course of the day or that these fluctuations have no impact. It is mentioned by Gailliot and Baumeister (2007) that even subtle changes in blood glucose levels could be

substantial enough to impact thoughts and behavoir (Gailliot & Baumeister, 2007; Woods et al., 1998). If one considers how glucose transport to the brain could be less than optimal without nessesarily being inadequete, it is plausiable to hypothesize that certain cognitive functions may be more or less priotized depending on how much glucose is received and how much glucose is required to carry out a task. Gailliot and Baumeister (2007) also propose that cerebral cognitive functions involved in effortful, controlled, or executive processes may require more glucose than simpler autonomic processes, and therefore, be more dependent on and susceptible to glucose. Furthermore, it is thought that individuals with poorer glucose tolerance (or individuals who store and utilize glucose less effectively than others) may be more limited in how much glucose is transported to the brain in an unfed state and therefore may have increased difficulty sustaining cognitive processes that are highly susceptible to glucose deficit when hungry (Gailliot & Baumeister, 2007).

One cognitive function of particular interest in our discussion of hanger concerns self-control or self-regulation. Analogous theories by different names including the *regulatory depletion hypothesis* (Ackermans et al., 2022; Carver & Scheier, 2012; MacCormack & Lindquist, 2019) and the *ego depletion effect* (Baumeister et al., 1998; Bushman et al., 2014; DeWall et al., 2011; Hagger et al., 2010) suggest that self-regulating behaviors require an abundance of energy, so when energy resources are depleted, self-regulatory functions are more likely to fail. These functions include behaviors related to attention and how we exhibit emotions notably in response to stress, impulsivity, and aggression (Bushman et al., 2014; Gailliot & Baumeister, 2007). These hypotheses related to self-regulatory deficits are consistent with empirical evidence of negative high-arousal emotions and aggressive outbursts that are frequently observed in individuals who are hungry (Bushman et al., 2014; DeWall et al., 2011;

MacCormack & Lindquist, 2019), yet inconsistent with empirical evidence of low-arousal emotions such as sadness as well as reduced positive emotions like low vigor and low self-esteem that have also been associated with hunger (Ackermans et al., 2022).

1.3 Psychological Underpinnings:

It has also been hypothesized that hanger is a psychological construct, meaning for hunger to be experienced as a negative emotion, hunger must be felt in a negative context (Ackermans et al., 2022; MacCormack & Lindquist, 2019). This theory is unlikely given the prevalence of hanger in neutral and even positive contexts. Nevertheless, it is important to consider factors influencing how context related to hunger is established and maintained. Ackermans et al. (2022) suggest that certain negative emotions associated with hunger could be evoked in response to one's own rules or restraint around eating and to what extent they have control (Ackermans et al., 2022). Frustration, for example, for not honoring hunger when it's felt.

1.3.1 The Role of Dietary Restraint:

Given the direct override of psychological hunger cues, there is reason to think that dietary restraint and the effects of restrictive eating could impact both the extent to which hunger is felt as well as how the feeling of hunger is emotionally conceptualized. Dietary restraint is the practice of consciously restricting food intake without responding to normal hunger cues (Anglé et al., 2009; Brytek-Matera et al., 2017; Karlsson et al., 2000). The effects of restriction, however, are multifaceted and can be measured in several ways. Cognitive restraint (CR) is the classic manifestation of dietary restraint, characterized by placing restrictions on eating with the

purpose of controlling body weight or shape. Because restraint can have disinhibitory effects, restrictive eating can also be related to uncontrolled eating (UE) and emotional eating (EE). UE describes the interplay between hunger and disinhibition characterized by eating past the point of fullness due to loss of control. EE, however, describes using food to down regulate or cope with negative emotions without necessarily considering physiological hunger (Anglé et al., 2009; Brytek-Matera et al., 2017; Karlsson et al., 2000). All three aspects are closely related to self-regulation and control.

