Emotional Eating in Adults: the Role of Socio-demographics, Lifestyle Behaviors, and Self-regulation- Findings From a US National Study

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Abstract

**Background:** Emotional eating, the tendency to overeat in response to negative emotions, has often been linked to weight gain. However, scant evidence exists examining prevalence and correlates of emotional eating among large samples of adults in the United States (US). Hence, we examine the relationship between individual and socio-economic factors, health behaviors, and self-regulation to emotional eating patterns among US adults.

**Methods:** Cross-sectional analysis of 5,863 Family Health Habits Survey participants. Multivariable ordered logistic regression was employed to examine the relationship between the frequency of the desire to eat when emotionally upset (never, rarely, sometimes, often, and very often) to the independent variables.

**Results:** Analysis reveals that 20.5% of the sample tended to emotionally eat often or very often. Being female, non-Hispanic white, and of younger age were all related to a higher likelihood of emotional eating. Additionally, inability to delay gratification (impatience) was related to an 18% increased likelihood (95%CI 1.05-1.33) for emotional eating. Finally, emotional eating was significantly related to more frequent fast food consumption, and increased alcohol intake.

**Conclusions:** Program planners might need to develop targeted interventions aimed at enhancing emotional regulation skills while addressing these less healthful behaviors (e.g., fast-food intake) with the ultimate goal of obesity and chronic disease prevention.

To examine the relationship between individual and socio-economic factors, health behaviors, and self-regulation to emotional eating patterns among adults.

**Background**

Obesity is a major public health concern particularly since it leads to increased risk for premature mortality and chronic diseases, including type 2 diabetes, cardiovascular disease, hypertension, stroke, some cancers, as well as soaring health care costs. [1–4] Emotional eating, which refers to the tendency to overeat in response to negative emotions, has been studied extensively over the last decades as a risk factor for obesity and an impediment to weight loss. [5–10]

Studies have employed various research methods to demonstrate how negative emotions, including sadness, anxiety, stress, or anger, are related to the urge to overeat. For example, laboratory studies indicate that priming negative affect among obese binge eaters via exposure to a sad film, induces overeating, [11] and a meta-analysis of 36 ecological momentary field studies, [12] confirmed an increase in negative emotions prior to binge eating episodes. A seminal study by Kaplan and Kaplan focusing on the psychosomatic interpretation of obesity, posits that eating in response to negative emotions is a learned behavior which aims to diminish the negative state that one is in. [13]
Furthermore, research has found a link between emotional eating and weight gain, [14] and it has been suggested that enhancing emotional regulation skills be the focus of interventions aimed at weight loss rather than caloric restriction alone. [15] Hence, it is important to describe the prevalence of emotional eating at a national level, factors predicting it, as well as its corollaries (e.g., associated health-related behaviors), particularly since emotional eating has been linked to adverse health outcomes. [10, 16] In this study, we describe emotional eating among a large US sample of adults by individual and socio-economic factors, health behaviors (e.g., alcohol consumption, fast food intake, physical activity), and a key indicator of self-regulatory performance, namely, temporal discounting. [17] Findings help elucidate factors that are related to emotional eating, and might therefore inform future intervention programs focused on emotional regulation while eating.

**Methods**

The current study cross-sectionally examines the relationship of socio-demographic factors, lifestyle behaviors, and self-regulation (independent variables) to emotional eating (dependent variable). This is explored using the 2011 Family Health Habits Survey (FHHS) data, which is described elsewhere. [18] Briefly, households from the Nielsen/Information Resources Inc. Consumer Panel were asked to participate in an internet based survey (i.e., FHHS), which aimed to assess obesity and lifestyle behaviors in families. [18] In the present study, we utilize individual level data on 5,863 adults aged 21 years and above from the FHHS with information pertaining to the independent and dependent variables. The current study received ethics approval from the University of Haifa Institutional Review Board (IRB) as well as exempt status from the Morehouse School of Medicine IRB.

