

The Relationship between Age, Gender, and Hedonic Hunger

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Abstract

Hedonic hunger is the subjective feelings and urges of hunger in periods of prolonged food deprivation. The purpose of this study was to determine if hedonic eating changes throughout the lifecycle and if there are differences between men and women. Subjects included 316 participants (200 females and 116 males) from Western Wisconsin. The three factor Power of Food Scale was used to assess an aggregated hedonic eating score as well as a score for each of the factors: Factor 1 “food available,” Factor 2 “food present,” and Factor 3 “food tasted.” The results indicated that the aggregated hedonic eating score was significantly ($P < 0.05$) lower in the 62+ age group ($M=2.30$, $SD=0.76$) when compared to the 18-28 year old group ($M=2.67$, $SD=0.84$). Additionally, there was a significant difference between the 62+ age group and the 18-28 year old group when comparing the food available scores ($M=1.98$, $SD=0.93$ vs. $M=2.37$, $SD=0.98$) and the food present score ($M=2.57$, $SD=1.01$ vs. $M=3.06$, $SD=1.05$). There were no significant differences in the age groups for the food-tasted factor. Lastly, results indicated that hedonic eating is more prevalent in women when compared to men. In conclusion, younger people and women had a higher likelihood of hedonic eating. Additional research is needed to determine the reason why younger people as well as women have a higher prevalence of hedonic eating.

Keywords: hedonic hunger, Power of Food Scale, food intake

Today, 67% of all adults in the United States over the age of 20 are considered to be overweight (body mass index above 25 kg/m^2) or obese (body mass index above 30 kg/m^2) (Center for Disease Control and Prevention, 2009). Individuals who are overweight or obese are at a higher risk for developing chronic health conditions such as heart disease, cancer, diabetes, high blood pressure, sleep apnea, and asthma (Kersick et al.,

2009), many of which decrease quality of life and life expectancy. Because of the strong association between weight gain and the onset of chronic health conditions, factors leading to overweight and obesity are an active area of research. A relatively new area of research focuses on why people eat and the regulatory mechanisms governing these reasons for eating.

Food intake is regulated by two complementary drives: the homeostatic and hedonic pathways. The homeostatic pathway controls energy balance by increasing the motivation to eat following depletion of energy stores (Lutter & Nestler, 2009). In contrast, hedonic, or reward-based regulation, can override the homeostatic pathway during periods of relative energy abundance by increasing the desire to consume foods that are highly palatable (Lutter & Nestler, 2009). The universal presence of highly-palatable food in the environment may chronically activate the hedonic appetite system, producing a need to actively restrain eating to avoid gaining weight (Lowe & Levine, 2005). The environmental changes promoting overweight and obesity in today's society that are related to hedonic eating include the portion size, cost and convenience of food, food advertising, social eating, as well as stress (Wansink, 2004; Wardle, 2007; Morland, Diez Roux, & Wing, 2006; Gallo, 1997; de Castro & Brewer, 1992; Adam & Epel, 2007). As the growing prevalence of obesity suggests, an increasing proportion of human food consumption appears to be driven by pleasure, not just by the need for calories (Lowe & Butryn, 2007). Therefore, it can be concluded that the widespread availability of easily-accessible palatable foods is now a major contributor to weight gain as well as the obesity epidemic.

The Power of Food Scale (PFS) was recently developed and validated to study how hedonic eating influences various people and situations (Lowe & Butryn, 2007). Using the PFS, Lowe et al. (2009) found no significant differences in hedonic eating between race (Caucasian, African American, or Asian) and gender, although 86% of respondents were female, which likely skewed the results. Two other studies were conducted to measure the consistency of the PFS and found that the PFS is a useful measure of the hedonic impact of the current food environment (Cappelleri et al., 2009; Forman et al., 2007). Both of these studies validated the PFS; however, one area in which the PFS has not been used to assess is how hedonic eating changes throughout the lifecycle.