As evidenced by Ackerman et al. (2022), previous research in populations with eating disorders reveals a close, but complicated relationship between hunger and mood under the setting of restrictive eating. First, restrictive eating disorders like anorexia nervosa (AN) and bulimia nervosa (BN) are frequently comorbid with mood disorders like anxiety and depression (Ackermans et al., 2022), as well as obsessive compulsive disorder and borderline personality disorder (Sansone & Sansone, 2011). While there is some evidence to suggest generalized negative mood in persons diagnosed with AN and BN (Ackermans et al., 2022), it is unclear whether these moods are associated with aspects of restriction including CR, UE and EE or increased physiological hunger that they may be experiencing because of the restriction. In their study, Ackermans et al. (2022) assessed disordered eating pathology in a subclinical population and found that higher disordered eating pathology was associated with greater tension, anger, and depression regardless of hunger level . They also found that decreased self-esteem was associated with satiety. This finding is supported by other previous research which has demonstrated a positive emotion related to feeling hungry in persons with restrictive eating disorders, likely due to feelings of fulfillment for “successfully” engaging in restrictive behaviors as means to alter one’s body.

The same response to restriction may not be true for individuals who do *not* exhibit disordered eating. One study evaluating the effects of restrictive dieting amongst healthy individuals with no history of restrictive eating found that after four weeks on an intermittent dieting schedule in which calories were restricted to less than 600 kcal per day three days a week, participants reported worse mood, heightened irritability and difficulties concentrating (Pirke, 1996). In a separate study evaluating the effects of a single, 18 hour-fast, increased hunger as well as increased irritability and difficulty completing a task were reported by a significant number of women participating in the study (Watkins & Serpell, 2016). However, participants in the single fast study did report a boost in positive feelings after successfully completing the fast, similar to the psychological process of positive reinforcement perpetuating the continuation of restriction commonly observed in people with restrictive eating disorders (Watkins & Serpell, 2016). That said, another study found that restrictive eating behaviors in non-clinical subjects was associated with reduced emotional regulation (Haynos et al., 2018), similar to the effects of self-regulation associated with low blood glucose. These results suggest that one's level of eating restraint could correlate with their likelihood to exhibit hanger, especially when restraint was related to self-regulatory mechanisms.

1.3.2 The Role of Personality:

In addition to level of dietary restraint, personality may be associated with one's propensity to feel hanger given differences in one's ability to regulate emotion and behavior at baseline. One way of categorizing personality with close attention to stress-related behavioral response is with the A/B Personality Scale. The Type A and Type B personality theory suggests that individuals with a Type A behavior pattern (TABP) tend to be action-oriented, time-driven,

competitive, impatient and aggressive, while individuals who classify as Type B tend maintain a relaxed and easy-going nature (Petticrew et al., 2012). Given the heightened response to stress associated with TABP, there is reason to think that individuals with this personality pattern may react more strongly to the stress related to feeling hungry, potentially manifesting as hanger. One study found a direct link between behavior patterns and eating patterns in Japanese men, where men with TABP tended to consume more food at mealtimes by rapid eating which may relate to reduced self-control. Previous research has also shown numerous connections between personality disorders and restrictive eating disorders (Wagner & Vitousek, 2019), suggesting an additional link between personality pathology and level of eating restraint.

1.4 Study Objective:

While several biological mechanisms may explain the general phenomenon of hanger, it is not well understood why some people are more suspectable to hanger, or display more symptoms of hanger, than others. The present study investigates whether psychological differences related to control around eating and emotional regulation can predict the severity of hanger that a person may experience or exhibit. Furthermore, our focus on potential psychological underpinnings of hanger contributes to the ongoing discussion as to whether hanger is more physiological or psychological in nature. The goals of the present study were, first, to assess differences in the perception of hanger in romantic partner pairs and, second, examine relationships between dietary restraint, personality type and the severity of hanger typically experienced by participants.