**Measures**

*Individual and Socio-Economic Variables:*

These variables consist of age (21-39, 40-49, 50-59, ≥60 years), race/ethnicity (Non-Hispanic white, Non-Hispanic black, Hispanic, other), annual household income (<$30,000, $30,000-44,999, $45,000-69,999, ≥$70,000), household size (continuous), college education (yes/no), marital status (married: yes/no), and self-reported health status (low, medium, high). In addition, Body Mass Index (BMI) was computed using the standard formula (kg/m^2) based on reported weight and height. BMI was then dichotomized into obese (BMI≥30): yes/no. [4] As in previous FHHS studies, participants’ sex was missing for a large proportion (73.9%) of participants. [19] Consequently, we utilized a multiple imputation approach to estimate the missing sex variable, [20] as done in a previous FHHS study. [19]

*Lifestyle Behaviors:* The physical activity measure is described elsewhere. [21] Briefly, this measure is adapted from the International Physical Activity Questionnaire (IPAQ), [22] where Metabolic Equivalent for Task (MET) minutes per week (min/wk) are computed based on the frequency, intensity, and duration of the activity [21]. MET min/wk were then dichotomized into meeting Health and Human Services Physical Activity guidelines (≥500 MET min/wk): yes/no. [23] Alcohol intake was based on participants reported
frequency of drinks (i.e., one beer, a glass of wine or a 2 oz. serving of spirits. Alcohol intake was
dichotomized into: (1) never or infrequent (up to 1-2 drinks a month); and (2) once a week or more. In
addition, the frequency of fast food consumption (eat-in and take out) was based on the reported times
per week frequenting these establishments. Participants were also queried regarding the frequency of
eating at sit-down restaurants. Both variables were categorized into the following 3 groups for
consistency with previous research: 0–1; 2–3; and ≥4 times a week. [19]

Self-regulation performance: We used an established proxy of self-regulatory performance, described
elsewhere—delay discounting. [17, 24] Delay discounting measures assess the ability to exert patience –
the extent to which one is willing to forego a smaller, more immediate reward for a larger, but later reward.
Thus, delay discounting measures gauge the ability to suppress present-moment impulse in the service of
valued longer-term goals with higher patience indicating higher self-regulatory performance. [25, 26] In
this study, we utilized a survey question on monetary tradeoffs related to delayed discounting.
Specifically, participants were asked whether they would prefer to receive $10 in 30 days or larger
monetary sums ($12, $15, $18) in 60 days. [19] Based on responses, we calculated delta values,
indicative of one’s ability to delay immediate gratification, using the standard exponential discount
model. [27, 28] As described elsewhere, [28] delta values, computed by dividing $10 by the lowest
monetary sum one is willing to receive in 60 days, were grouped into three categories: 1. Patience
(delta=0.83); 2. Medium patience (delta = 0.56–0.67); and 3. Impatient (delta<0.56). Whereas patience
served as the reference group, the medium patience and impatience categories referred to varying levels
of one’s (in)ability to delay gratification.

Emotional Eating: Participants were asked to state the frequency at which they feel the desire to eat when
emotionally upset or stressed. This question was adopted from the emotional eating scale of the Dutch
Eating Behavior Questionnaire (DEBQ). [29] Participants were asked to choose from the following
mutually exclusive categories: never, rarely, sometimes, often, and very often. Due to its ordinal nature,
this variable was entered into ordered logistic regression models as the dependent variable (see
Statistical Analysis).

Statistical Analysis

The relationship between socio-economic factors, self-regulation, lifestyle behaviors to emotional eating
is examined utilizing two ordered logistic regression models. The first model includes socio-economic
variables and self-regulation as independent variables and emotional eating as the dependent variable.
The second model adjusts for variables in the first model with the addition of health and lifestyle
behavior variables (e.g., obesity, physical activity, frequency of fast food consumption). In both models,
the ordered regression is indicative of the odds of reaching a higher emotional eating score versus
remaining in the same score according to the independent variables. Odds ratios (OR) and 95%
confidence intervals (CI) were computed. Stata version 15.1 (StataCorp LP, College Station, Texas) was
utilized for analyses with alpha below 0.05 regarded as statistically significant.
Results

Participants’ baseline characteristics are described in Table 1. Briefly, 59.2% of individuals were aged 50 years and older, with the largest (81.6%) racial/ethnic group being non-Hispanic white, followed by Non-Hispanic Black (7.3%), and Hispanic (5.2%). Less than half (45.6%) were college educated, and 62.7% earned an annual household salary of below $70,000. Regarding participants’ lifestyle variables, 33.6% were obese, 21.5% met physical activity guidelines, and 25.9% frequented fast food establishments twice a week or more. Moreover, 27.1% were regarded as being impatient; that is, having difficulties in delaying immediate gratification. Finally, 20.5% of participants indicated a tendency for emotional eating often or very often.

