

Compensatory Behaviors and Alcohol Consumption

by

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Abstract

Disordered eating and exercise have been linked with alcohol consumption and alcohol related problems. Body image dissatisfaction has been associated with increased alcohol consumption and disordered eating. The present study aimed to explore disordered eating and exercise behaviors in response to alcohol consumption in college students by assessing the performance of a recently developed measure (Compensatory Eating and Behaviors Related to Alcohol Consumption Scale; CEBRACS) in a new sample. The study also examined the influence of body shape satisfaction on these relationships. Participants (n=574 undergraduate female students) completed online self-report surveys assessing their drinking, eating, and exercise habits, as well as their body shape satisfaction. The CEBRACS total score and all four of the factors (alcohol effects, bulimia, dietary restraint and exercise, and restriction) were correlated with the Rutgers Alcohol Problem Inventory, and all but the bulimia factor were correlated with the Daily Drinking Questionnaire. Regression analyses indicated that all four factors were predictive of amount of alcohol consumed and alcohol related problems, and the addition of body shape satisfaction into the model accounted for a significant amount of variance. Analyses exploring the role of body shape satisfaction as a moderator were not significant. Female undergraduates are engaging in compensatory behaviors related to alcohol consumption, and this is associated with greater alcohol consumption and alcohol related problems. Interventions should incorporate assessment and discussion of compensatory behaviors, body shape satisfaction, and alcohol consumption and related problems.

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INTRODUCTION

Alcohol Consumption & Alcohol Related Problems Among College Students

A major public health concern, alcohol consumption in college students has been well documented in recent decades. Studies show that as many as 80% of college students report alcohol consumption in the last 30 days (Hingson, Heeren, Winter, & Wechsler, 2005). Of greater concern however, is the high prevalence of binge drinking episodes. Binge drinking is typically defined as five or more drinks on the same occasion for males, and four or more drinks on the same occasion for females. According to The National Survey on Drug Use and Health (2010), 42% of college students reported binge drinking in the last 30 days. Results also indicate that 15.6% of college students engaged in heavy drinking, defined as five or more drinks on the same occasion on at least five different days in the past 30 days. For most college students, consuming five or more beverages in a two hour period would produce a blood alcohol content (bac) of 0.08% (Hingson, Zha, & Weitzman, 2009). This is the legal limit for driving a motor vehicle in the United States, as a BAC of 0.08% indicates impairment in decision-making, impulse control, and memory. In 2007, 25% of college students drove under the influence of alcohol (Hingson, Zha, & Weitzman, 2009). While drinking and driving consequences are commonly discussed, other alcohol related problems deserve attention as well. For example, more than 97,000 college students between the ages of 18-24 are victims of alcohol-related sexual assault or date rape (Hingson et al., 2005). Nearly 600,000 students are unintentionally harmed while under the influence of alcohol, and another 1,800 students die each year from alcohol-related unintentional injuries (Hingson et al., 2005). Alcohol related health problems and alcohol-related suicide attempts also raise concern with more than 150,000 students developing alcohol-related health problems (Hingson, Heeren, Zakocs, Kopstein & Wechsler, 2002), and

between 1.2 and 1.5 percent of students attempting suicide within the last year due to drinking or drug use (Presley, Leichter, & Meilman, 1988). Excessive alcohol consumption has led to other problems including memory loss, physical assault, and property damage.

Disordered Eating

In addition to concerns about alcohol consumption on college campuses, eating disorders such as Anorexia Nervosa and Bulimia Nervosa have also gained attention at universities across the country. According to the National Eating Disorder Association (2006), approximately 20% of college students, male and female, reported that they have had an eating disorder at some point in their lives. Recent research shows that between 9-13% of female college students and 3-4% of college males currently endorse symptoms of an eating disorder (Eisenberg, Nicklette, Roeder, & Kirz, 2011) The percentage of college students affected by eating disorders grows even larger when considering Eating Disorders Not Otherwise Specified (EDNOS). EDNOS includes similar behaviors as Anorexia or Bulimia, but does not meet full criteria to be classified as an eating disorder (White, Reynolds-Malear, & Cordero, 2011). Research shows that 24% of college students, male and female, meet criteria for EDNOS (White et al., 2011). While there has been a growing body of literature focused on eating disorders among college students, including EDNOS (Hoek & Hoeken, 2003) research shows that unhealthy eating and dieting behaviors are not confined to only severe clinical cases.