2. Methodology:

2.1 Participants:

We recruited one hundred fifty-seven people for the study. All participants were recruited by social networking, tabling at the University of Vermont campus, physical flyers as well as digital advertisements on social medical platforms including Instagram and Facebook. Access to the survey was provided with a Uniform Resource Locator (URL) or a physical Quick Response (QR) code depending on the mode of recruitment; both were linked directly to the survey platform (Qualtrics). Inclusion criteria were being ages 18 to 29 years of age and currently identifying with being in a romantic partnership with a person who would also be willing to complete the survey. Partner-pairs were recruited to provide dual reporting on questions pertaining to hanger because to our knowledge there is currently no standard scale for measuring hanger and the validity of self-reporting for this topic is yet to be studied. For partners to accurately answer questions pertaining to each other's hanger, they must have a social history of interacting in situations both with and without feeling hungry. The decision to explicitly recruit for "romantic" partners was made to control for partner's level of intimacy and knowledge of each other's behavior in a variety of situations. "Friend" partner-pairs were considered, but decided against because previous studies have found that romantic relationships are typically more intimate than a friend relationship (Gächter et al., 2015). The Committee on Human Research in the Behavioral and Social Sciences at the University of Vermont approved the study protocol and issued a waiver of consent documentation. A research information sheet was provided at the start of the survey for prospective participants to independently review. Researcher's contact information was available in case of any questions.

2.2 Survey Design:

A 54-item quantitative survey designed for pairs of respondents in romantic partnerships was generated and administered via Qualtrics. Respondents were instructed to take the survey independently from their partner, with the exception of one question prompting partners to generate a shared code word to link their responses to the survey. To ensure codes were unique and unidentifiable, respondents were asked to create a code that consisted of a random number, color, and animal. For example, 3bluedog or 15pinkpanda. Survey responses with the same code entered at the start of the survey were linked as a romantic partner pair.

Respondents were also asked to report their age and how close they felt to their partner using the Inclusion of Others in Self (IOS) task (Gächter et al., 2015) available in Appendix A. Using the IOS task, we asked participants to assess their relationship with their romantic partner by selecting one out of seven pairs of increasingly overlapping circles in which one circle represented the respondent (referred to as "You") and the other circle represented to their romantic partner (referred to as "X"). We felt it was important to include a closeness rating (as provided by the IOS task) to quantify the general level of knowledgeability that our partner-pairs had with each other given how they would be reporting on each other's behavior. The closer the relationship, the more reliable the report.

To develop a list of behaviors commonly experienced when hungry, we used answers to an in-class anonymous survey question from an introductory nutrition course. "The question was: What behaviors do you most commonly experience when hungry?" The question is asked each semester by the instructor as part of a lesson on diet culture, and students answer anonymously using the iClicker response system. Using the five most cited hanger-associated

behaviors, we designed five questions to assess common themes of hanger. The five questions generated to self-assess hanger were as follows:

1. When I am hungry, I am more likely to be snappy.
2. When I am hungry, I tend to feel impatient.
3. When I am hungry, things tend to irritate or annoy me more.
4. When I am hungry, I feel frustrated or angry.
5. When I am hungry, I find it difficult to concentrate or think clearly.

Participants were asked how frequently they experience these behaviors when hungry using a 4-point Likert scale. Because there is no standard scale for measuring hanger, and one's own perception of their behavior when hungry might be different than a friend or family member's perception of that person's behavior when hungry, we collected answers to these questions from the participant, as well as from a participant's romantic partner. In addition to the five questions about their own behavior when hungry, participants were asked the same five questions about their partner's behavior when hungry. The same five questions above were repeated, however, instead of starting with the phrase, "when I am hungry" we asked, "when my partner is hungry." Using the same set of questions to assess one's own hanger as well as a partner's hanger allowed us to form two separate hanger scores for each participant. Throughout the remainder of the study, the hanger score given to self and hanger score received from partner will be referred to as "self-hanger score" and "partner-hanger score" respectively. The purpose of dual reporting was to help validate self-reports of propensity to display hanger.

In addition to answering questions about behaviors when hungry, all participants completed two additional scales to measure dietary restraint and personality. The Three Factor Eating Questionnaire R18 (TFEQ-R18) is an 18-item survey used to measure dietary restraint. The TFEQ-R18 is a revised and shortened version of the 52-item Three Factor Eating Questionnaire which measures cognitive restraint of eating (I), disinhibition (II) and hunger (III) (Stunkard & Messick, 1985). The revised version (TFEQ-R18) measures three similar factors in brevity; this includes 6-items to measure cognitive restraint (conscious restriction of food intake to manipulate body weight), 9-items to measure uncontrolled eating (tendency to eat more food than usual due to loss of control over food consumption with subjective hunger) and 3-items to measure emotional eating (the inability to resist emotional cues to eat) (Fleurbaix Laventie Ville Sante Study, 2004; Karlsson et al., 2000). The full scale can be found in Appendix D.