Table 2 depicts the relationship between socio-economic factors and self-regulation to emotional eating. Analysis reveals that being female, non-Hispanic white, and of younger age were all related to a higher likelihood of emotional eating. For example, non-Hispanic blacks and Hispanics were less likely (OR=0.58; 95%CI 0.48-0.70; OR=0.64; 95%CI 0.52-0.79; respectively) to report higher emotional eating rates than their non-Hispanic white counterparts. Further, having a college education was significantly associated with emotional eating (OR=1.23; 95%CI 1.12-1.36). Additionally, those who were impatient and had medium levels of patience were 19% (95%CI 1.07-1.33) and 18% (95%CI 1.05-1.33), respectively, more likely to have higher emotional eating scores. Marital status and annual household income, however, were not significantly related to emotional eating.

Furthermore, Figure 1 presents the association between lifestyle behavior variables and emotional eating while adjusting for co-variables. Analysis reveals that higher alcohol intake, more frequent fast food consumption, and obesity are each significantly related to emotional eating. For example, those frequenting fast food establishments 2-3 times a week were ~24% (95%CI 1.10-1.40) more likely to have a higher emotional eating score in comparison to fast food consumption of 0-1 times weekly (reference group). Full-service restaurant consumption and physical activity as well as self-rated health were not related to emotional eating.

Discussion

Emotional eating, the tendency to eat in excess when experiencing negative emotions, is a major public health concern, particularly since it is related to weight gain and thus obesity risk. [14] Emotional eating also hinders weight loss and weight maintenance. [5–10] Indeed, obesity is a risk factor for premature mortality and increased risk for chronic diseases (e.g., type 2 diabetes and hypertension). [4] Thus, in the current endeavor, we seek to describe rates of emotional eating among a national sample of adults, while illuminating potential contributing factors to this phenomenon. Findings suggest that approximately one fifth of adults reported a tendency for emotional eating often or very often, thereby potentially contributing to the obesity epidemic in the US. [1, 15] Thus, there is a need not only to describe emotional eating at the national level, but also to explore predictive factors.
Hence, beyond describing prevalence rates, the present study explores socio-demographic factors related to emotional eating. Specifically, multivariable analysis indicates that younger adults (21-39 years old) were markedly more likely to be emotional eaters. One possible explanation for this finding is that older adults might have a tendency to adhere to routine meal plans (i.e., breakfast, lunch, dinner), which facilitates meal planning and enhances eating self-efficacy in social situations (e.g., when tempting food is in front of them). Moreover, eating disorders (which are associated with high rates of emotional eating) are more prevalent among younger rather than older adults. [31]

Notably, Non-Hispanic blacks and Hispanics reported lower emotional-eating rates than their non-Hispanic, white counterparts did. These findings are supported by research suggesting that despite a high prevalence of obesity among African Americans and Hispanics,[32] the prevalence of disordered eating behaviors (e.g., emotional eating) among these minority groups is relatively low.[33–35] It may be that other factors besides emotional eating (e.g., abundance of energy dense foods, less physical activity) accelerate weight gain among African Americans and Hispanics. [36]

In addition, we examined the relationship between emotional eating and lifestyle behaviors, such as alcohol intake, fast food consumption, and physical activity. Study findings indicate that unhealthy lifestyle behaviors (e.g., fast food consumption) are related to emotional eating while more healthful behaviors (e.g., physical activity) are not. Prior evidence suggests that low distress tolerance (inability to cope with negative emotions) is related to both alcohol consumption and emotional eating [37]. Moreover, the link found between fast food and emotional eating is consistent with previous studies showing that emotional eaters often have a preference for energy dense foods with abundant saturated fat. [38, 39] With regard to physical activity, our findings corroborate a study by Koenders among 1,562 US adults observing no significant association between emotional eating and exercise. [14] Thus, while emotional eating and lack of insufficient physical activity are each related to weight gain and maintenance, [10, 40] they appear not to be directly linked to each other.