Sub-clinical disordered eating has also become an important concern on college campuses as its prevalence has reached far more undergraduates than eating disorders. Despite not meeting full criteria for an eating disorder in DSM-IV, several studies have shown that many college students are engaging in behaviors including binge eating, chronic dieting, and fasting or purging to control weight (e.g. self-induced vomiting, use of diet pills or diuretics; (Forman-

Hoffman, 2004; Mintz & Betz, 1988; Tylka & Subich, 2002). In fact, 61% of female college students have some sort of sub-clinical eating problem (Mintz & Betz, 1988), and 20% of males endorse disordered eating behaviors (O’Dea & Abraham, 2002). Such behaviors are linked with significant decreases in quality of life (QOL). More specifically, research findings indicate that adolescents with any level of an eating disorder or disordered eating endorsed significantly lower QOL across a variety of domains including physical, psychological, family, peers, school, and self-esteem (Herpertz-Dahlman, Willie, Holling, Vloet, Ravens, 2008). Similar findings were discovered in a longitudinal study of young Australians with sub-clinical disordered eating behaviors. This 20-year study has followed 9,688 women for nine years thus far. Consistent results across four different surveys administered each year indicate that even minor levels of disordered eating symptomology are associated with significant deficits in well-being, both immediate and long-term (Wade, Wilksch, & Lee 2012).

Disordered Eating and Alcohol Use

Disordered eating and alcohol misuse are separate health concerns that are both associated with distinct psychological and physical problems. Perhaps not surprisingly however, the high prevalence of both disorders lends itself to the co-occurrence of alcohol use and disordered eating. Intentional caloric restriction, self-induced purging, diet pills, and fasting have been associated with heavy drinking and alcohol related consequences (Krahn, Kurth, Gomberg, & Drewnowski, 2005). This phenomenon of disordered eating behaviors and binge drinking has been dubbed by the popular media as *Drunkorexia*, a term that has also appeared in scholarly articles (Burke, Creemens, Vail-Smith, & Woolsey, 2010; Barry & Piazza-Gardner, 2012). Although the literature lacks a clearly defined construct depicting this co-occurrence, several studies have explored the relationship in college students. Findings from a study of 1,348 women

in their first year of college suggested that the prevalence and intensity of alcohol use has been positively associated with dieting and bingeing severity, as more severe dieters and at-risk dieters (at-risk & probable bulimic groups combined) are more likely to report recent negative consequences of drinking as compared to non-dieters and casual dieters (Krahn et. al, 2005). Another study reported significantly different patterns of alcohol consumption between students who reported restricting calories on days they knew they would drink, and those who did not engage in these behaviors (Burke, 2010). Among current drinkers, findings indicated that the majority of students who restricted calories (30%) reported drinking 10-19 days of the last month, as compared to only 20% of non-restricting participants. Furthermore, 11% of diet restrictors reported drinking 20+ days of the last month, compared to only 3% of non-restrictors. Similar differences were found among binge drinkers who restrict calories, as 33% of restricting participants reported binge-drinking episodes on 10-19 days out of the last month, compared to 20% of non-restrictors. Binge drinking on 20+ days out of the last month was reported for 21% of restricting participants compared to only 13% of non-restrictors. This pattern suggests a consistent trend that those who engage in caloric restriction are drinking (including binge drinking) on more days.

A qualitative study (Peralta, 2002) conducted with college students identified two major themes related to *Drunkorexia*. The first theme suggested that students' altered eating patterns through skipping meals and/or eating less than usual during a meal to reduce the total number of calories consumed. Findings indicated that 18% of college students, male and female, altered their eating habits in this fashion. Narratives of student interviews reflected sentiments that limiting food consumption was a solution to the problem of "high calorie" or "empty calorie" alcohol. Dual pressures including pressure to participate in alcohol-related social activities and

the pressure to maintain a desired body shape dictated some students' decisions to eliminate dinner in order to drink more. Participants in the study also suggested a dual benefit to limiting food consumption. By altering eating habits on a day of drinking, students were allowed the added benefit of requiring less alcohol to become intoxicated, as well as eliminating calories that could pose a threat to body shape norms. These motivations for altered eating patterns are further supported by findings from Burke et al. (2010). In this study, students provided the same rationale for conscious caloric restriction. The study found that of the 14.2% of college students who knowingly restricted their caloric intake on days when they planned to drink alcohol, 39% did so to avoid weight gain, and 68% did so to increase the effects of alcohol.