The Hunter-Wolff A/B Personality Questionnaire is a 24-item questionnaire measuring personality on an A/B spectrum. The questionnaire measures four factors that are typically characteristic of Type A personality; this includes 7-items to measure leadership (the desire to lead others and succeed in activities), 7-items to measure impatience-aggression (the tendency to have a quick temper, interrupt and argue with others), 7-items to measure eagerness-energy (identified by rapid movement, speech or food intake) and 3-items to measure hard-driving behavior (drive to complete tasks with maximal effort) (Hunter et al., 1982). The full scale can be found in Appendix E.

2.3 Statistical Analyses:

Before performing any statistical analyses, all survey responses were translated into numeric values. First, each respondent was given two numeric identifiers, an individual ID and a

partner ID. Partner IDs were assigned based on matching partner codes. Using a Microsoft Excel function, the five items prompting respondents to rate their partner's hanger (partner-hanger score) were swapped within partner pairs based on the partner ID. This allowed us to organize data *about* each respondent under the same individual ID. Therefore, self-hanger score and partner-hanger score were calculated under the same individual ID. Both self-hanger score and partner hanger score were scored on a 4-point scale where 1 = definitely false and 4 = definitely true. Then, total scores for self-hanger were determined by the sum of scores from the five hanger questions that each respondent gave themselves and total scores for partner-hanger were determined by the sum of the five questions that each respondent received from their partner. Scores were kept separate in order to compare perception of hanger and validate self-report.

Next, each item from the TFEQ-R18 was scored on a 4-point scale in which higher responses coded for greater frequency or truth of the behavior. The final item of the TFEQ-R18 asked respondents to rank themselves on a scale from 1-8 where 1 meant no restraint in eating and 8 meant total restraint in eating; this item was translated to the same 4-point scale such that scores of 1 or 2 = 1, 3 or 4 = 2, 5 or 6 = 3, and 7 or 8 = 4. After appropriate items were reverse coded, the raw scores for cognitive restraint, uncontrolled eating and emotional eating were converted to a relative proportion by the following formula: [((raw score - lowest possible raw score)/ possible raw score range) x 100]. Higher scores indicated greater level of restraint and lesser tendency to eat freely (Fleurbaix Laventie Ville Sante Study, 2004). Highest to lowest possible scores ranged from 24 to 6 for cognitive restraint, 36 to 9 for uncontrolled eating and 12 to 3 for emotional eating.

Finally, each item from the Hunter-Wolff A/B Personality Questionnaire was scored on a 1-7 Likert scale where 1 represented the Type B end of the spectrum and 7 represented Type A

end of the spectrum. Total scores were determined by the sum of the scores for each of the 24 items. Highest to lowest possible scores range from 168 to 24 which code for completely Type A and completely Type B respectively (Hunter et al., 1982).

SPSS Statistics version 28 (IBM, Chicago) was used for all statistical analyses. Self-hanger scores and partner-hanger scores were compared using a two-tailed correlation test. Multiple linear regression was used to test if three domains of eating restraint and personality predicted self-hanger scores and partner-hanger scores. Model 1 measured the effect of eating restraint and personality on self-hanger score; Model 2 measured the effect of eating restraint and personality on partner-hanger score.

3. Results:

One hundred fifty-seven individual survey responses were received. Thirty-five survey responses were excluded from the study due to partner codes not matching to a code entered by another respondent. One hundred twenty-two individual responses with corresponding partner responses were available for analysis, thus accounting for sixty-one romantic partner pairs. Respondents' ages ranged from 18-29 years old, with the mean age being 21.3 years old (SD = 2.1). Mean partner pair closeness was 5.2 (SD = 1.3).

3.1 Correlation of Hanger Scores:

Correlation of self-hanger score and partner-hanger score was significant at the 0.01 level (two-tailed). Mean self-hanger score was 9.63 (SD = 3.2) while mean partner-hanger score was 10.7 (SD = 3.6).

