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The effects of immigrant and non-immigrant status on binge eating disorder characteristics

By

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Master of Public Health

Epidemiology

_____

Thesis Committee Chair: David G. Kleinbaum, PhD

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Abstract

The effects of immigrant and non-immigrant status on binge eating disorder characteristics

By: Millicent E. Nwankwo

Background:

Little population-based data exist in the United Sates on the epidemiology of racial/ethnic influences on the development of binge eating disorder. Cross-national data on BED are presented and compared among period prevalence and lifetime prevalence groups using the Collaborative Psychiatric Epidemiology Surveys.

Methods:

Cross-sectional survey data generated from the 2001-2003 Collaborative Psychiatric Epidemiology Surveys (CPES) were used in this study. CPES contains three national representative surveys: the National Comorbidity Survey Replication (NCS-R), the National Survey of American Life (NSAL), and the National Latino Asian American Study (NLAAS). The survey population includes all United Sates adults who are 18 years of age and older residing in housing located in one of the 48 contiguous states.

Results:

Racial/Ethnic-specific prevalence estimates are consistently higher within 12-Month and Lifetime BED groups. Crude estimates show Hispanic/Latin-American survey respondents as having a higher odds of endorsing 12-Month (OR: 1.85, 95%CI: 1.06 – 3.24) binge eating disorder compared to Caucasians. Additionally, adjusted estimate reports reveal a decreased odds of both 12-Month and Lifetime BED when assessing the effect of immigration status on the racial/ethnic category called “other”.

Conclusion:

BED represents a public health problem greater than other eating disorders such as Anorexia and Bulimia Nervosa, with slight differences among persons of different cultural/racial groups. New and updated DSM-V BED guidelines exist that can guide research and highlight the clinical importance of diagnosing and treating patients with BED and other health problems.

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Background and Literature Review

Eating disorders are psychiatric syndromes characterized by aberrant behaviors including binge eating, unhealthy dietary restriction or fasting, or compensatory behaviors such as self-induced vomiting, misuse of laxatives and exercise (14). Full syndromes eating disorders are sometimes rare; however, the behaviors that characterize eating disorders and the cognitive correlates such as preoccupation with shape, weight, and body are highly prevalent in young women between ages 12 and 35 (14). Eating disorders typically develop early in teen years, but sometimes may not be noticed until later in adulthood. In addition, research reports that there are strong associations of psychiatric conditions, role impairment, substance abuse, and suicidality among persons with eating disorders (2). In just the United States alone, approximately 20 million women and 10 million men suffer from a clinically significant eating disorder at some point in their life (14). In addition, eating disorders have the highest mortality rate of all mental illnesses. The main types of eating disorders include anorexia nervosa, bulimia nervosa, binge eating disorder, or an eating disorder not otherwise specified. Primary treatments for eating disorders involve psychotherapy, nutrition and physical activity education, family counseling, medication use, and hospitalization. For various reasons, many cases are not likely to be reported.

The exact cause of many eating disorders is largely unknown. It is likely that the presence of one or more of the following factors increases the risk of developing an eating disorder: cultural, biologic (genetics), stressful life events and changes, psychological, family, life changes, personality/behaviors, and interpersonal conditions (14). For example, studies have indicated that four out of five women are dissatisfied with their appearance.

The American culture's emphasis on thinness and/or muscularity can lead to body dissatisfaction among individuals with low-self-esteem. Young men and women are constantly bombarded with media images of people who display the so-called "perfect body image" and thus place more value on physical appearance than inner qualities and strengths. Whether obtaining these physical characteristics is idealistic or not, the means at which eating disorder victims go about doing this is very risky. A lot of individuals engaged in appearance-oriented professions and activities such as models, actors, gymnasts, wrestlers, and etc. are especially vulnerable to developing eating disorders while dealing with daily cultural presses. Eating disorders also have a high chance of occurring in individuals who have a history of being teased or ridiculed based on weight, and in those who have a history of physical and sexual abuse. Parents attitudes on appearance brought about by racial, ethnic, and, cultural backgrounds (possibly discrimination and prejudices) can cause stress upon their children, thus influencing the development of eating disorders as well. Women with bulimia tend to have a higher incident of sexual abuse. People with bulimia in general are more like than average to have parents with a substance abuse or psychological disorder. Research strongly supports the correlation of pre-existing psychological disorders such as anxiety, depression, anger, loneliness. Scientists are also exploring the biological bases and biochemical processes behind most eating disorders. In some individuals with eating disorders, certain chemicals of the brain that control hunger, appetite, and digestion are said to be imbalanced. However, the exact meaning and implications behind these results are still under investigation. Eating disorders often run in families as well. There is current research that indicates significant genetic contributions to eating disorders. In conclusion, eating disorders are more than just a food and weight

problem. The food intake and weight control mechanisms resulting from eating disorders are brought about by these potential varying causes listed earlier, that help individuals cope with daily pressures and feel in control of their lives. Although once begun, eating disorders can lead to a self-perpetuating cycle of physical and emotional destruction

Anorexia Nervosa

A person with Anorexia Nervosa has an intense fear of gaining weight and often undergoes self-imposed starvation as a way of coping with their symptoms. Although a person with this condition may be thinly shaped and have a low body weight, they still tend to think of themselves as overweight and are unwilling to maintain a normal or healthy weight. Many individuals who are anorexic severely restrict the amount of the food they consume while also engaging unhealthy levels of intense physical exercise. They may also attempt to control their calorie intake through the misuse of laxatives, diet aids, diuretics, or enema. Anorexia Nervosa is diagnosed when patients weight at least fifteen percent less than their normal healthy body weight expected for their height.

People with Anorexia may develop accompanying psychiatric and physical illnesses including depression, obsessive compulsive disorder, anxiety, problems with physical development, and neurological/cardiovascular issues (8). If left untreated, Anorexia can cause serious medical problems and even lead to death. Studies show that one in every five people who have died from anorexia have committed suicide, while other common causes of death are alcohol and starvation (13). As a result of engaging in these unhealthy behaviors among, many female anorexics experience hormonal issues such as decreased menstruation patterns (sometimes even missing periods three times in a row) and troubles getting pregnant (13). If pregnant, older women become at a higher risk

for miscarriages, having a C-section, a baby with low birth weight, and/or post-partum depression. It is also not uncommon for anorexics to feel lethargic, mild anemia, muscle weakness, and bone thinning due to loss of calcium. Being that their bodies are not getting the amount of food they needs, it slows down making it difficult for them to perform simple daily tasks (13). The most common forms of treatments for patients with Anorexia involve regular visits to both a health care professional (doctor or nurse) and mental health professional (psychologist or licensed counselor). Cognitive behavior therapy is considered to be the gold standard for treating these individuals (9). At the core of Anorexia Nervosa is negative thinking and distortion of one's self-image. Consistent therapy which addresses these underlying emotional and mental issues, as well as nutritional counseling, can lead to these individuals taking charge of their weight, perspective, and overall lifestyle in a healthy way.

Bulimia Nervosa

Bulimia Nervosa is condition of bingeing and compensatory behaviors such as self-induced vomiting designed to undo or compensate for the effects of binge eating. In other words, a person with Bulimia eats a lot of food that is high in calories, fats, sugars, and carbohydrates, in a short amount of time (binging), and then tries to prevent weight gain by getting rid of the food (purging) (13). Unlike anorexia, people with bulimia typically fall within the normal weight in proportion to their age and height. But similar to people with anorexia they have an intense fear of gaining weight, desperately want to lose weight, and are very unhappy with their body shape and size. It presently affects one to two percent of adolescent and women and is common in more than 80% of females (13). Usually, bulimic behavior is usually done discreetly because it causes the person to

disgust and shame. The binge eating and purging cycles can occur anywhere from several times a week to multiple times a day. However, bulimia is more than just a problem with food and eating. A binge can be triggered by dieting, stress or uncomfortable emotions such as anger and sadness (8). Purging and other methods of preventative weight gain (diet pills, laxatives, etc.) are ways for bulimics to feel more in control of their lives as well as ease stress and anxiety (8). Contrary to the popular belief, purging and other supplements do not effectively reduce weight in bulimic patients. At most, 50% of calories stored within the body after consumption of foods are removed by way of vomiting while less than 10% by way of laxatives and diuretic pills (13).

A person with bulimia may be thin, normal, or overweight. They are usually aware that their behaviors are abnormal, however, feel lack of control over their situation and continue to put their lives at risk. Therefore, it is important to be cognizant of the signs and symptoms accompanied with bulimia nervosa disorder because the chance of recovery increases with early detection. Bulimia Nervosa can be extremely detrimental to the body. The frequently occurring binge and purge cycles can damage the entire digestive system, and purging behaviors can lead to electrolyte and chemical imbalances in the body affecting the heart and other major organs (13). Acid from vomiting can causes tooth decay, gum disease, and wearing of the enamel. Any type of purging can cause bone thinning, kidney failure, irregular heartbeats, and even death. Other medical complications that can occur are severe dehydration due to low potassium and sodium levels, swelling of salivary glands, and abnormal bowel functioning (13).