Additionally, differences in hedonic eating between genders warrants further investigation. Therefore, the purpose of this study was to utilize the PFS to determine differences in hedonic eating between various age groups and if there are differences in hedonic eating between men and women.

Methods

Subject Selection and Data Collection

The survey was distributed both electronically and by hard copy. The electronic version of the survey was developed using Qualtrics (version 20695), and a link to the electronic version of the survey was posted on Facebook (www.facebook.com, © 2011). Potential participants who accessed the link were directed to the implied consent form, and upon reading the consent form, they were allowed to complete the survey. For the participants completing the hard copy version of the survey, permission was first obtained from the management of Anytime Fitness, the Village at White Pine apartments, and Tantara apartments in Menomonie, Wisconsin; then, drop boxes were placed at each location. The implied consent form and survey were made available and a letter stating when the surveys needed to be turned in was posted in the location. Data were collected over a period of approximately three weeks from mid-May to June 2011. Three hundred and sixteen subjects (200 females and 116 males) successfully completed the survey. Approval to conduct research was granted by the University of Wisconsin-Stout Institutional Review Board prior to any data collection.

Instrumentation

All subjects in the study completed the Power of Food Survey (PFS), which was developed by Michael Lowe in the Department of Psychology, Drexel University, Philadelphia, Pennsylvania, and obtained directly from Dr. Lowe (personal communication, January 7, 2011). The PFS was designed to measure appetite for highly-palatable foods, and thus it does not include any items describing actual food consumption. The survey utilized for the current study consisted of 17 questions, with the first two questions asking gender and age. The question on age was asked as a range of 18-28 years old, 29-39 years old, 40-50 years old, 51-61 years old, and 62 years and older. The next 15 questions were specific

to the PFS and reflected the responsiveness to the food environment. The 15 questions were grouped into three main domains according to food proximity with (1) food readily available in the environment but not actually present (“food available”), (2) food present but not tasted (“food present”), and (3) food first tasted but not consumed (“food tasted”). Examples of questions in the three domains are as follows: (1) “I find myself thinking about food even when I’m not physically hungry”; (2) “If I see or smell a food I like, I get a powerful urge to have some”; and (3) “When I eat delicious food, I focus a lot on how good it tastes.” For each item, subjects had to score their reactions on a 5-level scale: 1 = I don’t agree at all, 2 = I agree a little, 3 = I agree somewhat, 4 = I agree, and 5 = I strongly agree. Thus, the scores for each of the domains indicate hedonic hunger motivation at different levels of food availability (Schultes, Ernst, Wilms, Thurnheer, & Hallschmid, 2010; Lowe et al. 2009). The mean of the items making up each of the three domain scores was calculated to obtain an aggregated score. Although correlations between the three domains have been found to be generally high (all $r > 0.77$) and support the use of an aggregated domain score, the three-domain model has been found to be superior to the one-domain model (Lowe et al., 2009).

Data Analysis

The Statistical Program for Social Sciences (SPSS) version 15.0 computer software program was used to analyze the data. Descriptive statistics, including the mean and standard deviation, were conducted on the interval and ratio data. A One-Way ANOVA test was run, comparing each age group with each of the three factors as well as the total mean. Results were considered significant at $p \leq 0.05$. Two-Way ANOVA tests were run for each factor separately, as well as the total mean, comparing age and gender, with results being significant at $p \leq 0.05$.

Results

Aggregated Score

Figure 1 describes the mean aggregated score (i.e., the average of Factor 1, Factor 2, and Factor 3) and standard deviation for both males and females in the different age groups. Age had a statistically significant effect on the aggregated score with the 18-28 year

olds scoring significantly higher than the 62+ group ($p=0.009$), suggesting that the youngest subjects had a higher likelihood of hedonic eating than the oldest subjects in the study. Gender also had a significant effect on the aggregated hedonic eating score with an overall aggregated score of 2.62 (SD=0.81) for females and 2.48 (SD=0.79) for men ($p=0.019$). These data suggest that women have a higher prevalence of hedonic eating compared to men. There was no significant interaction between age and gender ($p=0.302$).