3.2 Regression Analyses of Predictors:

Results of the linear regressions for hanger scores are shown in Table 1. Mean scores for each of the three domains of eating restraint are as follows: cognitive restraint was 25.3 (SD = 14.6), uncontrolled eating was 32.9 (SD = 15.2) and emotional eating was 32.2 (SD = 20.3). Mean personality score was 106.4 (SD = 19.9). Model 1 measured the effect of the three domains of eating restraint (cognitive restraint, uncontrolled eating and emotional eating) and personality on self-hanger score. The overall regression was statistically significant ((R^2 = 0.125, F(4, 119) = 4.251 p = 0.003). It was found that uncontrolled eating significantly predicted self-hanger score. Cognitive restraint, emotional eating, and personality were not significantly related to self-hanger scores.

Model 2 measured the effect of the three domains of eating restraint (cognitive restraint, uncontrolled eating and emotional eating) and personality on partner-hanger scores. The overall regression was statistically significant ((R^2 = 0.084, F(4, 119) = 2.712, p = 0.033). It was found that emotional eating significantly predicted partner-hanger score. Cognitive restraint, uncontrolled eating, and personality were not significantly related to partner-hanger scores.

Table 1. Multiple Linear Regression Models for Self-Hanger Scores and Partner Hanger Scores

Model 1 – Self-Hanger Scores

Predictor	β	Coefficients of Standard Error	t	Sig.
Cognitive Restraint (CR)	0.008	0.020	0.410	0.682
Uncontrolled Eating (UE)	-0.052	0.025	-2.102	0.038
Emotional Eating (EE)	-0.021	0.019	-1.109	0.269
A/B Personality Score	-0.013	0.015	-0.879	0.381

Model 2 – Partner-Hanger Scores

Predictor	β	Coefficients of Standard Error	t	Sig.
Cognitive Restraint (CR)	-0.008	0.023	-0.345	0.731
Uncontrolled Eating (UE)	0.027	0.028	0.970	0.334
Emotional Eating (EE)	-0.057	0.021	-2.693	0.008
A/B Personality Score	-0.014	0.017	-0.842	0.401

4. Discussion:

4.1 Perception of Hanger:

In our examination of hanger in romantic partner pairs, we found that the hanger score participants gave to themselves was highly correlated with the hanger score that they received from their partner. This suggests that one's own perception of their behavior is similar to their partner's impression of the same behavior. Partner closeness ratings reinforce the reliability of these findings, as a majority of respondents indicated a closer rather than weaker relationship with their partner on the IOS task. Partners that feel closer may provide a more accurate interpretation of their partner's emotions and behavior compared to partners who feel less close.

It should also be mentioned that respondents identified with each of the five themes of hanger symptoms addressed in the present study, which were a mix of both high-arousal emotion (snappiness, impatience, irritation/annoyance, and anger/frustration) and cognitive deficit (difficulty concentrating). Consistent with previous hanger research by (MacCormack & Lindquist, 2019) and (Ackermans et al., 2022), our findings support the discrete, negative high-arousal emotion of anger to be associated with hunger. Other discrete emotions including tension as previously measured by (Ackermans et al., 2022) and aggression, as measured by (Bushman et al., 2014; DeWall et al., 2011), were not assessed in the present study due to lack of prevalence in the initial class survey used to generate our hanger questions. That said, our findings do support the general observation that hunger increases multiple negative, high-arousal emotions, not just anger as colloquially suggested. We did not assess any low-arousal emotions, such as sadness or depression, because no low-arousal emotions were frequently indicated in the survey used to develop our hanger questions. Lastly, our results indicating concentration difficulties reflect similar cognitive changes associated with hunger as previously reported by

(Ackermans et al., 2022) who measured increased confusion and fatigue in their study. This observation is also in line with previous literature linking cognitive deficits to hunger and lack of eating, notably in fasting studies (Bellisle, 2004; Benau et al., 2014) and eating disorder research (Pirke, 1996; Zakzanis et al., 2010) respectfully.