Binge Eating Disorder

Binge Eating Disorder (BED) is a relatively recently recognized disorder, and sometimes referred to as compulsive overeating disorder. Some researchers believe it is the most common eating disorder affecting millions of Americans; however, to date, little research has been reported surrounding the prevalence and classification of binge eating disorder (BED) in the U.S. and worldwide. Previous studies undergone by researchers Hudson and Kessler cite the prevalence of BED to be approximately 1.2% for the overall U.S. population according to DSM-IV criteria. About one in five people binge eat (11). They also found respective lifetime prevalence estimates of 3.5% proving that BED is the most commonly occurring eating disorder among women and men (11). DSM-IV Binge Eating disorder is currently classified as Eating Disorder not otherwise specified (EDNOS) where patients are said undergo recurrent episodes of binge eating in the absence of regular compensatory behaviors, as well as experience a sense of loss of control over the large amounts of food consumed in that time period (6). People with this disorder typically overeat or "binge" to comfort themselves, to avoid uncomfortable situations, or to numb their feelings. According to DSM-IV specifications, those with binge eating disorder do so at least twice a week for approximately three to six months (6). A binge eating episode can range from two hours, but some people binge eat off and on all day long. A binge can widely vary in the amount of food consumed. Binge eaters often eat when they are not hungry and continue until they are completely full. Their compulsive eating behaviors cause them to feel distress, guilt, and embarrassment. They feel as they want to stop, but cannot or don't how to which sometimes leads to depression for most. Many are so good at concealing their binge eating habits that friends and even close family members are unaware they suffer from the disorder. Binge eating ends up

turning into a viscous cycle of eating to feel better, feeling worse as a result, and then turning back to food as for relief. Unlike those with bulimia and anorexia nervosa, they do not attempt to compensate for their overeating by vomiting, fasting, exercising, or abusing laxatives and/or other forms of pills (13). As a result, people with binge eating disorder are often obese and overweight. The typical age of onset is during adolescence or young adults; however most patients don't present symptoms until middle adulthood. Although women are more likely than men to have eating disorders overall, when it comes to binge eating disorder the prevalence amongst both gender groups is relatively the same if not, slightly different. (3.5% for women and 2.0% for men) (11). In addition, 30% to 40% of individuals seeking weight loss treatments or control programs have an increased likelihood of being clinically diagnosed with binge eating disorder at some point within their lifetime (13).

Approximately 70-80% individuals with BED recover over time, while those with fewer interpersonal problems achieve recovery at a faster rate (13). People who are obese and have binge eating disorder are at a much greater risk for suffering from numerous life threatening complications including: type 2 diabetes, heart disease, anxiety, depression, certain cancers, gastrointestinal problems, join and muscle problems, plus many others. Currently, most healthcare professionals apply psychological methods such as cognitive based therapies to treat their patients which unfortunately do not contribute to actual weight reduction (14). Alternatively, patients are also treated with anti-depression, anti-anxiety, and anti-obesity medications. Studies show other drug therapies such as toprimate and anti-obesity medication may aid weight loss in overweight and obese patients with BED (14).

As noted previously, binge eating disorder can be influenced by cultural factors. Studies cite the importance of more research assessing risk factors of mental disorders and other issues among diverse and even, international populations (7). There are few articles on epidemiological studies where ethnicity is even a central consideration (7). To confirm this previous indication by another author, we searched reputable public literature databases with the terms “binge eating disorder” and “immigrants” and no articles appeared. That being said, only a few showed up when typing “binge eating disorder” with another racial category such as Latino, African-American, etc. The need for treatment (perhaps even person or group-specific) of binge eating disorder is clear, especially when it comes to underserved populations who may lack access to necessary healthcare resources. Therefore, it is important in this original study that we address the role of cultural diversity at the forefront of binge eating disorder so as to give a clearer direction for future studies on how to provide the best recommendation for intervention.

Specific Study Objectives

1) Primary Objective: To assess the extent to which there is an association between Immigration Status (persons born Outside of the United States) and DSM-IV binge eating disorder

2) Secondary Objectives: To describe socio-demographic characteristics and other factors (i.e. prescription medication use) that are associated with DSM-IV binge eating disorder

Methods

Study Population

Our study focuses on individuals from a 2001 – 2003 cross-sectional Collaborative Psychiatric Epidemiology Surveys (described more below). Study subjects included 15,337 survey participants, 149 of whom reported (i.e. "endorsed") symptoms of BED in a 12-month period and 15,188 of whom reported no BED in a 12-month period. Similarly, of the 15,337 survey participants in our study, 286 reported (i.e. "endorsed") symptoms of BED and 15,051 whom reported no BED in their lifetime. The term "symptomatic" and "endorsed" in this study is defined as those subjects who reported at least three or more related characteristics of binge eating disorder according to DSM-IV guidelines (Table 1, Appendix II).

Study Design

Cross-sectional survey data from the 2001 -2003 Collaborative Psychiatric Epidemiology Surveys (CPES) will be used in this research study to perform further statistical analyses that will provide insight into the research objectives and questions stated above. The CEPS is modeled after the World Health Organization's (WHO) Composite International Diagnostic Interview (CIDI) which was developed for the World Mental Health Survey Initiative (WHM-CIDI) back in 2004. With support from the National Institute of Mental Health (NIMH), the CEPS was implemented to gather comprehensive epidemiological information regarding the distribution, risk factors, and correlations of mental health disorders among the general population with a special emphasis on minority groups. The main goal was to provide data related to the

prevalence of mental disorders, impairments associated with these disorders, and treatment-seeking patterns comparing majority and minority populations. In addition, insight into the relationship between mental health disorders and social cultural issues was also an important topic of interest. CPES consists of three nationally representative surveys: the National Comorbidity Survey Replication (NCS-R), the National Survey of American Life (NSAL), and the National Latino Asian American Study (NLAAS). Collectively, these three studies provide the first national data with sufficient power capable of investigating the cultural and ethnic influences on mental disorders. Additional information on the three surveys can be found in Figure I of Appendix II.

The organizational structure of the CPES (including the NCS-R, NSAL, NLAAS) field and data collection staff) were divided into three or four teams with approximately 6 to 12 interviewers in each team. Those three to four teams were considered to be a "workgroup", and supported by a team leader coordinator. A regional field manager was then assigned to each workgroup to encourage production efforts, quality control, and personnel management. Efforts were made to assign interviewers to teams prior to training, as well as keep those originating from the same region together throughout the whole process. In total, 946 interviewers were trained for the CPES project: 342 interviewer for NCS-R, 329 interviewer for NSAL, and 25 interviewers for NLAAS. Study-specific training lasted five to seven days for most interviewers. In addition, interviewers underwent training in sensitivity to cultural, racial, and socioeconomic diversity that would be encountered during face to face interviews with participants.

The NIMH-CPES survey data collections were based complex survey design involving a multi-area probability sample encompassing the 252 geographic regions or

primary sampling units in the United States. The three individual studies contain unique features designed to optimize the cost and error-specific properties of the control. The selection of a probability sample of respondents for each study's interview involved a four-step sampling process – a primary stage sampling of the U.S. Metropolitan Statistical Areas (MSAs) and counties, followed by a secondary stage sampling of area segments, a third stage sampling of housing units within selected area segments, and concluding with a random selection of eligible respondents form the sample housing units. The general CPES (the NCS-R, NSAL, and NLAAS) survey population includes all United States adults who are 18 years of age and older residing in housing located in one of the 48 contiguous states. Individuals who fell into the category of institutionalized were excluded from each individual study; these included persons who were in prison, jail, nursing homes, and/or long-term medical or dependent care facilities. Military personnel living in civilian housing were also eligible for the study; however, residents of housing located on a military base or reservation were excluded. Lastly, only individuals who were able to complete the interview in English were allowed to complete the surveys. Some survey questions were considered "core" to the CPES and therefore asked in all three studies.

The NCS-R is a four-stage probability sample of the United States modeled after the original 1992 NCS (NCS-1) survey carried out a decade prior. This NCS-R repeats many of the questions from the NCS-1 while also expands the questioning to include assessments based on the diagnostic criteria of the American Psychiatric Association as reported in the Diagnostic and Statistical Manual – IV (DSM – IV). In addition, the NCS-R investigates time trends and their correlates over the decade of the 1990s. For the

NCS-R, 10,622 addresses yield eligible households out of the households 13,054 screened. In the end, 9,282 adult interviews were completed: 7,693 interviews with the main respondent (70.9% final weighted response rate) and 1,589 interviews with a second adult in the household (80.4% final weighted response rate).

The NSAL is a study designed to investigate racial and ethnic differences in mental disorders, psychological distress, and informal and formal service use with a focus on the risk and protective factors in the African-American and Afro-Caribbean populations of the United States as compared with the white respondents living in the similar conditions.. The African-American population included only black adults who did not have ancestral ties in the Caribbean. The Afro-Caribbean survey population was restricted to black adults who self-identified as being only of Caribbean ancestry. The white survey population included all Caucasian adults except persons who self-reported being of Hispanic descent. Contrary to the relatively high sample yield of the NCS-R survey, only 11,634 eligible households in the NSAL were identified out of the 26,495 randomly sampled addresses. A total of 6,199 adult respondents were interviewed for the NSAL study (1,006 white respondents, 1,623 respondents of Caribbean descent, 3,570 African American respondents). The overall response rate for the NSAL core yielded a response rate of 71.9%, while the Caribbean supplement sample yielded a weighted response rate of 74.9%.