A second theme emerged from the Peralta (2002) study suggesting that students were also engaging in self-induced purging to rid the body of calories already ingested from alcohol. Findings indicated and 3.8% of students in the study engaged in this purging behavior. Similar sentiments to restricting caloric intake prior to alcohol consumption were also established in this post-drinking behavior. Although not as prevalent as altered eating behaviors, some participants reported engaging in self-induced vomiting after drinking in order to eliminate calories consumed. This behavior was a result of fears about gaining weight from alcohol calories.

College-age students who endorse disordered eating habits and also engage in binge drinking may face unique consequences. For example, in a highly restrained eater, it is possible that situations of elevated alcohol consumption or binge drinking increase the reward of highly palatable foods (Krahn et al., 1992; Krahn et al., 2005), and lower restrictive eating inhibitions. Thus, body-conscious college students may engage in uninhibited eating during or following a binge-drinking episode. This notion is supported in a study that found that students endorsed eating more food after drinking episodes than when not drinking, eating large amounts of food

following alcohol consumption (“drunk munchies; 36%) on at least half of drinking episodes, and being less healthy in their food choices as compared to when they refrain from drinking (Lloyd-Richardson, Lucero, Dibello, Jacobson, & Wing, 2009). Although uninhibited drunken eating could potentially cause guilt for anyone the day after a night of drinking and unhealthy eating, the psychological impact would seemingly be greater for an individual who is generally overly conscious of their eating habits and body shape satisfaction.

The causal link between disordered eating and binge-drinking remains unclear as students may endorse disordered eating behaviors to compensate for their binge drinking episodes, or perhaps correlates of disordered eating pathology including impulsivity and compulsivity lends itself to binge drinking. In the current study we hope to better describe the concept of *Drunkorexia*, and to measure its prevalence related to other variables including alcohol related problems and body image satisfaction.

Exercise and Alcohol Use

The relationship between physical activity and binge drinking is also complex, and has produced mixed findings in the field. It could be reasonably hypothesized that individuals who do not engage in physical activity would be most likely to participate in binge drinking. This notion is supported by evidence that people who do not engage in exercise are more likely to report other unhealthy behaviors than those who do exercise (Blair, Jacobs, & Powell, 1985). Similarly, research on young female adults indicates that women who exercise in response to stress are less likely to misuse alcohol as compared to women who do not exercise in response to stress. It was also found that chronic drinking is less likely in females who exercise moderately when compared to females who do not exercise (Bradstock et al., 1988). Other studies have found no relationship between exercise and alcohol (Kim, Larimer, Walker, & Marlatt, 1997).

Despite these findings, research has more consistently shown positive correlations between physical activity and binge drinking, especially when examining college student populations. For example, results from a recent study of college students indicate that strength training and vigorous intensity exercise are strong predictors of binge drinking (Barry & Piazza-Gardner, 2012). Similarly, results from a midsized university in Northern Florida showed that freshman participants who were frequent exercisers reported drinking significantly more often and consuming a significantly greater quantity of alcohol than did infrequent exercisers (Moore & Werch, 2008). Another study examining the relationship between physical activity and alcohol consumption found that there is a positive correlation between the two behaviors, even when accounting for third variables including age, sex, and Greek membership (Musselman & Rutledge, 2010). Several hypotheses have been offered as to why the positive correlation between alcohol consumption and physical activity exists in college students. For example, perhaps college students are not as concerned with healthy lifestyle habits as other adults. Instead, they are motivated to exercise by other factors (i.e. physical appearance or fitting in socially), and are not concerned by the health issues associated with drinking (Correia, Benson, & Carey, 2005). Another study suggests that the relationship exists as a result of reward-seeking individuals. A “work hard, play hard” motto has been endorsed by many college students, and may account for reward-seeking in both alcohol use and exercise (Perry, Larson, German, Madden, & Carroll, 2005). Participation on athletic teams could also play a large roll in the positive relationship between alcohol and exercise. Research on student athletes found that team environments support and encourage drinking, and perceived peer social norms contribute to findings that athletes drink more than non-athletes (Turrisi, Mastroleo, Mallett, Larimer, & Kilmer, 2007). Additionally, students involved in team sports sometimes have increased