Figure 1

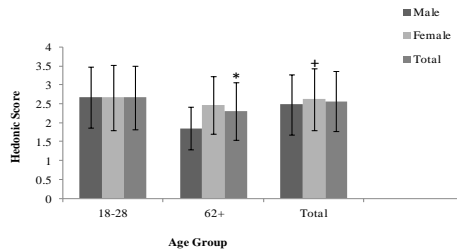


Figure 1. Means and standard deviation for the aggregated hedonic eating score (i.e. the average of Factor 1, Factor 2, and Factor 3) for males and females by age. *Significantly different from 18-28 year olds ($p=0.009$); †Significantly different from males ($p=0.019$). There was no significant interaction between age and gender ($p=0.302$).

Factor One (Food Available)

In the food-available domain, there was a statistically significant effect of age, with the 18-28 years olds scoring higher than the 62+ age group ($p=0.016$, Figure 2). Gender also had a significant effect on hedonic scores related to Factor 1, with an overall score of 2.39 (SD=0.99) for females and 2.10 (SD=0.85) for males. There was no significant interaction between age and gender ($p=0.441$). These results suggest that when food is readily available, but not physically present, younger people and women have a stronger tendency toward hedonic eating. Or, conversely, the oldest group and men are less likely to exhibit hedonic eating behaviors.

Figure 2

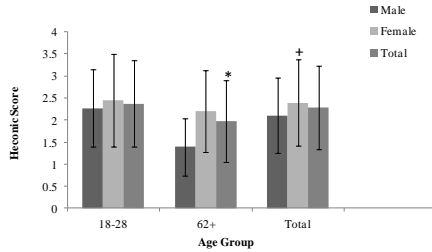


Figure 2. Means and standard deviation for the Factor 1 (food available) hedonic eating score for males and females by age. *Significantly different from 18-28 year olds ($p=0.016$); *Significantly different from males ($p=0.003$). There was no significant interaction between age and gender ($p=0.441$).

Figure 3

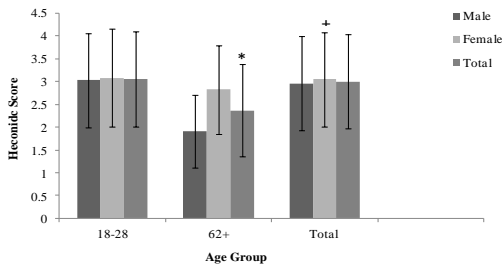


Figure 3. Means and standard deviation for the Factor 2 (food present) hedonic eating score for males and females by age. Significantly different from 18-28 year olds ($p=0.005$); *Significantly different from males ($p=0.004$). There was no significant interaction between age and gender ($p=0.124$).

Factor Two (Food Present)

Figure 3 shows the mean score and standard deviation for both males and females in their respected age group for Factor 2 (food present). Similar to the aggregated score and the scores for Factor 1, age had a statistically significant effect on Factor 2 with the 18-28 year olds scoring higher ($M=3.10$, $SD=1.05$) than the 62+ group ($M=2.40$, $SD=1.01$). These data indicate that younger people have a higher likelihood of engaging in hedonic eating when food is present but has not been tasted. Gender also had a significant effect on Factor 2 (Figure 3), with an overall mean of 3.05 ($SD=1.04$) for females and 2.81 ($SD=1.04$) for men ($p=0.004$), indicating that women have a significantly higher prevalence of hedonic eating when food is present but not tasted. There was no significant interaction between age and gender ($p=0.124$).