The National Latino and Asian American Study (NLAAS) is a nationally representative community household survey that estimates the prevalence of mental disorders and rates of mental health service utilization by Latino and Asian Americans in the United States. The main goals of the NLAAS consisted of the three parts. First, to

describe the lifetime and 12-month prevalence of psychiatric disorders and rates of mental health services use for Latino and Asian American populations using nationwide representative sample groups. The second, to assess the associations among social position, environmental context and psychosocial factors with the prevalence of psychiatric disorders and utilization rates of mental health services. The third and last goal was to compare the lifetime and 12-month prevalence of psychiatric disorders, utilization of mental health services of Latinos and Asian Americans with national representative samples of non-Latino whites (extracted from the NCS-R) and African-Americans (extracted from the NSAL)

Measures

Study Variables of Interest, Outcomes, Data Coding/Recoding for Analysis

- The CPES Diagnostic Questionnaire Sections were administered after the core screening section and household listing sections. The Eating Disorders module, included in all three studies, was used assess the number of participants who met *a priori* defined criteria for symptoms associated with 12-month (V07552) and lifetime (V07480) DSM-IV BED w/ hierarchy, and those who did not. Both variables initially coded endorsed/not endorsed, were then recoded to yes/no so that they could serve as our main outcomes of interest (or dependent variables) in this study analysis. In the original un-recoded survey questionnaire, respondents had to answer yes to a number of common characteristics exhibited by individuals with DSM-IV BED in order to be categorized in either of the designated groups mentioned earlier (Table 1, Appendix II).

- The main independent variable of interest asked participants of the survey the country in which they were born (V05577). For our purposes, it was only essential to know whether respondents were born in the United States or outside of the U.S. It was our intention to collapse the initial multi-level variable listing all international countries into a binary variable in the format mentioned earlier, and rename it "Immigrants".
- Demographic covariates including age (V07306), race (Rancest), sex (V09036), bmi (V00823), and region (V08992) are recognized confounders in binge eating disorder studies and will be assessed and controlled for in the logistic regression (multivariate) models as well was the descriptive analyses. Race is currently categorized as: White, Black, and Other; however for our analyses we chose to expand the "Other" category to distinctly represent other racial groups. The recreated categories were as follows: Caucasian, African-American, Hispanic/Latin-American, Asian-American, and Other (for racial groups that did not fit into the categories mentioned earlier). In addition, five age categories were created which correspond to the age groups of prevalence of DSM-IV BED.
- Clinical variables questioning whether participants ever abused prescription medicine (V03332) and whether they felt sad, empty, or depressed about life for several days (V00829) were used in this study to detect possible influences by the exposure variable. Both variables were renamed to "preabuse" and "depressed", respectively, in this study.

Statistical Analysis

The primary analysis aimed to determine the overall and immigration status-specific prevalence and odds of 12-month and lifetime DSM-V binge eating disorder. Descriptive statistics were computed for the following categorical variables: citizenship outside of the United States, age, race, sex, bmi, geographic location, and prescription abuse. Other exploratory analyses (normal probability plot, boxplots, Kolmogorov-Smirnov test) were performed on the continuous variable age at which drinking alcohol first began so as to assess normality, potential outliers, and the need for potential transformation. Unweighted and weighted frequencies and percentages were calculated for all categorical variables while means, standard deviations, skewness and kurtosis were calculated for all continuous variables.

Before performing multivariate regression, multi-collinearity among all independent variables, and interaction terms, was tested. Variables with conditional indices greater than 30 and corresponding variance decompositions (vdp's) greater than 0.5 were considered to be collinear with another variable. If one or more variables were identified as problematic in collinearity analysis, one was removed and collinearity analysis was performed again, until there were no indications of problematic multicollinearity. As a result the model becomes a "revised" initial model from which we determine a final "best" model using the hierarchical backwards elimination strategy (as in K&K's logistic regression text).

Crude/unadjusted odds ratios (cOR) for all independent variables were computed for all levels of independent variables using PROC SURVEYLOGISTIC in SAS. The reason for considering crude analyses for independent variables other than the exposure variable (Immigration Status) was to verify whether these variables were observed to be

risk factors from the actual data being analyzed. Multivariate logistic regression was performed as well to measure the associations between both 12-month and lifetime DSM-IV binge eating disorder and the main independent variable “immigration status”, while controlling for all other covariates (demographic and substance use). For the outcomes of interest – DSM-IV 12-Month and Lifetime BED, adjusted odds ratios (aOR) estimates and 95% Wald Confidence intervals were obtained using the PROC SURVEYLOGISTIC procedure in SAS. According to CPES Weighting Guidelines, when the sample size is below 200 then study populations can be treated as a simple random sample and apply normal logistic methods. Thus, pre-constructed CPES weights would not have to be applied and variance will not be affected significantly. However, being that study design was generated from complex surveys using multi-area probability samples, it was in our best interest to apply survey logistic methods to our analyses. CPES weights were applied when necessary as the sample size did not meet conditions needed to be excluded from weighting. Decisions about variable removal were based upon a combination of a priori knowledge and bivariate analysis. Multivariate logistic regressions was preformed to measure associations between binge eating disorder and the main independent variable “immigration status” while controlling for all other covariates including interaction terms. Overall chunk tests were performed between the full (including interactions terms) and reduced models (excluding interaction terms), to view if the presence of interaction terms significantly increased the fit of each model. Difference models were compared using likelihood ratio tests. Backward elimination was performed to determine which interaction terms, when removed, did not significant detract from the models fit. Models derived from the assessment of interaction were considered gold standard models and

referred to as full models in the Results section of the thesis. Following assessment of interaction, covariates were eliminated based upon the following criteria: 1) When removing the covariate from the model, the main independent variable's odds ratio did not change more than 10% of that in the gold standard model; 2) And, ideally, the main independent variable's measured effect did not lose more than 10% precision according to the odds ratio's confidence interval. The models derived from assessment of confounding are referred to as final models in the Results section of this thesis.

All statistical analyses including descriptive and inferential procedures were conducted using SAS 9.4 Software (SAS Institute Inc., Cary, NC, USA). The alpha level of statistical significance was set a priori at $p < 0.05$. The study was exempted from review by Emory Institutional review board.

Results

Outcomes, Immigration Status, Demographic Characteristics, Confounders

A total of 20,013 participants who completed the NIMH-CPES questionnaires were initially intended for use in this study. Out of the 20,013 respondents only 15,337 valid case participants were able to be used in this study. Other cases were eliminated due to invalid coding of participants (n=1,086) and conflicts with weighting due to weighting (n = 3,590). Fully .7% (n = 149) of the unweighted study population reported at least three of the symptoms characteristic of DSM-IV 12-month Binge Eating Disorder. In addition, 1.5% (n= 286) of the unweighted study population endorsed at least three of the symptoms characteristic of DSM-IV Lifetime Binge Eating Disorder. Consistent with overall expectations, the DSM-IV lifetime group showed the greatest proportion of binge eaters. (Table 2, Appendix 2).

At the point of study administration, 12.8% (n = 4917) of the unweighted study population reported origination from a country outside of the United States. Moreover, implying that they were immigrants being that were able to eligible to enroll and complete our administered surveys.

Among the covariates, age group categorizations including ages 18 to 29 (n = 4011, 22.9%), ages 30 to 39 (n = 3775, 19.6%) ages 40 to 49 (n= 3500, 20.8%), ages 50 to 64 (n= 3263, 21.0%), ages 65 and over (n=1874, 16.1% all showed relatively equal distributions. The greatest frequencies of participants were Caucasian (n= 5071, 70.8%), African-American (n= 5725, 11.3%), Hispanic/Latin-American (n = 3264, 11.8%), Asian-American (n = 2178, 4.3%).Prescription medication use examining those who ever

abused such medications in their lifetime was approximately 10.9% (n= 1449) in our study population. Unweighted and weighted frequencies for the study variables of the entire sample are available in Table 1 (Appendix 2).

Immigration Status and Covariates by Outcome

For both outcomes of interest (DSM-IV 12-Month BED and DSM Lifetime BED) frequencies for immigration status and its covariates were examined. The percentage of participants who were endorsed for DSM-IV BED were relatively the same for immigrants and non-immigrants within the 12-month group, and slightly higher for non-immigrants compared to immigrants within the lifetime group. In both immigrant and non-immigrant groups, 0.8% (n =41) and 0.9% (n=108) of survey participants endorsed symptoms characteristic of DSM-IV 12-Month Binge Eating Disorder, respectively. In addition, 1.6% (n= 78) and 1.8% (n= 208) of survey participants who were considered to be immigrants and non-immigrants endorsed symptoms characteristic of DSM-IV Lifetime Binge Eating Disorder, respectively.

Survey respondents with ages ranging from 30 to 39 years old had the highest proportion of participants endorsing 12-Month BED (n= 45, 1.2%). On the other hand, among lifetime BED, participants with the highest proportion were within ages ranging from 40 to 49 years old (n= 74, 2.1%). Females were more than almost half times likely to endorse 12-Month Binge eating disorder characteristics than male participants in the survey.