4.2 Assessment of Restrictive Eating:

4.2.1 Cognitive Restraint:

Cognitive restraint refers to the act of placing restrictions on food without considering hunger and satiety cues; it is the conscious component that drives restrictive eating behavior (Karlsson et al., 2000). While we expected to see increased cognitive restraint related to increased hanger behaviors, our data provides no evidence of a relationship. Neither the hanger scores that participants gave to themselves nor the hanger score that they received from their partner were predictive of hanger in the present study. This is interesting given how previous studies have found CR to be the most identifiable behavior out of the three domains measured by the TFEQ-R18 (Fleurbaix Laventie Ville Sante Study, 2004).

It is important to note that cognitive restraint stems from a desire to control body weight, shape, or size (Karlsson et al., 2000); it often drives dieting behavior. Though previous research has found that individuals on diets tend to have worse mood, heightened irritability and difficulties concentrating (Pirke, 1996), our findings suggest that any hanger symptoms one may experience while dieting are likely not related to the underlying cognitive restraint. Our evidence may provide more reason to think that it is the actual caloric restriction involved in restrictive diets that evokes negative emotions and behaviors, rather than the psychological cognitive

processes that encourage the restraint in the first place. These findings may reinforce the idea that hanger is more physiologically triggered despite having psychological manifestations.

4.2.2 Uncontrolled Eating:

Uncontrolled eating, which relates hunger with disinhibition, refers to the tendency to eat past the point of fullness with the feeling of being out of control. It is thought that the lesser the sense of control around food, the greater the difficulty in correctly determining the state of hunger, the greater the likelihood of overeating. Therefore, UE is measured by consuming excessive amounts of food (Karlsson et al., 2000). In the present study, lower uncontrolled eating scores were associated with higher self-given hanger scores. According to Karlsson et al., lower UE score would suggest a greater sense of control around food; therefore, it is reasonable to predict that individuals who do not engage in uncontrolled eating are better able to detect and determine their state of hunger and may be more in tune with hunger cues, including hanger.

That said, the same association was not related to the hanger score each participant received from their partner. Given the role of self-control in both eating behavior and emotional regulation, it may be that individuals who feel a strong sense of control over how much they eat also exhibit a greater level of control over how they express their emotions or behave when they feel hungry despite the level to which they internally experience an emotion. It is mentioned by (Roy, 2014) that inhibition plays a role in both emotional regulation, such as monitoring aggressive behavior, as well as eating behavior, such as controlling overeating tendencies. Future research should further investigate the role of disinhibition in the hunger response in terms of how both eating behavior and emotional behavior are simultaneously regulated.

4.2.3 Emotional Eating:

Emotional eating refers to eating in response to various negative emotions (Karlsson et al., 2000). The negative emotions specifically addressed in the present study related to eating more when anxious and eating to cope with feelings of sadness and loneliness. The present study found that those with lower emotional eating (EE) scores tended to receive higher hanger scores from their partner, however, there was no association between EE score and hanger scores given to self. A lower EE score suggests that an individual is less likely to eat in response to negative emotions thereby reflecting infrequent use of food as a tool to cope. This could mean that individuals with lower EE tendencies are more likely to express their emotions rather than using other coping mechanisms. Perhaps individuals who are more expressive of their emotions would have a greater propensity to externalize any hanger that they felt, thereby explaining why partners tended to pick up on hanger behaviors.

4.3 Assessment of Personality Type:

It was expected that individuals who scored high on the restrictive eating scale would score higher on the A/B personality scale, thus reflecting more A-type personality traits. The present study did not find this to be true, as personality scores were not correlated with hanger scores given to self or received from partner. This evidence suggests that people of all personality types experience hanger. Personality is unlikely to predict the severity of hanger a certain individual may experience, reinforcing a lack of support for psychological origins of hanger despite the phenomenon's psychological presentations. Our results differed from the literature in eating disorder research that suggests a strong link between personality pathology and disordered eating pathology (Sansone & Sansone, 2011; Wagner & Vitousek, 2019).

Personality traits do not appear to be related to eating behavior traits based on the results of the present study.