opportunities for social drinking, including more initiation events that involve drinking (Vickers et al., 2004). Other explanations offered to explain the mechanisms for positive alcohol-exercise associations include large amounts of free time (Wechsler, Dowdall, Davenport, & Castillo, 1995), and counteracting the alcohol-related calories (Bryant, Darkes, & Rahal, 2012). For purposes of this study, we are most interested in examining the use of exercise as a compensatory behavior to counterbalance calories consumed during a drinking episode.

Body Image

The relationship between compensatory behaviors and alcohol consumption is undoubtedly complex. In addition to exploring the correlation between these behaviors, it is also important to pose potential explanations for the existence of the relationship. In the current study, we propose that body image satisfaction could potentially moderate the relationship between disordered eating, exercise, and alcohol consumption. Body image satisfaction is often conceptualized as a discrepancy between current and ideal body shape (Garner & Garfinkel, 1981), and the degree of negative feelings about body shape, body parts, and weight (Cash & Fleming, 2002). Poor body image satisfaction has been linked to increased risks of numerous psychological disturbances. For example, low body image satisfaction has been linked to eating disordered symptomatology, nicotine use (Stice & Shaw, 2003), and binge drinking (Vickers et al., 2004). Body dissatisfaction has also been linked to exercise in meaningful, but conflicting directions. LePage, Crowther, Harrington, & Engler (2008) explored the psychological correlates of fasting and vigorous exercise as compensatory strategies in undergraduate women. Participants were divided into four groups based on their scores on the Eating Disorder Examination-Questionnaire. Thus, the study compared women who engaged in both fasting and vigorous exercise as compensatory strategies (Combined group) with women who engaged in

either fasting or vigorous exercise as compensatory strategies and women who endorsed no compensatory strategies. Their results indicated that the Combined group, the Fasting Only group, and the Exercise Only group reported significantly greater body dissatisfaction and restrained eating than the control group. Additionally, the Combined group reported significantly greater awareness of internalization of the thin ideal than the remaining three groups (Lepage, et al., 2008). These results indicate a positive correlation between vigorous exercise and body dissatisfaction. However, another study found conflicting results regarding the relationship between exercise and body dissatisfaction. Lamarche and Gammage (2012) found that negative appearance evaluation was associated with less physical activity.

The association of body satisfaction and binge drinking is two-fold. Perhaps individuals who have engaged more frequently in binge drinking have a poorer body image as a result of their alcohol-related weight gain. Conversely, college students who have a poorer body image may choose to engage in binge drinking as a way to alleviate body dissatisfaction. Further exploration of these relationships including exercise, alcohol consumption, body image satisfaction, and disordered eating are necessary to better understand the complexity of these behaviors.

CEBRACS

Although there has been a growing interest in compensatory behaviors as they relate to alcohol consumption, there are limited measures to assess these behaviors. Previous qualitative findings of Peralta (2002) indicate results consistent with the phenomenon of *Drunkorexia*, but do not provide quantitative data to replicate in another sample. However, a recent study by Rahal, Bryant, Darkes, Menzel & Thompson (2012) developed a measure aimed to look at the relationship between compensatory eating and behaviors in response to alcohol consumption in a

quantitative manner. The measure was developed in order to assess eating habits and other behaviors, including exercise, intended to compensate for caloric intake during alcohol consumption. The survey is broken into three sections assessing behaviors during three time periods: before, during, and after alcohol consumption. Each of the three sections addresses behaviors in response to calories consumed from drinking alcohol. Specific items include questions about eating less than usual, skipping meals, eating low-calorie foods, and use of diet pills or laxatives. The measure was used in a sample of 274 undergraduate students from the University of South Florida. The majority of participants were female (n=223) and Caucasian (75.2%).

In addition to the CEBRACS, participants in the Rahal et al. (2012) study were administered supplementary measures. To assess for severity of eating disorder symptomology, subjects were asked to respond to three subscales of the EDI-2 including: Drive for Thinness, Bulimia, and Body Dissatisfaction. Participants also provided demographic and alcohol consumption information, and completed the Global Belief in a Just World Scale.