Out of the five geographic locations examined, the Northeast region endorsed DSM-IV 12-Month (n=44, 1.3%) Lifetime (n= 76, 2.3%) BED with the highest frequency. However, among those who were DSM-IV 12-Month Binge eaters, 0.8% (n =20) were presently located in the Midwest, 0.7% (n=46) were presently located in the South, and 1.0% (n=39) were presently located in the West. Among those who were Lifetime binge eaters, 1.8% (n=44) were presently located in the Midwest, 1.3% (n=84), were presently located in the South, 2.2% (n=76) were presently located in Northeast, and 2.1% (n=82) were presently located in Western region.

A high percentage of participants, who cited prescription medication abuse, as well as depression diagnosis, endorsed both outcomes of interest. Among prescription medication abusers, 2.3% (n=34) endorsed 12-Month BED compared to 0.8% (n=115) among non-prescription medication abusers. DSM-IV Lifetime BED participants showed roughly the same results as well. Among persons diagnosed with depression disorder, 1.6% (n= 105) were substantially more likely to be endorsed for 12-Month BED compared to 0.6% (n= 8) among non-depression diagnosed participants. The same results were also seen for those will lifetime BED and can be seen in Table 3 (Appendix 2).

Bivariate and Multivariate Logistic Regression Analyses

Bivariate Relationships of Independent Variables with DSM-IV Binge Eating Disorder Outcomes

With one exception, unadjusted odds ratios were significant for all dichotomous variables in regards to both outcomes of interest. Respondents who were female (OR: 2.18, 95% CI: 1.16 – 4.12), ever abused prescription medications (OR: 2.31, 95% CI:

1.29 – 4.13), and met characteristics for clinical depression (OR: 7.21, 95% CI: 2.80 – 18.60) had increased odds of being symptomatic for 12-Month BED (Appendix 2, Table 4). Results were also similar for respondents who had Lifetime BED. The exception was among our main exposure variable of interest. Those who were considered to be immigrants (not originally born in the U.S.) had insignificant decreased odds of being symptomatic for 12-month BED, and even more so for Lifetime BED.

Results were not as consistently significant for categorical variables; not all-non referent groups for age, race/ethnicity, body mass index (BMI), and geographic location had significant odds ratios. Among all racial/ethnic groups, respondents that were Hispanic/Latin-American (OR: 1.85, 95% CI: 1.06 – 3.24) had a higher odds of being symptomatic for12-Month BED compared to Caucasians. In addition, respondents who were 40 to 49 years of age (OR: 2.49, 95% CI: 1.23 – 5.04) also had a higher odds of being symptomatic for Lifetime BED compared those 65 years and older. That being said, none of the age categories corresponding to 12-Month BED were significant, nor were the racial categories corresponding to Lifetime BED.

Respondents who had a BMI ranging from 18.5 to 24.9 had lower odds of endorsing both BED outcomes of interest. However, respondents who were in the BMI category of 35 and greater had an increased odd of endorsing 12-Month Lifetime BED compared to the referent group (less than 18.5). All other BMI levels had significant p-values (except for 25.0 to 29.9,) yet their confidence intervals contained the null value of one, and thus were reported as insignificant.

Respondents who were geographically located in the Midwest (OR: .52, 95% CI: 30 – .92) and South (OR: .49, 95% CI: .28 – .86) had a significantly lower odds for Lifetime BED compared to those residing in the Western region. Other lifetime and 12-month geographic location categories were reported as insignificant because of their p-value or confidence interval containing the null value of one. Additional data can be viewed in Table 2 of Appendix 2.

Multivariate Relationships of Independent Variables w/DSM-IV Binge Eating Disorder Outcomes

Multivariate logistic regression was conducted to examine the association between immigration status (originally born outside of the United States) and each binge eating disorder type. Separate, but similar models were developed for each outcome of interest – 12-Month Binge Eating Disorder and Lifetime Binge Eating Disorder – and are listed below.

Full Model:

12-Month BED and Lifetime BED

Logit P(X) = α+ β_1*countryb + γ_1*agecat1+ γ_2*agecat2 + γ_3*agecat3 + γ_4*agecat4 + γ_5*black+ γ_6*hispanic + γ_7*asian + γ_8*other + γ_9*sex + γ_{10}*bmi + γ_{11}*region + γ_{12}*preabuse + γ_{13}*depressed + $\delta_1$countryb*black + $\delta_2$countryb*hispanic + $\delta_3$countryb*asian + $\delta_4$countryb*other + $\delta_5$countryb*sex + $\delta_6$countryb*bmi + $\delta_7$countryb*region + $\delta_8$countryb*preabuse + $\delta_9$countryb*depressed

The initial model seen above controlled for all covariates and all interaction terms. However, multicollinearity tests indicated a collinear problem existed in both 12-Month (condition indices: 38.01) and Lifetime BED (condition indices: 40.82) models when considered separated. Condition indices reflected corresponding vdp's greater than 5 involving the interaction term immigration status and age. This term was removed from the model, reran, and showed no further signs of collinearity issues. Therefore, regression analyses proceeded with the model excluding the interaction term involving immigration status and age. The final models for both outcomes of interest were derived, separately, using hierarchical backward elimination. All covariates that were not problematically collinear, and their interaction terms with immigration status, were regressed.

Final (Reduced) Model for 12-Month BED:

$$\text{Logit } P(X) = \alpha + \beta_1 * \text{countryb} + \gamma_1 * \text{agecat1} + \gamma_2 * \text{agecat2} + \gamma_3 * \text{agecat3} + \gamma_4 * \text{agecat4} + \gamma_5 * \text{black} + \gamma_6 * \text{hispanic} + \gamma_7 * \text{asian} + \gamma_8 * \text{other} + \gamma_9 * \text{sex} + \gamma_{10} * \text{bmi} + \gamma_{11} * \text{preabuse} + \gamma_{12} * \text{depressed} + \delta_1 \text{countryb} * \text{black} + \delta_2 \text{countryb} * \text{hispanic} + \delta_3 \text{countryb} * \text{asian} + \delta_4 \text{countryb} * \text{other}$$

The final reduced model for the association between immigration status and 12-Month BED, adjusted for all covariates, can be viewed above. According to the chunk test, one or more interaction terms significantly increased the fit of the model for binge eating disorder (LR test statistic = 0, df = 9, p-value: <.0001). Subsequently, hierarchical backward elimination was performed and the following variables remained in the model: immigration status, age, race, sex, BMI, prescription abuse, depression, and the

interaction terms for immigration status and race. Removal of covariates during assessment of confounding resulted in a less than a 10% change in the odds ratio and better precision for confidence interval estimates resulting in the decision to choose the reduced model as our final model. Although the variable age reflected insignificant values during confounding assessment, it remained in the model for validity and reliability purposes. Prior models involving binge eating disorder determined age to be an influentical confounder.

When controlling for all other variables in the model, participants who were female (OR: 2.53, 95% CI: 1.35 – 4.72) versus male had a greater likelihood of reporting symptoms characteristic of 12-Month BED. In addition, respondents who ever abused prescription medication (OR: 2.02, 95% CI: 1.01 – 4.03) and were also endorsed for depression (OR: 7.54, 95% CI: 2.85 – 19.94) had an increased odds of being endorsed for 12-Month BED. Odds ratios reporting the values for the effect of immigration status with each race/ethnic category can be seen in Table IV listed below (Appendix II).

Final (Reduced) Model for Lifetime BED:

Logit P(X) = α+ β_1*countryb + γ_1*agecat1+ γ_2*agecat2 + γ_3*agecat3 + γ_4*agecat4 + γ_5*black+ γ_6*hispanic + γ_7*asian + γ_8*other + γ_9*sex + γ_{10}*bmi + γ_{11}*region + γ_{12}*preabuse + γ_{13}*depressed + $\delta_1$countryb*black + $\delta_2$countryb*hispanic + $\delta_3$countryb*asian + $\delta_4$countryb*other

The final reduced model for the association between immigration status and Lifetime BED, adjusted for all covariates, can be viewed above. According to the chunk test, one or more interaction terms significantly increased the fit of the model for binge

eating disorder (LR test statistic = 0, df = 9, p-value: <.0001). Subsequently, hierarchical backward elimination was performed and following variables remained in the model: immigration status, age, race, sex, BMI, geographic location, prescription abuse, depression, and the interaction terms for immigration status and race and immigration status and age. Removal of covariates during assessment of confounding resulted in a less than a 10% change in the odds ratio and better precision for confidence interval estimates resulting in the decision to choose the reduced model as our final model. Although the variable age reflected insignificant values during confounding assessment, it remained in the model for validity and reliability purposes. Prior models involving binge eating disorder found age to be an influential factor.

When controlling for all other variables in the model, participants who were female (OR: 2.39, 95% CI: 1.56 – 3.58) versus male had a greater likelihood of reporting symptoms characteristic of Lifetime BED. In addition, respondents who ever abused prescription medication (OR: 2.38, 95% CI: 1.49 – 3.79) and were also endorsed for depression (OR: 6.38, 95% CI: 2.90 – 14.04) had an increased odds of being endorsed for Lifetime BED. Odds ratios reporting the values for the effect of immigration status with each race/ethnic category can be seen in Tables IV and V listed below (Appendix II).

Discussion

The purpose of this research was to explore the association between immigration status related risk factors and binge eating disorder types among a nationally representative same of the United States population. The study found that in the CPES 2001 -2003 weighted population, approximately 0.7% endorsed 12-Month binge eating disorders and 1.5% endorsed lifetime binge eating disorder. The percentages are expected to be slightly lower being that DSM criteria for assessing binge eating disorder has changed since this study was done, as well as the BED population has grown proportionally.