4.4 Strengths and Limitations:

To our knowledge, the present study is the first to date to investigate why certain individuals may experience hanger to a greater or lesser degree than others. It is also the first to assess differences in the perception of hanger based on the internal experience of emotions and behaviors compared to the outward expression of emotions and behaviors. For that reason, we implemented dual reporting to validate self-report of hanger given how there is currently no validated scale to self-assess. Because self-hanger scores and partner-hanger scores were very highly correlated, it appears the experience and expression of hanger is perceived similarly. Creating a validated scale would be a good direction for future research. Additionally, by limiting participation to individuals in romantic relationships (which are typically more intimate than a friend relationship) (Gächter et al., 2015) and implementing the "Inclusion of Others in in the Self" Scale, the present study was able to control for partner-pair closeness. By confirming partner-pairs reporting on one another were in fact close, we have confidence that partners had witnessed each other in hungry states frequently enough to accurately report on any affect changes.

Given that this study is the first to quantify hanger, there are several limitations that warrant mention. First, we cannot confirm that the five questions asked to assess hanger measured the phenomenon of interest. To our knowledge, there is no published literature that has explicitly defined hanger to include any specific emotion or behaviors related to hanger. As this field is just now starting to be explored, a validated way to measure or quantify hanger does not

exist at this time. That said, participants did seem to identify with all five themes of hanger proposed by the present study, as scores for each were relatively similar. The themes that participants identified with in the present study are both related to self-control behaviors as well as high arousal emotions, thus supporting both self-control deficits and onset of high-arousal emotions described in previous literature looking at response to low blood glucose. The present study did not assess blood glucose, but our finding may reinforce the link between blood glucose, onset of hunger, and psychological responses related to changes in emotional state and behavior. Partner pairs were expected to complete the entire survey separately, including the portion in which they were asked about their partner's behavior. Partners were not under supervision while completing the survey, so it is possible that partners could have discussed their responses prior to submitting. Additionally, participants misunderstanding which question should be answered about themselves versus their partner could lead to unidentifiable invalid responses.

The present study did not assess specific demographic information such as gender identity, race, ethnicity, socioeconomic status, or level of education. To our knowledge, there was no research published to date relating these factors to hanger; however, it is possible that any of these factors could be confounding variables. Selection bias is also probable given that most recruitment for the study took place on a college campus. We must acknowledge that the hanger symptoms derived from the class survey could be biased by the demographics of the class being predominantly young adult students in an introductory nutrition course. Additionally, our sample did not allow us to see a broad distribution of personality scores. Participants in the present study tended to score higher on the A/B personality scale, reflecting a population that was overall more A type than B. While regression analysis allowed us to compare the available data, it should be acknowledged that the range of data was not broad. While the present study did not find a

correlation between personality and hanger, we cannot deny the possibility that a correlation may exist in a population with greater representation of participants with B type traits. Future studies should consider using a broader sample when assessing personality. It would be interesting to see if expanding the demographic of the populations beyond college students and young professionals would reveal greater differences in personality.

5. Conclusion:

Hanger is a phenomenon that is experienced by many people; however, it remains unclear why certain individuals may have greater propensity to experience it than others. It is clear from our research that one's own intrapersonal experience of hanger is also observed interpersonally, indicating that hanger could impact relationships. Hanger may be related to uncontrolled eating and emotional eating; however, level of cognitive restraint and personality differences do not appear to be robust predictors. The interplay of self-regulation in both eating behavior and emotional behavior warrants further investigation, as the aim the present study was not focused on the specific role of regulation. That said, it is important that we continue to look for predictors of hanger that are potentially within a person's control to improve understanding as to why certain individuals may act out and, further, reduce the effects it may have on interpersonal relationships.

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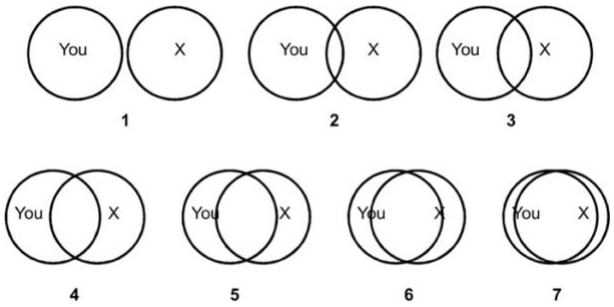
Appendix:

A. Inclusion of Others in Self (IOS) Task: (Gächter et al., 2015)

1. Using the following figure, please consider which of these pairs of circles best describes your relationship with your partner. In the figures, "X" serves as a placeholder for your partner. By selecting the appropriate number, please indicate to what extent you and your partner are connected.