Results from the Principle Components Analysis by Rahal et al., 2012 indicated that the CEBRACS yielded four clear factors to best account for the data. Factor 1 (alcohol effects) contained items related to behaviors designed to enhance alcohol effects. Factor 2 reflected bulimic behaviors (bulimia). Factor 3 (exercise & dietary restraint) depicted exercise and dietary restraint. Factor 4 (restriction) reflected extreme restrictive behaviors (i.e. skipping meals or not eating for a day). Additionally, the findings indicated that the CEBRACS total scores were significantly associated with higher levels of body dissatisfaction, drive for thinness, and bulimia symptoms. The alcohol effects factor was associated with higher levels of drive for thinness and bulimia, but not body dissatisfaction. Both the dietary restraint and exercise and restriction

factors were significantly correlated with all three convergent measures. Correlations between the CEBRACS and alcohol use indicate small but significant relationships. Higher scores on compensatory behaviors were associated with higher levels of usual quantity of consumption, maximum drinks, and episodes of binge drinking.

Present Study

Previous research indicates a positive correlation between caloric restriction, increased exercise, and alcohol consumption and alcohol related problems (Krahn et al., 2005; Barry & Piazza-Gardner, 2012). Despite the noted links between compensatory behaviors and alcohol consumption, until recently there were no validated measures developed to dissect these compensatory behaviors in the context of alcohol consumption. In 2012, Rahal et al. created the CEBRACS scale, a measure that aims to explore these behaviors, however, the measure lacks additional validation in the literature. Thus, one goal of the present study was to analyze the performance of the CEBRACS scales in a new sample of undergraduate females. A second aim of the current study was to look at potential correlations between the CEBRACS factors and total scores and additional measures. As the CEBRACS was originally administered alongside supplementary measures assessing constructs related to compensatory behaviors, we evaluated related behaviors and beliefs, extending beyond the scope of what was previously explored. Specifically, we administered measures including the Eating Attitudes Test-26 (EAT-26), Daily Drinking Questionnaire (DDQ), and Rutgers Alcohol Problem Inventory (RAPI). Finally, this study also aimed to address the influence of body shape satisfaction on compensatory behaviors related to alcohol consumption. Thus, the addition of the Body Shape Questionnaire (BSQ) allowed us to investigate a potential third variable, body shape, as it relates to disordered eating, exercise, and alcohol consumption.

It was hypothesized that we would confirm that the four CEBRACS factors would be positively correlated with the DDQ and RAPI, thus indicating that restricted behaviors are correlated with greater alcohol consumption and alcohol-related problems. Furthermore, it was hypothesized that the EAT-26 will be positively correlated with the four factors of the CEBRACS, suggesting that individuals who endorse disordered eating habits are engaging in compensatory behaviors related to alcohol consumption. An additional hypothesis was that higher CEBRACS total scores would indicate higher scores on the RAPI, DDQ, EAT-26, and BSQ. Finally, it was hypothesized that body image satisfaction would serve as a moderator in the relationship between all 4 of the CEBRACS factors and CEBRACS total score and the DDQ and RAPI. Thus, the strength of the relationship between the CEBRACS factors and the DDQ and RAPI will be impacted by the body image satisfaction of an individual.

METHOD

Participants

Participants were 574 females ages 18 and over from a large Southeastern public university who participated in the online study. However, students who were over the age of 24 were removed (n=5) because they did not reflect of our target population. Additionally, only participants who reported at least one occasion of alcohol use in the last 28 days were used in the analyses, resulting in a sample of 366. The average age of the sample was 19.34 (SD=.94). The majority of participants were Caucasian (94%), but other racial ethnicities were also reported in the sample (African America/Black=4.1%, American Indian/Native American=3.3%, Asian=1.4%, and Native Hawaiian/Pacific Islander=0.8%). Participants endorsed having at least one alcoholic beverage an average of 6.98 days in the last 28 days, (SD=4.34), an average of 3.36 episodes of binge drinking (SD=3.67) in the past 28 days, and a maximum of 5.74 (SD=3.19) drinks

consumed in one night in the last 28 days.