Approximately 12.8% of this study's weighed population cited birth outside of the United States and thus were classified as immigrants since eligible study criteria required you currently resided in the United States to participate in CPES surveys. Based upon their binge eating disorder type, 0.6% of this study's weighted population was actually immigrant among persons with 12-Month binge eating disorder. Also, 1.2% of this study's weighted population was actually immigrant among persons with lifetime binge eating disorder.

In this research, the following questions were addressed: Is there an association between immigrant status and binge eating disorder types based on time period – 12-Month and Lifetime – among the United States population. Also, do other variables affect these associations such as demographic variables, clinical variables, and additional co-morbidity variables?

Our bivariate analyses data generated for 12-month BED data showed significant increased individual associations for persons who were female, Hispanic/Latin-American,

had BMI levels greater than 35, abused prescription medication and showed signs of depression. However, our multivariate regression models eliminates the effect of BMI and shows decreased significant effects when the immigration status and race ("Other") are combined together. This leads us to conclude that immigration status is more protective of binge eating disorder for persons who are not considered to be in any major race categories (such as Black, Hispanic, and Asian). Yet, considering all other covariates in the model, persons who are classified as binge eaters within the 12-month period still have a greater chance of being female, abuse prescription medications, and displaying symptoms of clinical depression.

Our bivariate analyses data generated for Lifetime BED showed significant increased individual associations for persons who were female, had BMI levels greater than 35, abused prescription medication and showed signs of depression. On the other hand, significant lower individual associations were seen among persons geographically located in the Midwest and Southern regions. Although, the variable for geographic location was included for multivariate regression purposes, for Lifetime BED, were still somewhat similar to those obtained for 12-month BED model. Our multivariate regression models shows decreased significant effects when immigration status and race ("Other") were combined together. This leads us to conclude that immigration status is more protective of binge eating disorder for people who are not considered to be in any major race categories (such as Black, Hispanic, and Asian). Yet, considering all other covariates in the model, persons who are classified as binge eaters within their lifetime still have a greater chance of being female, abuse prescription medications, and displaying symptoms of clinical depression.

Strengths and Limitations

The main strength of this study was the large national representative sample size which increased power. The NIH-CPES surveys explored a variety of mental health outcomes using DMS-IV and ICD-10 criteria in order to document distributions, correlates and risk factors among the general pollution, with a special emphasis on minority groups. In order to ensure transparency among the three independent nationally representative surveys, variables were merged, recoded, dropped, and labeled missing if and when necessary. In other words, each individual study went through an extensive data cleaning process to ensure compliance with the overall CPES surveys. The study encouraged. Prior to release of the complete data for public use, the researchers underwent numerous procedures to ensure identity protection of CPES research subjects were maintained. The master CPES datasets are updated by initial survey administrators periodically to correct for any errors, as well as ensure diagnostic algorithms are up-to-date.

The results of this study were also subject to limitations. This was a cross sectional study, which prevented the assessment of directionality when analyzing relations between covariates and the different types of binge eating disorder.

The use of self-reported data also introduces a few limitations as well. Participants' may have underreported or over-reported unfavorable behaviors or characteristics for the outcomes and covariates included in this study.

Despite the initially large cohort of NIMH-CPES survey respondents and participants, outcomes of interest that become study populations for analysis are still somewhat small. In addition, the main covariate of interest, immigration status was also

relatively small in size compared the non-immigrant status group. It is also important to note that the logistic regression models estimated weighted sample prevalence odds ratios. Moreover, most measures of association in this analysis were weighted. Our study population, comprised of participants responding in a manner to survey questions indicating with binge eating disorder, revealed 149 persons with 12-month and 286 persons with lifetime prevalence. Diminished study population sizes lack the statistical power to detect relevant associations between the exposure and outcome of interest which is what this study experienced.

Public Health Implications and Future Directions

Today, the prevalence of binge eating disorder is much greater than what is was a years ago when the CPES surveys were first conducted. In May of 2013, Binge Eating Disorder was announced as an actual eating disorder diagnosis in the DSM-5 which was officially released by the American Psychiatric Association. Key changes are more so associated with binge eating frequency which changed to at least once a week, several times a day. In addition, the recently changed specifications call for more attention to be paid towards psychological behaviors. That being said, it would be beneficial to have an updated and more comprehensive collaborative psychological epidemiology survey so that additional research can be conducted on binge eating disorder and potential risk factors that may dictate the development and progression of the disorder over time. Although our study focused on cultural/racial/ethnic differences among those with binge eating disorder over 12-month and Lifetime periods, it is likely that future studies will discover other co-factors and change the way in which binge eating disorder, as well as other eating disorders, are evaluated and treated among the general population.

Appendices

Appendix I: References

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Appendix II: Tables and Figures

Figure I: General Features Common to each Sample Design of CPES Surveys, CPES 2001 – 2003

Table 1. Key features of the Collaborative Psychiatric Epidemiology Studies (CPES) sample designs

Sample design feature	National Comorbidity Survey Replication (NCS-R)	National Survey of American Life (NSAL)	National Latino and Asian American Study (NLAAS)
Survey population	All adults, age 18+ residing in households in the coterminous United States. Exclusions include institutionalized persons, those living on military bases, and non-English speakers.	African-American, Afro-Caribbean, and non-Hispanic white adults, age 18+ residing in households in the coterminous United States. Exclusions include institutionalized persons, those living on military bases and non-English speakers.	Latino and Asian-American adults, age 18+ residing in households in the coterminous United States, Alaska, and Hawaii. Exclusions include institutionalized persons and those living on military bases.
Sample frame	Four-stage national area probability sample.	Four-stage national area probability sample with special supplement for Afro-Caribbean adults.	Four-stage national area probability sample with special supplements for adults of Puerto Rican, Cuban, Chinese, Filipino and Vietnamese national origin.

Sample size	13,054 sample housing units screened for eligible adults. 9,282 completed interviews with eligible respondents.	26,495 sample housing units screened for eligible adults. 6,199 completed interviews with eligible respondents.	27,026 sample housing units screened for eligible adults. 4,649 completed interviews with eligible respondents.
Special features	Selection of two adult respondents in a subsample of households. Special study of main survey nonresponse.	Two-phase sample design to control survey costs in final stages of data collection.	Sample linked to NCS-R for statistical comparisons. Selection of two adult respondents in a subsample of households. Two-phase sample design to control survey costs in final stages of data collection.

Table 8. Interviews, response rate, interview length, and number of contacts for NCS-R, NSAL, NLAAS

Component	Interviews	Response rate (%)	Average interview length (mins)	Average Contacts per interview
NCS-R				
Main respondent	7,693	70.9	126	7.1
Second respondent	1,589	80.4	124	4.7
NSAL				

Adult respondent	4,842 (core) 1,357 (supplement)	71.5 (core) 76.4 (supplement)	145	7.4
NLAAS				
Main respondent	3,620	75.7	161	9.2
Second respondent	1,029	80.3	152	11.6

Table I. Criteria for Diagnosis of DSM-IV 12-Month and Lifetime BED , CPES 2001 - 2003

Symptoms of DSM-IV BED	Questions in CPES surveys assessing
Recurrent episodes of eating, in a discrete period of time (e.g., within any 2 hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances	EA16 is Yes(1)
A sense of lack of control over eating disorder during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating.	EA17a is Yes(1) OR EA17b is Yes(1) OR EA17c is Yes(1) OR EA17h is Yes(1)
The binge-eating episodes are associated with three (or more) of the following: 1. eating much more rapidly than normal 2. eating until feeling uncomfortably full 3. eating large amounts of food when not feeling physically hungry 4. eating alone because of being embarrassed by how much one is eating 5. feeling disgusted with oneself, depressed, or very guilty after overeating	1. EA17 is Yes(1) 2. EA17a is Yes(1) 3. EA17b is Yes(1) 4. EA17c is Yes(1) 5. EA17d is Yes(1)
Marked distress regarding binge eating is distressed	EA17d is Yes(1) OR EA17e is Yes(1) OR EA17g is Yes(1) or EA17h is Yes(1)
The binge eating occurs, on average at least 2 days a week for 6 months	EA16 is Yes(1)

Table II Summary Statistics: Unweighted and Weighted Frequencies and Percentage of Categorical Variables, CPES 2001 - 2003

Characteristics	Unweighted		Weighted	
	N	Percent	N	Percent
Dependent Variables				
DSM-IV 12-Month Binge Eating Disorder (BED)				
Yes (Endorsed)	149	0.7%	1325577	0.7%
No (Not Endorsed)	15188	99.3%	191539158	99.3%
DSM-IV Lifetime Binge Eating Disorder (BED)				
Yes (Endorsed)	286	1.5%	2916941	1.5%
No (Not Endorsed)	15051	98.5%	189947794	98.5%
Independent Variable				
Immigrant Status (Originally Born Outside the U.S.)				
Yes	4917	12.8%	26637524	12.8%
No	11436	87.2%	181431461.00	87.2%
Covariates				
Age				
18 to 29	4011	22.9%	47787306	22.9%
30 to 39	3775	19.6%	40804464	19.6%