Furthermore, current study findings underscore the independent and significant relationship between patience time preferences and emotional eating. That is, those who had difficulties delaying immediate gratification for a larger delayed reward were markedly more likely to eat when emotional than their more patient counterparts were. This finding is consistent with psychological research linking emotional eating behaviors to impulsiveness and self-control. [41, 42] These studies, however, measured self-control via a self-report instrument asking participants to rate their ability to resist temptation, [43] which might be influenced by conscious or unconscious factors to reinforce self-image.[26] While this approach is widely accepted, eliciting self-control through assigning an objective task, such as in psychological experiments (e.g., crossing out the letter ‘e’ in a text), [44] or multiple list price methodology (in economics) will likely yield a more valid assessment. [45] Hence, in the present study, we utilize the latter approach (i.e., multiple price list methodology) which provides a more robust assessment of self-regulation. [46]

The current study has several limitations that should be noted. Its design is cross-sectional, therefore a temporal (and subsequent causal) relationship between the independent variables (e.g., lifestyle
behaviors) and dependent variable (emotional eating) cannot be substantiated. Thus, subsequent longitudinal research is needed to establish a cause-effect relationship. Moreover, emotional eating was determined via a single survey item revealing one’s propensity to feel the desire to eat when upset or stressed. While it might have been preferable to utilize the complete 13 item emotional-eating subscale of the Dutch Eating Behavior Questionnaire, [29] this information was not available in the dataset. In addition, the sex variable was missing for a large proportion of the sample; thus, we utilized a multiple-imputation approach in an attempt to address this limitation. Finally, the data were derived from a US survey which is not nationally representative, and the racial/ethnic minority composition in this sample is lower than in the US population at large.

Nonetheless, the current study significantly contributes to the literature by determining the prevalence of emotional eating among a national sample of US adults and examining predictive factors of this behavior. Findings reveal that approximately one fifth of US adults report emotional eating behavior often or very often, and it is more common among younger adults, non-Hispanic whites, those with a college degree, and with difficulty delaying immediate gratification. Furthermore, an emotional eater might have an increased tendency for obesity, to consume alcohol more frequently, and to eat at fast food establishments more often. Future longitudinal research among large samples is clearly warranted to determine cause-effect relationships. Moreover, since emotional eating is related to obesity and other unhealthy behaviors, program planners might need to develop targeted interventions aimed at addressing these maladaptive health behaviors (e.g., fast food intake) alongside improving emotional regulation skills with the ultimate goal of obesity prevention and chronic disease prevention.

**Abbreviations**

IPAQ: International Physical Activity Questionnaire

MET: Metabolic Equivalent for Task

Min/wk: minutes per week

BMI: Body Mass Index

FHHS: Family Health Habits Survey

OR: Odds ratio

CI: Confidence Interval

**Declarations**

*Ethics, consent and permissions*: The current study received ethics approval from the University of Haifa Institutional Review Board and exempt status from the Morehouse School of Medicine IRB.
**Consent for publications**: Not applicable.

**Availability of data and materials**: The data used for this study are not publicly available. For data requests, please contact the Nielsen Consumer Panel.

**Competing interests**: The Authors declare that there are no competing interests.

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**Authors' contributions**: REB and KS led the writing, conceived and designed the study, contributed to the analytic approach, as well as interpretation of the study findings. QL contributed to the analytic approach and led the statistical analyses. QL, RO, JD, ALY, BMF, MH participated in the study design, interpretation of results, as well as critical revisions of the manuscript drafts.