B. Self-Hanger Assessment:

1. When I am hungry, I am more likely to be snappy.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

2. When I am hungry, I tend to feel impatient.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

3. When I am hungry, things tend to irritate or annoy me more.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

4. When I am hungry, I feel frustrated or angry.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

5. When I am hungry, I find it difficult to concentrate or think clearly.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

C. Partner-Hanger Assessment:

1. When my partner is hungry, he/she/they are more likely to be snappy.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

2. When my partner is hungry, he/she/they tend to be impatient.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

3. When my partner is hungry, he/she/they seem to become irritated or annoyed by things more easily.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

4. When my partner is hungry, they tend to exhibit a general sense of anger or frustration.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

5. When my partner is hungry, I notice that he/she/they have difficulties concentrating or tell me they can't think clearly.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

D. *Three Factor Eating Questionnaire R18 (TFEQ-R18):* (Karlsson et al., 2000)

1. When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

2. I deliberately take small helpings as a means of controlling my weight.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

3. When I feel anxious, I find myself eating.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

4. Sometimes when I start eating, I just can’t seem to stop.

Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

5. Being with someone who is eating often makes me hungry enough to eat also.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

6. When I feel blue, I often overeat.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

7. When I see a real delicacy, I often get so hungry that I have to eat right away.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

8. I get so hungry that my stomach often seems like a bottomless pit.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

9. I am always hungry so it is hard for me to stop eating before I finish the food on my plate.

   Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

10. When I feel lonely, I console myself by eating.

    Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

11. I consciously hold back at meals in order not to weight gain.

    Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

12. I do not eat some foods because they make me fat.

    Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

13. I am always hungry enough to eat at any time.

    Definitely true (4)/ mostly true (3)/ mostly false (2)/ definitely false (1)

14. How often do you feel hungry?

    Only at meal times (1)/ sometimes between meals (2)/ often between meals (3)/almost always (4)

15. How frequently do you avoid “stocking up” on tempting foods?

    Almost never (1)/ seldom (2)/ moderately likely (3)/ almost always (4)

16. How likely are you to consciously eat less than you want?

    Unlikely (1)/ slightly likely (2)/ moderately likely (3)/ very likely (4)

17. Do you go on eating binges though you are not hungry?

    Never (1)/ rarely (2)/ sometimes (3)/ at least once a week (4)

18. On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself?

E. Hunter-Wolff A/B Personality Questionnaire: (Hunter et al., 1982)

1. I am easy going(1)—hard-driving(7)
2. I take it easy and give little effort(1)—go all out and give a lot of effort(7)
3. When given an assignment, it does not matter if it’s late(1)—does matter if it’s late(7)
4. I talk slowly(1)—talk quickly(7)
5. I talk softly(1)—talk loudly(7)
6. I never feel rushed(1)—always feel rushed(7)
7. I eat slowly(1)—eat quickly(7)
8. It feels like time passes slowly(1)—time passes quickly(7)
9. I walk slowly(1)—walk quickly(7)
10. I drink slowly(1)—drink quickly(7)
11. I do not like to argue(1)—do like to argue(7)
12. I never get in fights(1)—always get in fights(7)

13. It is easy to wait(1)—difficult to wait(7)
14. I always sit and listen(1)—break in when someone else is talking(7)
15. It takes a lot to make me angry(1)—takes little to make me angry(7)
16. When others act slowly, I am never frustrated(1)—always frustrated(7)
17. I do not lose my temper easily(1)—do lose my temper easily(7)
18. I am never a leader(1)—always a leader(7)
19. I do not care if I win(1)—always want to win(7)
20. I have no interests(1)—many interests(7)
21. I am satisfied with my performance(1)—always want to have better performance(7)
22. I think about one thing at a time(1)—many things at a time(7)
23. I do not like to tell others what to do(1)—do like to tell others what to do(7)
24. I have few hobbies(1)—many hobbies(7)