40 to 49	3500	20.8%	42687490	20.8%
50 to 64	3263	21.0%	43668954	21.0%
65+	1874	16.1%	33516117	16.1%
Race				
Caucasian	5071	70.8%	147684494	70.8%
African-American	5725	11.3%	23479975	11.3%
Hispanic/Latin-American	3264	11.8%	24558295	11.8%
Asian-American	2178	4.3%	9051393	4.3%
Other	185	1.8%	3690174	1.8%
Sex				
Female	9630	52.6%	109693035	52.6%
Male	6793	47.4%	98771295	47.4%
Body Mass Index (kg/m^2)				
< 18.5	5931	37.6%	76493778	37.6%
18.5 to 24.9	5349	34.3%	69760960	34.3%
25.0 to 29.9	2594	15.6%	31844733	15.6%
30.0 to 34.9	1611	9.3%	18870691	9.3%
35.0 +	445	3.3%	18870691	3.3%
Geographic Location				
Northeast	3501	19.9%	41375711	19.9%
Midwest	2511	22.5%	46876541	22.5%
South	6432	34.0%	70763893	34.0%

West	3979	23.7%	49448187	23.7%
Prescription Abuse (ever)				
Yes	1449	10.9%	21079702	10.9%
No	13885	89.1%	171695346	89.1%
Depressed				
Yes	6468	83.0%	81894583	83.0%
No	1357	17.0%	16737376	17.0%

Table III Summary Statistics: Unweighted and Weighted Frequencies and Percentage of Categorical Variables by Outcomes of Interest, CPES 2001 - 2003

	DSM-IV 12-Month BED (event =1)				DSM-IV Lifetime BED (event =1)			
Characteristics	**Unweighted**		**Weighted**		**Unweighted**		**Weighted**	
	N	**Row Percent**	**N**	**Row Percent**	**N**	**Row Percent**	**N**	**Row Percent**
Independent Variable								
Immigrant Status (Originally Born Outside the U.S.)								
Yes	41	0.8%	155306	0.6%	78	1.6%	318714	1.2%
No	108	0.9%	1170271	0.6%	208	1.8%	2598227	1.4%
Covariates								
Age								
18 to 29	41	1.0%	283621	0.6%	81	2.0%	750280	1.6%
30 to 39	45	1.2%	345092	0.8%	67	1.8%	626115	1.5%
40 to 49	37	1.1%	319315	0.7%	74	2.1%	744748	1.7%
50 to 64	20	0.6%	279372	0.6%	47	1.4%	558025	1.3%
65+	6	0.3%	98177	0.3%	17	0.9%	237773	0.7%

Race								
Caucasian	36	0.7%	764278	0.5%	79	1.6%	1875414	1.3%
African-American	54	0.9%	167721	0.7%	95	1.7%	352008	1.5%
Hispanic/Latin-American	46	1.4%	259742	1.1%	84	2.6%	503271	2.0%
Asian-American	11	0.5%	51829	0.6%	26	1.2%	104242	1.2%
Other	2	1.1%	82007	2.2%	2	1.1%	82007	2.2%
Sex								
Female	114	1.2%	937052	0.9%	207	2.1%	1980303	1.8%
Male	35	0.5%	388525	0.4%	79	1.2%	936638	0.9%
Body Mass Index (kg/m^2)								
< 18.5	26	0.4%	160341	0.2%	52	0.9%	438039	0.6%
18.5 to 24.9	35	0.7%	362839	0.5%	81	1.5%	962768	1.4%
25.0 to 29.9	42	1.6%	395271	1.2%	71	2.7%	728504	2.3%
30.0 to 34.9	38	2.4%	367455	1.9%	65	4.0%	603899	3.2%
35.0 +	4	0.9%	20896	0.1%	9	2.0%	84268	0.4%
Geographic Location								
Northeast	44	1.3%	389255	0.9%	76	2.2%	958964	2.3%
Midwest	20	0.8%	246129	0.5%	44	1.8%	458067	1.0%
South	46	0.7%	272037	0.4%	84	1.3%	594849	0.8%
West	39	1.0%	418156	0.8%	82	2.1%	905062	1.8%
Prescription Abuse (ever)								

Yes	34	2.3%	290434	1.4%	64	4.4%	808977	3.8%
No	115	0.8%	103514 3	0.6%	222	1.6%	210796 4	1.2%
Depressed								
Yes	105	1.6%	964491	1.2%	206	3.2%	221023 7	2.7%
No	8	0.6%	27869	0.2%	16	1.2%	68512	0.4%

Table IV Final Model: Unadjusted and Adjusted Odds Ratios of Indicators for DSM-IV 12-Month BED, CPES 2001 - 2003

	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Indicator - Independent Variable				
Immigrant Status (Originally Born Outside the U.S.)				
Yes	.85 (.51 - 1.43)	0.5430	2.88.(.73 - 11.26)	0.1294
No	1.00 (ref)		1.00 (ref)	
Indicator - Covariates				
Age				
18 to 29	2.01 (.68 - 5.93)	0.2047	1.13 (.32 - 4.02)	0.8476
30 to 39	2.94 (.90 - 9.64)	0.0753	1.33 (.33 -5.35)	0.6889
40 to 49	2.57 (.90 - 7.32)	0.0781	.79 (.24 - 2.60)	0.7022
50 to 64	2.20 (.73 - 6.63)	0.1609	1.16 (.35 - 3.83)	0.8119
65+	1.00 (ref)		1.00 (ref)	
Race				
African-American	1.29 (.78 - 2.15)	0.3212	1.42 (.74 - 2.71)	0.2933
Hispanic/Latin-American	1.85 (1.06 - 3.24)	0.0315	2.59 (1.07 - 6.25)	0.0346
Asian-American	1.00 (.43 - 2.30)	0.9929	1.63 (.44 - 6.08)	0.4661
Other	3.93 (1.00 - 15.42)	0.0496	3.46 (.86 - 13.93)	0.0806
Caucasian	1.00 (ref)		1.00 (ref)	
Sex				
Female	2.18 (1.16 - 4.12)	0.0158	2.53 (1.35 - 4.72)	0.0036
Male	1.00 (ref)		1.00 (ref)	

Body Mass Index (kg/m^2)				
< 18.5	1.00 (ref)		1.00 (ref)	
18.5 to 24.9	.70 (.12 - 3.98)	0.0001	.64 (.11 - 3.81)	0.0004
25.0 to 29.9	1.72 (.31 - 9.70)	0.5684	2.23 (.38 - 12.93)	0.6350
30.0 to 34.9	4.20 (.75 - 23.60)	0.0079	4.23 (.66 - 27.26)	0.0194
35.0 +	6.59 (1.15 - 37.67)	<.0001	4.82 (.77 - 29.98)	0.0037
Geographic Location				
Northeast	1.17 (.60 - 2.29)	0.0287	-	-
Midwest	.61 (.28 - 1.35)	0.3445	-	-
South	.49 (.24 - 1.00)	0.0318	-	-
West	1.00 (ref)		-	-
Prescription Abuse (ever)				
Yes	2.31 (1.29 - 4.13)	<.0001	2.02 (1.01 - 4.03)	0.044
No	1.00 (ref)		1.00 (ref)	
Depressed				
Yes	7.21 (2.80 - 18.60)	<.0001	7.54 (2.85 - 19.94)	<.0001
No	1.00 (ref)		1.00 (ref)	
Interaction				
Immigrant Status*Race_Black	-	-	1.49 (.46 - 4.76)	0.5039
Immigrant Status*Race_Hispanic	-	-	.65 (.23 - 1.86)	0.4245
Immigrant Status*Race_Asian	-	-	2.79 (.58 - 13.43)	0.1994
Immigrant Status*Race_Other	-	-	7.62e-6 (1.18e-6 - .000049)	<.0001
Immigrant Status*Race_Caucasian			2.87 (.73 - 11.26)	0.1294

Table V Final Model: Unadjusted and Adjusted Odds Ratios of Indicators for DSM-IV Lifetime BED, CPES 2001 - 2003

	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Indicator - Independent Variable				
Immigrant Status (Originally Born Outside the U.S.)				
Yes	.79 (.51 - 1.22)	0.2835	.95 (.22 - 4.03)	0.9413
No	1.00 (ref)		1.00 (ref)	
Indicator - Covariates				
Age				
18 to 29	2.21 (1.08 - 4.54)	0.0306	1.84 (.69 - 4.92)	0.2221
30 to 39	2.21 (.99 - 4.93)	0.0531	1.61 (.58 - 4.48)	0.3580
40 to 49	2.49 (1.23 - 5.04)	0.0115	1.11 (.46 - 2.68)	0.8109
50 to 64	1.82(.94 - 3.54)	0.0781	1.18 (.46 - 3.05)	0.7896
65+	1.00 (ref)		1.00 (ref)	
Race				
African-American	1.11 (.74 - 1.65)	0.6195	1.43 (. 95 - 2.15)	0.0836
Hispanic/Latin-American	1.46 (.92 - 2.32)	0.1043	1.71 (.95- 3.06)	0.0713
Asian-American	.81 (.49 - 1.36)	0.4341	1.07 (.51 - 2.26)	0.8509
Other	1.59 (.39 - 6.44)	0.5166	1.31 (.32 - 5.38)	0.7052
Caucasian	1.00 (ref)		1.00 (ref)	
Sex				
Female	1.92 (1.23 - 3.00)	0.0040	2.39 (1.56 - 3.68)	<.0001
Male	1.00 (ref)		1.00 (ref)	
Body Mass Index (kg/m^2)				
< 18.5	1.00 (ref)		1.00 (ref)	