All procedures were approved by the university's Institutional Review Board (IRB). Participants from this study were recruited through the Human Subject Pool Management System, SONA, and were compensated for their participation with extra credit in their psychology courses. Participants read an informed consent letter, which indicated that their completion of the measures implied that they were giving their informed consent. Participants then completed the measures described in the next section through an online portal.

Measures

General Information Questionnaire

This measure assessed basic demographic information such as age, ethnicity, years of school completed, and Greek membership. This information is used for descriptive purposes.

Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985)

The DDQ is a self-report calendar in which participants reported her drinking habits in the past calendar month including number of standard drinks consumed on a given day and maximum number of standard drinks consumed on a calendar day. To provide a better understanding of a drinking episode, additional questions were added to the measure to better assess type(s) of alcohol consumed, binge drinking episodes, and the weight of each participant.

Rutgers Alcohol Problem Inventory (RAPI; White & Labouvie, 1989)

The RAPI is a 23-item screening measure that was used to measure the consequences of alcohol use in the last 28 days. Respondents indicated on a likert scale ranging from 1(Never) to 4 (More than 10 times) the frequency of alcohol related consequences that occurred while using alcohol or because of alcohol use. Sample items include, "Caused shame or embarrassment to

someone,” “Neglected your responsibilities,” and “Felt you had a problem with alcohol.” Scores can range from 0-92 with higher scores indicating more severe alcohol related problems. The RAPI has demonstrated good test-retest reliability (Miller et al., 2002) and discriminant and construct validity (White, Filstead, Labouvie, Conlin, & Pandina, 1988; White & Labouvie, 2000). Additionally, the modified RAPI has shown adequate internal consistency among a college sample ($r=.84$; Correia, Carey & Borsari, 2002). In the current sample, Cronbach’s alpha was 0.89.

Compensatory Eating Behaviors in Response to Alcohol Consumption Scale (CERBACS; (Rahal, Bryant, Darkes, Menzel, & Thompson, 2012)

In order to assess compensatory behaviors including disordered eating and exercise prior to, during, and after alcohol consumption, the CERBACS was used. The CERBACS is a self-report measure that assesses engagement in compensatory behaviors in response to calories consumed from drinking alcohol. The questionnaire measures the presence of these behaviors at three specific time points: before, during, and after alcohol consumption. The scale asks respondents to rate items from 1(Never) to 5 (Almost all the time) that have occurred in the last month. Sample items include: skipping meals, diuretic use, eating low calorie foods, and exercising. The initial testing of the CERBACS in a college sample yielded Cronbach’s alpha of .89 for the overall CERBACS, and subscale alphas ranging from .79-.95 (Rahal et al., 2012). In the current sample, Cronbach’s alpha was .93 for the overall CERBACS total, and subscale alphas ranged from .68-.95.

Body Shape Questionnaire (BSQ; (Cooper et al., 1987)

The BSQ was used to measure the concerns and feelings about body shape, in particular, the experience of “feeling fat.” The BSQ is a 34-item self-report measure that uses a 6-point likert scale ranging from “never” to “always.” Higher scores indicate higher levels of body dissatisfaction. Tests for concurrent validity with previously established body satisfaction scales including the Body Satisfaction subscale of the Body Dissatisfaction Inventory and the Body Dysmorphic Disorder Examination indicated very high and moderately high correlations (Cooper, et al., 1987; Rosen, Jones, Ramirez, Waxman, 1996). Test-retest reliability for the BSQ was .88 (Rosen et al., 1996). In the present sample, Cronbach’s alpha was .97.

Eating Attitudes Test-26 (EAT-26; (Garner & Garfinkel, 1979)

In order to assess disordered eating behaviors in everyday life, the EAT-26 will be used. This 26-item self-report measure of eating disorder symptomology was derived from the original EAT-40 (Garner & Garfinkel, 1979), and has proved to be a reliable substitute for the longer original measure. In the current sample, Cronbach’s alpha was .92.