Figure 4

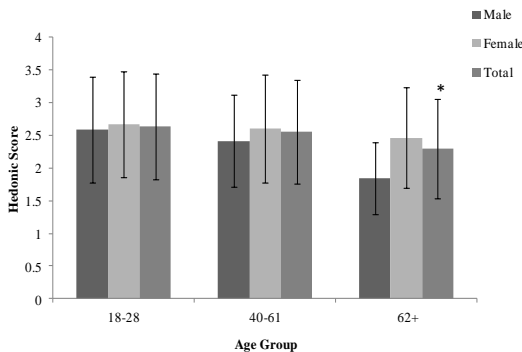


Figure 4. Mean aggregated hedonic score and standard deviation for males and females by life stage category: younger (18-39 years old), middle-aged (40-61 years), and elderly (62+ years). *Statistically different from 18-39 year olds ($p=0.007$) and 40-61 year olds ($p=0.039$). There was no significant interaction between age and gender ($p=0.124$).

Factor Three (Food Tasted)

There was no significant effect of age ($p=0.104$) or gender ($p=0.965$) with regards to the food tasted factor (data not shown).

Average of Combined Age Groups (18-39, 40-61, 62+)

To compare the impact of life stage on hedonic eating, the age groups were categorized into three life stages. Figure 4 describes the mean aggregated hedonic score and standard deviation for both males and females when grouping them into three age categories: younger (18-39 years old), middle-aged (40-61 years), and elderly (62+ years). Age had a statistically significant effect on the aggregated score with the 18-39 year olds ($M=2.64$, $SD=0.81$) as well as the 40-61 year olds ($M=2.55$, $SD=0.79$), scoring significantly higher than the 62+ group ($M=2.30$, $SD=0.76$). These data suggest that, during early and mid-adulthood, people have a higher likelihood of hedonic eating. When combining the ages there was no significant interaction between age and gender ($p=0.239$).

Discussion*Aggregated Score*

Results of the present study indicated that age had a significant effect on measures of hedonic eating, with the 18-29 year olds scoring higher than the 62+ age groups. An explanation as to why hedonic eating decreases with advanced age can be explained by the changes, both physiological and psychological, that happen as individuals age. As described by Johnson and Fischer (2004), when people age, food intake generally decreases due to physiological changes, such as a reduction in taste and smell of food, which can reduce enjoyment. Additionally, psychological changes, such as cognitive impairment, can limit the ability to shop for food as well as impact one's ability to remember when the last meal was eaten.

When comparing the aggregated hedonic score between genders, a significant difference was also found ($P=0.019$) between the mean scores of females (2.62) and males (2.48). This result differed from a study done by Lowe et al. (2009) which found no difference in hedonic eating scores between genders; however, the purpose of the Lowe et al. (2009) study was to validate the PFS as a research instrument and not to test differences between men and women. Additionally, females comprised 86% of the total respondents, compared to 63% in the current study. Stress may be one reason why females may have scored higher for hedonic eating in the present study, as it was found by Van Strien, Frijters, Bergers, and Defares (1986) that women under stress tend to eat more

calories in the form of fat than men. Foods higher in fat tend to be more palatable and thus more likely to promote hedonic hunger (Lowe & Butryn, 2007). However, stress was not measured in the present study.

Factor 1 (Food Available)

Two questions from the survey that measured Factor 1 are “I find myself thinking about food even when I’m not physically hungry,” and “It’s scary to think of the power that food has over me”; higher scores implied that the food environment increases hedonic eating.

Analysis of the food available domain indicated that both age and gender had a significant effect on hedonic hunger when food is readily available in the environment but not actually present. Again, it can be hypothesized that as individuals age normal aging processes affect feelings of hedonic hunger, as the process of aging can slowly diminish taste (Johnson & Fischer, 2004). This phenomenon helps to explain why, as people age, they would be less interested in eating even when food is readily available. Women also scored higher on Factor 1 (food available) compared to men. These findings may be explained by observations that stress can increase eating in women (Van Strien et al., 1986), and if palatable food is readily available and convenient, women may turn to food to reduce feelings of stress (Oliver, Wardle, & Gibson, 2000).