18.5 to 24.9	.47 (.17 - 1.32)	<.0001	.45 (.16 - 1.28)	<.0001
25.0 to 29.9	1.13 (.42 - 3.04)	0.6874	1.49 (.53 - 4.22)	0.319
30.0 to 34.9	1.92 (.73 - 5.06)	0.0305	1.76 (.59 - 5.27)	0.1428
35.0 +	2.70 (.95 - 7.64)	0.0005	2.15 (.80 - 5.79)	0.0062
Geographic Location				
Northeast	1.34 (.76 - 2.36)	0.0012	1.41 (.78 - 2.56)	0.0110
Midwest	.52 (.30 - .92)	0.0250	.76 (.42 - 1.36)	0.4106
South	.49 (.28- .86)	0.0085	.55 (.29 - 1.06)	0.0277
West	1.00 (ref)		1.00 (ref)	
Prescription Abuse (ever)				
Yes	3.21 (2.17 - 4.75)	<.0001	2.38 (1.49 - 3.79)	0.0003
No	1.00 (ref)		1.00 (ref)	
Depressed				
Yes	6.82 (3.14 - 14.78)	<.0001	6.38 (2.90 - 14.04)	<.0001
No	1.00 (ref)		1.00 (ref)	
Interaction				
Immigrant Status*Race_Black	-	-	.61 (.22 - 1.71)	0.3506
Immigrant Status*Race_Hispanic	-	-	.85 (.38 - 1.88)	0.6836
Immigrant Status*Race_Asian	-	-	1.98 (.75 - 5.20)	0.1665
Immigrant Status*Race_Other	-	-	9.68e-6 (1.30e-6 - .000072)	<.0001
Immigrant Status*Race_Caucasian			.95 (.22 - 4.03)	0.9413