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Tables

Table 1. Baseline social demographic, lifestyle behaviors, and self-regulation characteristics of study participants. a,b
| Characteristic                  | n   | Percentage* |
|-------------------------------|-----|-------------|
| **Age (years)**               |     |             |
| 21-39                         | 786 | 13.41%      |
| 40-49                         | 1605| 27.38%      |
| 50-59                         | 1796| 30.63%      |
| 60+                           | 1676| 28.59%      |
| **Sex**                       |     |             |
| Male                          | 454 | 29.67%      |
| Female                        | 1076| 70.33%      |
| **Race and ethnicity**        |     |             |
| Non-Hispanic White            | 4785| 81.61%      |
| Non-Hispanic Black            | 426 | 7.27%       |
| Hispanic                      | 308 | 5.25%       |
| Other                         | 344 | 5.87%       |
| **Annual household income**   |     |             |
| <$30,000                      | 1087| 18.54%      |
| $30,000-44,999                | 1030| 17.57%      |
| $45,000-69,999                | 1559| 26.59%      |
| ≥$70,000                      | 2187| 37.30%      |
| **Married**                   |     |             |
| No                            | 4113| 70.15%      |
| Yes                           | 1750| 29.85%      |
| **College Graduate**          |     |             |
| No                            | 3187| 54.36%      |
| Yes                           | 2676| 45.64%      |
| **Household Size- Mean (SD)** | 5863| 2.84 (1.43) |
| **Self-rated Health**         |     |             |
| Low                           | 331 | 5.65%       |
| Medium                        | 1356| 23.13%      |
| Category                  | Count | Percentage |
|--------------------------|-------|------------|
| High                     | 4176  | 71.23%     |
| **Self-Regulation**      |       |            |
| Patience                 | 2434  | 41.52%     |
| Medium patience          | 1837  | 31.33%     |
| Impatience               | 1592  | 27.15%     |
| **Obese**                |       |            |
| No                       | 3892  | 66.38%     |
| Yes                      | 1971  | 33.62%     |
| **Meeting PA Guidelines**|       |            |
| No                       | 4603  | 78.51%     |
| Yes                      | 1260  | 21.49%     |
| **Alcohol consumption**  |       |            |
| Never or infrequently    | 1617  | 27.58%     |
| Once a week or more      | 4246  | 72.42%     |
| **Fast food restaurants**|       |            |
| 0-1 times/wk             | 4344  | 74.09%     |
| 2-3 times/wk             | 1240  | 21.15%     |
| ≥ 4 times per wk         | 279   | 4.76%      |
| **Full-service Restaurants** |   |            |
| 0-1 times/wk             | 4171  | 71.14%     |
| 2-3 times/wk             | 1332  | 22.72%     |
| ≥ 4 times per wk         | 360   | 6.14%      |
| **Emotional Eating**     |       |            |
| Never                    | 1047  | 17.86%     |
| Rarely                   | 1744  | 29.75%     |
| Sometimes                | 1868  | 31.86%     |
| Often                    | 680   | 11.60%     |
| Very often               | 524   | 8.94%      |

* If the percentage does not equal 100.0% this is due to rounding.
aThe sex variable is multiply imputed due to missing data; b PA=Physical activity. Meeting PA Guidelines here refers to meeting reaching 500 MET minutes per week or more to meet the requirements of Health and Human Services Physical Activity Guidelines for Americans.

Table 2. Socio-Economic Variables, Self-Regulation, and Emotional Eatinga: Ordered Logistic Regression
| VARIABLES          | Odds Ratio | 95% Confidence Interval |
|--------------------|------------|-------------------------|
| **Age**            |            |                         |
| 21-29 years (reference) | 0.83*      | 0.71 - 0.97             |
| 40-49 years        |            |                         |
| 50-59 years        | 0.71**     | 0.61 - 0.83             |
| 60+ years          | 0.52**     | 0.44 - 0.62             |
| **Sex**            |            |                         |
| Female (reference) |            |                         |
| Male               | 0.80**     | 0.68 - 0.95             |
| **Race/ethnicity** |            |                         |
| Non-Hispanic white (reference) |        |                         |
| Non-Hispanic Black | 0.58**     | 0.48 - 0.70             |
| Hispanic           | 0.64**     | 0.52 - 0.79             |
| Other              | 0.61**     | 0.50 - 0.74             |
| **Annual Household Income** |        |                         |
| <$30,000 (reference) |            |                         |
| $30,000-44,999      | 1.02       | 0.87 - 1.19             |
| $45,000-69,999      | 1.15       | 0.99 - 1.33             |
| ≥$70,000            | 1.08       | 0.93 - 1.25             |
| **Married**        |            |                         |
| No (reference)      |            |                         |
| Yes                | 0.99       | 0.87 - 1.12             |
| **College Educated** |            |                         |
| No (reference)      |            |                         |
| Yes                | 1.23**     | 1.12 - 1.36             |
| **Self-Regulation** |            |                         |
| Patience (reference) |            |                         |
| Medium Patience     | 1.19**     | 1.07-1.33               |
| Impatience          | 1.18**     | 1.05-1.33               |
**p<0.01, *p<0.05

Emotional eating is based on a survey item pertaining to the desire to eat when emotionally upset or stressed.

**Figures**

![Figure 1](image)

Self-rated Health, Obesity, Lifestyle Behaviors, and Emotional Eating: Ordered Logistic Regression

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The circle represents the point estimate (Odds Ratio), and the range bar represents the 95% confidence interval.
interval. When the range bar (horizontal line) crosses the vertical line ('line of no effect') the relationship is not statistically significant; b The multivariable model adjusts for age, sex, race/ethnicity, marital status, annual household income, education, household size, and self-regulation.