Factor 2 (Food Present)

When comparing the effects of age and gender on hedonic eating scores related to Factor 2, it was found that 18-28 year olds scored higher than the 62+ year olds and women scored higher than men. Again these significant differences in age and gender coincide with the findings of the aggregated score as well as the Factor 1 score. The effect of aging on taste can once again be used to explain why older individuals (62+ years old) would score lower in Factor 2 compared to younger individuals (18-28 years old). With regards to the effects of gender on Factor 2 scores, it can be argued that if stress increases hedonic eating in women, especially when food is physically present, females would score higher than men on Factor 2 (Wardle, Steptoe, Oliver, & Lipsey, 2000).

The “food present” domain was designed to show how an individual’s motivation to eat is changed when food is physically

present. Questions that were included on the survey for this domain were “If I see or smell food I like, I get a powerful urge to have some” and “When I know a delicious food is available, I can’t help myself from thinking about having some.” A study related to this domain was conducted by Painter, Wansink, and Hieggelke (2002) who showed that having candy visible and accessible increased its consumption by office workers. Unfortunately, the Painter et al. (2002) study did not examine differences between men and women; however, based on the results of the present study, one can hypothesize that, compared to men, women would be more likely to consume candy when visible and accessible.

Factor 3 (Food Tasted)

Factor 3 is the “food tasted” domain and is intended to show how individuals’ motivations change as they are about to eat or while they are engaging in eating food. Some questions on the PFS in the Factor 3 domain are “Just before I taste a favorite food, I feel intense anticipation” and “When I eat delicious food, I focus a lot on how good it tastes.” When analyzing the effects of age and gender on hedonic eating scores related to Factor 3, the present study found no significant differences between ages and genders, as well as no interaction between the two. Factor 3 was the only factor showing no impact of age or gender. Schultes et al. (2010) found similar results when comparing hedonic eating in obese and non-obese patients in that there were significant differences found in Factors 1 and 2, but no difference in hedonic score’s in the third domain. This similarity on Factor 3 (food tasted) was explained by the differences each individual has in taste perception. There are multiple links between taste perceptions, taste preferences, and food choices, and taste responses are influenced by a range of genetic, physiological, and metabolic variables (Drewnowski, 1997). Simply put, each individual’s “food taste” is highly varied, and these individual variations are much larger than variations between groups.

Combined Age Groups (18-39, 40-61, 62+ years old)

When combining the ages into three main groups or life stages, younger (18-28 years old), middle aged (40-61 years old), and older (62+ years old), the present study found that, again, age significantly

impacted measures of hedonic hunger with the 18-39 year olds and 40-61 year olds scoring significantly higher than the 62+ year olds. These results help support the idea that as individuals age, hedonic eating becomes less prevalent due to the processes of aging.

Limitations

A number of limitations deserve mentioning. The first is that the population sample was primarily from one area in Western Wisconsin. Therefore, it may not be possible to expand the current findings to a larger, more urban population, where there may be differences in factors such as food availability. The second limitation of this present study was the small sample size. Repeating this study utilizing a larger sample with a larger representation of each age group of differing socio-economic backgrounds would be a valuable investigation. The third limitation was that the level of activity was not taken into account as a variable that may increase or decrease hedonic eating (Stroebe, Papies, & Aarts, 2008). Additionally, it was assumed that the participants who completed the survey did so after having eaten a satisfying meal. If an individual completed the survey and was experiencing a short- or long-term calorie deficit, the results may be different than if they were satiated. Lastly, with the known effect of stress on feelings of hedonic hunger (Born et al., 2010), the present study would be stronger if stress levels were also assessed.

Conclusions

The results of the current study indicate that age and gender have a significant effect on feelings of hedonic hunger, with 18-28 year olds scoring higher than adults aged 62 and older, and women scoring significantly higher than men. When analyzing the effects of age and gender on each of the three factors that make up the PFS separately, significant differences were found in Factors 1 (food available) and 2 (food present), but not in Factor 3 (food tasted). Overall, these results suggest that as individuals age the pleasure of eating is reduced. The results also suggest that women have a higher likelihood of hedonic eating compared to men. The specific mechanisms leading to decreases in hedonic hunger with age and increases in hedonic hunger in women warrant further investigation.

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