Appendix III: SAS Programs

```
/*****************************************************************
*************************************************
Filename: CPES 2001 - 2003 Modification Analytic Program.sas
Input: CPES 2001 - 2003 SAS datafile publically accesible @
http://www.icpsr.umich.edu/icpsrweb/CPES/studies/20240
Created by: Millicent E. Nwankwo
Creation Date: December 2013
Purpose: Preparation and analysis (survey design accommodated) of CPES
2001 - 2003 public use data for purposes of masters thesis
Updates: Jan/Feb/March/April 2015
*****************************************************************
*************************************************/



/*****************************************************************
*****************

Start Modification

*****************************************************************
*****************/


**Assign library name**;
libname epi 'H:\SAS 9.4';
run;

**Expand page size**;
proc options;
options pagesize = 1000;
run;

data epi.thesis;
set work.cpes;

**Create new variable for race**;
if rancest = 12 then racer = "1";
if rancest = 1 or rancest = 2 or rancest= 3 or rancest= 4 then racer =
"4";
if rancest = 5 or rancest = 6 or rancest = 7 or rancest=8 then racer =
"3";
if rancest = 9 or rancest = 10 then racer = "2";
if rancest = 11 then racer = "5";

**Create new variable for age**;
if V07306 ge 18 and V07306 le 29  then age = "18 - 29";
else if V07306 ge 30 and V07306 le 39 then age = "30 - 39";
else if V07306 ge 40 and V07306 le 49 then age = "40 - 49";
else if V07306 ge 50 and V07306 le 64 then age = "50 - 64";
```

```
else if V07306 ge 65 then age = "65+";

**Create new variable for income**;
if V08683 lt 25000 then income = "<25K";
else if V08683 ge 25000 and V08683 le 50000 then income = "25K - 50K";
else if V08683 ge 50000 and V08683 le 75000 then income = "50K - 75K";
else if V08683 ge 75000 then income = ">75K";

**Create new variable for Prescription Abuse*;
if V03332 = 1 then preabuse = "Yes";
if V03332 = 5 then preabuse = "No";

**Create new variable for Country born in**;
if V05700 = 1 then countryb = "U.S.";
if V05700 = 2 then countryb = "Outside";

**Create new variable for DSM-IV BED Lifetime**;
if V07840 = 1 then bedlife = "Yes";
if V07840 = 5 then bedlife = "No";

**Create new variable for DSM-IV BED 12-Month**;
if V07552 = 1 then bed12m = "Yes";
if V07552 = 5 then bed12m = "No";

**Create new variable for DSM-IV BED 30-Day**;
if V07553 = 1 then bed30d = "Yes";
if V07553 = 5 then bed30d = "No";

**Create new variable for BMI**;
if V08823 = 1 then bmi = "5";
if V08823 = 2 then bmi = "1";
if V08823 = 3 then bmi = "2";
if V08823 = 4 then bmi= "3";
if V08823 = 5 or V08823 = 6 then bmi = "4";

**Create new variable for Sex**;
if V09036 = 1 then sex = "Male";
if V09036 = 2 then sex = "Female";

**Create new variable for Education**;
if V08172 = 1 then education = "Male";
if V08172 = 2 then education = "Female";

**Create new variable for Employment**;
if V09154 = 1 then employed = "Yes";
if V09154 = 2 or  V09154 = 3 then employed = "No";

**Rename variable for Region**;
region = V08992;

**Rename variable for Marital Status**;
marital = V08759;

**Rename variable for Age at alcohol use**;
alcohol = V03266;
if V03266 = 997 then alcohol = 0;
```

```
**Rename variable for suicide**;
suicide = V01993;

**Create new variable for alcoholism lifetime**;
if V07831 = 1 then alcolife = "Yes";
if V07831 = 5 then alcolife = "No";

**Create new variable for alcoholism 12-month**;
if V07517 = 1 then alco12m = "Yes";
if V07517 = 5 then alco12m = "No";

**Create new variable for depressed**;
if V00829 = 1 then depressed = "Yes";
if V00829 = 5 then depressed = "No";

**Create new variable for Prescrpiton Medication Use in Past 12
months**;
if V02614 = 1 then antid = "Yes";
if V02614 = 5 then antid = "No";

**Create dummy variables for interaction**;
if racer = 2 then black = 1; else black = 0;
if racer = 3 then hispanic = 1; else hispanic = 0;
if racer = 4 then asian = 1; else asian = 0;
if racer = 1 then other = 1; else other = 0;

**Create dummy variable for age to deal with interaction**;
if age = '18 - 29' then agecat1 = 1; else agecat1 = 0;
if age = '30 - 39' then agecat2 = 1; else agecat2 = 0;
if age = '40 - 49' then agecat3 = 1; else agecat3 = 0;
if age = '50 - 64' then agecat4 = 1; else agecat4 = 0;

run;


/*****************************************************************
*****************


End Modification

*****************************************************************
*****************/


/*****************************************************************
*****************

                                                          Start
Outcome Frequencies

*****************************************************************
*****************/


**DSM-IV 12-Month BED**;
proc surveyfreq data=epi.thesis ;
```

```
tables bed12m;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m;
run;

**DSM-IV Lifetime BED**;
proc surveyfreq data=epi.thesis ;
tables bedlife ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife;
run;


/*************************************************************************
*****************

                                                                    End
Outcome Frequencies

*************************************************************************
*****************/


/*************************************************************************
*****************

                                                              Start
Predictor Frequencies

                        Unadjusted/Adjusted

*************************************************************************
*****************/


**Main Exposure Variable**;
proc surveyfreq data=epi.thesis ;
tables countryb ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*countryb;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m*countryb;
```

```
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

**Covariates**;
proc surveyfreq data=epi.thesis ;
tables preabuse ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*preabuse ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m*preabuse ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveyfreq data=epi.thesis ;
tables age;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*age;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m*age ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveyfreq data=epi.thesis ;
tables racer ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*racer ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
```

```
tables bed12m*racer ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveyfreq data=epi.thesis ;
tables sex;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*sex;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m*sex ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveyfreq data=epi.thesis ;
tables bmi ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*bmi ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m*bmi;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveyfreq data=epi.thesis ;
tables region ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*region ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
```

```
tables bed12m*region ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveyfreq data=epi.thesis ;
tables depressed ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bedlife*depressed ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
proc surveyfreq data=epi.thesis ;
tables bed12m*depressed ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;


/*************************************************************************
*****************

                                                                End
Predictor Frequencies

                        Unadjusted/Adjusted

*************************************************************************
*****************/


/*************************************************************************
*****************

                                                                Start
Bivariate Analyses

*************************************************************************
*****************/


**DSM-IV 12-Month BED***;
**Main Exposure Variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.');
model bed12m (event='Yes') = countryb  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
```

```
**Covariates**;
proc surveylogistic data=epi.thesis ;
class preabuse (param=ref ref = 'No');
model bed12m (event='Yes') = preabuse  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class age (param=ref ref = '65+');
model bed12m (event='Yes') = agecat1 agecat2 agecat3 agecat4 ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class racer ;
model bed12m (event='Yes') = black hispanic asian other ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class sex ;
model bed12m (event='Yes') = sex  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class bmi ;
model bed12m (event='Yes') = bmi  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class region ;
model bed12m (event='Yes') = region ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class depressed (param=ref ref = 'No');
model bed12m (event='Yes') = depressed ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;
```

```
**DSM-IV Lifetime BED**;
**Main Exposure Variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.');
model bedlife (event='Yes') = countryb  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

**Covariates**;
proc surveylogistic data=epi.thesis ;
class preabuse (param=ref ref = 'No');
model bedlife (event='Yes') = preabuse  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class age (param=ref ref = '65+');
model bedlife (event='Yes') = agecat1 agecat2 agecat3 agecat4 ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class racer ;
model bedlife (event='Yes') = black hispanic asian other ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class sex ;
model bedlife (event='Yes') = sex  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class bmi ;
model bedlife (event='Yes') = bmi  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class region ;
model bedlife (event='Yes') = region ;
weight cpeswtlg;
stratum sestrat;
```

```
cluster seclustr;
run;

proc surveylogistic data=epi.thesis ;
class depressed (param=ref ref = 'No');
model bedlife (event='Yes') = depressed ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
run;


/*************************************************************************
*****************

                                                                  Start
Collinearity Assement

*************************************************************************
*****************/


********************Collinearity Assessment for DSM-IV 12-Month
BED*********************;
%include 'S:\course\Epi740\MACRO\collin_2011.sas';
proc surveylogistic data=epi.thesis ;
ods output surveylogistic.covb=logistic;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region antid depressed  ;
weight cpeswtlg ;
stratum sestrat;
cluster seclustr  ;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*agecat1 countryb*agecat2 countryb*agecat3
countryb*agecat4 countryb*black countryb*hispanic
countryb*asian countryb*other countryb*sex countryb*bmi countryb*region
countryb*preabuse countryb*depressed  / covb ;
run;
%collin(COVDSN=logistic, PROCDR=surveylogistic, output=LOG_COLIN);

**Step 1: Identified collinear problem - CI = 38.013**;
**Removal of collinear problem involving interaction term countryb by
agecat variable**;
%include 'S:\course\Epi740\MACRO\collin_2011.sas';
proc surveylogistic data=epi.thesis ;
ods output surveylogistic.covb=logistic;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region antid depressed  ;
weight cpeswtlg ;
stratum sestrat;
cluster seclustr  ;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic
```

```
countryb*asian countryb*other countryb*sex countryb*bmi countryb*region
countryb*preabuse countryb*depressed  / covb ;
run;
%collin(COVDSN=logistic, PROCDR=surveylogistic, output=LOG_COLIN);
**Last step, no more collinear problems identified**;


********************Collinearity Assessment for DSM-IV
Lifetime*********************;
%include 'S:\course\Epi740\MACRO\collin_2011.sas';
proc surveylogistic data=epi.thesis ;
ods output surveylogistic.covb=logistic;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region antid depressed  ;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*agecat1 countryb*agecat2 countryb*agecat3
countryb*agecat4 countryb*black countryb*hispanic
countryb*asian countryb*other countryb*sex countryb*bmi countryb*region
countryb*preabuse countryb*depressed  / covb;
weight cpeswtlg ;
stratum sestrat;
cluster seclustr  ;
run;
%collin(COVDSN=logistic, PROCDR=surveylogistic, output=LOG_COLIN);

**Identified collinear problem - CI = 40.816**;
**Step 1: Removal of collinear problem involving interaction term
countryb by agecat variables**;
%include 'S:\course\Epi740\MACRO\collin_2011.sas';
proc surveylogistic data=epi.thesis ;
ods output surveylogistic.covb=logistic;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region antid depressed  ;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic
countryb*asian countryb*other countryb*sex countryb*bmi countryb*region
countryb*preabuse countryb*depressed  / covb;
weight cpeswtlg ;
stratum sestrat;
cluster seclustr  ;
run;
%collin(COVDSN=logistic, PROCDR=surveylogistic, output=LOG_COLIN);
**Last step, no more collinear problems identified**;
/*****************************************************************
*****************

                                                          End
Collinearity Assement

*****************************************************************
*****************/
```

```
/*************************************************************************
*****************

Begin Regression

*************************************************************************
*****************/


*********************************DSM-IV 12-MONTH BED
Model*****************************;
**Full Model**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed;
run;
**Chunk Test**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex countryb*bmi countryb*region
countryb*preabuse countryb*depressed;
run;
**Step 1: Backward Elimination of Interaction Terms, Remove Exposure by
BMI variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex countryb*region countryb*preabuse
countryb*depressed ;
run;
**Step 2: Backward Elimination of Interaction Terms, Remove Exposure by
sex variable**;
proc surveylogistic data=epi.thesis ;
```

```
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*region countryb*preabuse countryb*depressed;
run;
**Step 3: Backward Elimination of Interaction Terms, Remove Exposure by
depressed variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*region countryb*preabuse  ;
run;
**Step 4: Backward Elimination of Interaction Terms, Remove Exposure by
region variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*preabuse ;
run;
**Step 5: Backward Elimination of Interaction Terms, Remove Exposure by
preabuse variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other;
run;
**Step 6: Backward Elimination of Confounders, Remove region
variable**;
**Compute Odds Ratios**;
proc surveylogistic data=epi.thesis ;
```

```
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi
depressed countryb*black countryb*hispanic countryb*asian
countryb*other ;
contrast "or countryb" countryb 1 /estimate = both;
contrast "or black" black 1/estimate = both;
contrast "or hispanic" hispanic 1 /estimate = both;
contrast "or asian" asian 1/estimate = both;
contrast "or other" other 1 /estimate = both;
contrast "or countryb countryb*black" countryb 1 countryb*black 1
/estimate = both;
contrast "or countryb countryb*hispanic" countryb 1 countryb*hispanic 1
/estimate = both;
contrast "or countryb countryb*asian" countryb 1 countryb*asian 1
/estimate = both;
contrast "or countryb countryb*other" countryb 1 countryb*other 1
/estimate = both;
contrast "or countryb countryb*white" countryb 1  /estimate = both;
run;
**Last Step involving removal of variables, variable age remains in
model although insignificant**;
**Interaction Assesment between model from step 6 and model w/o
interaction terms is still significant:
LR test statistic: 0, df: 4, p-value: 1.000, therefore use model
w/interaction**;

****************************************** Final Model for DSM-IV 12-
Month BED*********************************************;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bed12m (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi
depressed countryb*black countryb*hispanic countryb*asian
countryb*other;
run;
************************************************************************
*****************************************************;

*******************************DSM-IV Lifetime BED
Model*****************************;
**Full Model**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
```

```
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed ;
run;
**Chunk Test**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex countryb*bmi countryb*region
countryb*preabuse countryb*depressed;
run;
**Step 1: Backward Elimination of Interaction Terms, Remove Exposure by
preabuse variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex countryb*bmi countryb*region
countryb*depressed  ;
run;
**Step 2: Backward Elimination of Interaction Terms, Remove Exposure by
BMI variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex countryb*region countryb*depressed ;
run;
**Step 3: Backward Elimination of Interaction Terms, Remove Exposure by
depressed variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
```

```
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex countryb*region ;
run;
**Step 4: Backward Elimination of Interaction Terms, Remove Exposure by
region variable**;
proc surveylogistic data=epi.thesis ;
class countryb (param=ref ref = 'U.S.') preabuse (param=ref ref='No')
age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No')  ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other countryb*sex  ;
run;
**Step 5: Backward Elimination of Interaction Terms, Remove Exposure by
sex variable**;
**Compute Odds Ratios**;
proc surveylogistic data=epi.thesis ;
class preabuse (param=ref ref='No') age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No') countryb
(param=ref ref = 'U.S.') ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other;
contrast "or countryb" countryb 1 /estimate = both;
contrast "or black" black 1/estimate = both;
contrast "or hispanic" hispanic 1 /estimate = both;
contrast "or asian" asian 1/estimate = both;
contrast "or other" other 1 /estimate = both;
contrast "or countryb countryb*black" countryb 1 countryb*black 1
/estimate = both;
contrast "or countryb countryb*hispanic" countryb 1 countryb*hispanic 1
/estimate = both;
contrast "or countryb countryb*asian" countryb 1 countryb*asian 1
/estimate = both;
contrast "or countryb countryb*other" countryb 1 countryb*other 1
/estimate = both;
contrast "or countryb countryb*white" countryb 1 /estimate = both;
run;
**Last Step involving removal of variables, variable age remains in
model although insignificant since OR's did not differ greatly**;
**Interaction Assesment between model from step 5 and model w/o
interaction terms is still significant:
LR test statistic:0, df: 4, p-value: 1.000, therefore use model
w/interaction**;
```

```
****************************************Final Model for DSM-IV
Lifetime BED************************************************;
proc surveylogistic data=epi.thesis ;
class preabuse (param=ref ref='No') age (param=ref ref = '65+')
racer sex bmi region depressed (param=ref ref = 'No') countryb
(param=ref ref = 'U.S.') ;
weight cpeswtlg;
stratum sestrat;
cluster seclustr;
model bedlife (event = "Yes") = countryb preabuse agecat1 agecat2
agecat3 agecat4 black hispanic asian other sex bmi region
depressed countryb*black countryb*hispanic countryb*asian
countryb*other;
run;


************************************************************************
*************************************************;

/************************************************************************
******************

End Regression

************************************************************************
******************/
```