RESULTS

Data Analysis

Correlational Analyses

A series of correlations were conducted to determine the relationship among the compensatory behaviors related to alcohol, and measures of alcohol consumption, alcohol related problems, disordered eating and body shape satisfaction. These correlations are presented on Table 2. All four of the CEBRACS factors were positively correlated with one another. The CEBRACS total score and all four of the factors were correlated with the RAPI, and all but the bulimia factor were correlated with the DDQ Totals, suggesting that individuals who engage in compensatory behaviors in order to enhance the effects of alcohol or compensate for calories are

also consuming more alcohol and experiencing more alcohol related problems. The CEBRACS total score and all four factors were also positively correlated with the BSQ, which indicates that individuals who endorse poorer body image satisfaction, are more frequently engaging in behaviors in order to minimize alcohol calories consumed, or to feel the effects of alcohol faster.

Regression Analyses for CEBRACS, Alcohol Variables, and Body Image

A series of hierarchical regression analyses were conducted to determine if scores on the four CEBRACS scales (alcohol effects, bulimia, dietary restraint & exercise, & restriction) and CEBRACS total scores were predictive of scores on the RAPI and DDQ, respectively. In each of the 10 regressions, the CEBRACS factor or total score was entered as the first step, and the BSQ was entered as the second step. The interaction term consisting of the BSQ and the CEBRACS factor or total score was entered as the third and final step; the interaction terms were inserted to test the hypothesis that body shape satisfaction would moderate the relationship between the CEBRACS and measures of alcohol use and related problems. The results of the regressions are presented in Table 3-12

The first set of five regressions (Tables 3-7) employed RAPI scores as the dependent variable. In each case, the CEBRACS factor or total score accounted for a significant amount of variance (R^2 values= .09-.20). The addition of the BSQ also led to a small but statistically significant increase in the amount of variance accounted for ($R^2\Delta = .01-.04$). The interaction term was not significant and did not increase the amount of variance accounted for in any of the models, and therefore there was no evidence of moderation.

The second set of five regressions (Tables 8-12) employed DDQ scores as the dependent variable. The CEBRACS factor or total score accounted for a significant amount of variance (R^2 values= .05-.16) in four out of five models; the bulimia factor did not account for significant

variance in DDQ scores. The addition of the BSQ led to statistically significant increases in the amount of variance accounted for ($R^2\Delta$ values= .01-.04) in three out of the five models: bulimia, dietary restraint and exercise, and restriction. The addition of the BSQ did not account for significant variance in the models including alcohol effects or the total CEBRACS score. The interaction term was not significant and did not increase the amount of variance accounted for in any of the models, and therefore there was no evidence of moderation.

DISCUSSION

Previous research has indicated links between alcohol consumption and alcohol related problems and disordered eating, exercise, and body image satisfaction (Heidelberg & Correia, 2009; Barry & Piazza-Garndner, 2012; Vickers et al., 2004). Limited research is available, however, looking at specific alcohol-related behavior and practices that account for these relationships. A recent measure, the CEBRACS, was designed by Rahal et al. 2012 to explore a set of specific compensatory behaviors in response to alcohol consumption. The current study was designed to assess the performance of this measure in a new sample. Furthermore, the present study aimed to look at the relationship between the CEBRACS factors and total scores and additional measures related to alcohol consumption and related problems, disordered eating symptomology, and body shape satisfaction. A final goal of the study was to explore body shape satisfaction as a potential moderator of the relationships between the CEBRACS total scores and factor scores, and measures of alcohol consumption and alcohol related problems.

An analysis of bivariate correlates indicated that all of the factors of the CEBRACS (alcohol effects, bulimia, exercise and dietary restraint, and restriction) and the CEBRACS total score are positively correlated with the measures of alcohol consumption and related problems (DDQ, RAPI); the lone exception was the lack of a significant relationship between the bulimia

factor and the DDQ. These findings suggest that increased alcohol consumption and alcohol related problems is linked with greater compensatory behaviors in response to alcohol. These compensatory behaviors include engaging in behaviors to increase the effects of alcohol, dietary restraint and exercise, and restrictive eating behaviors. These findings confirmed our hypotheses, and have been demonstrated in previous literature. Prior findings suggest that alcohol consumption and alcohol-related problems are linked with disordered eating including intentional caloric restriction (Krahn et al., 2005) as well as increased exercise engagement (Moore & Werch, 2008.) Moreover, the findings that participants were engaging in compensatory behaviors in order to increase the effects of alcohol has also been confirmed in recent literature. Peralta (2002) found that individuals often times limit caloric intake because they can get drunk quicker. Similar findings in Burke et al. (2010) indicate that of the 14.2% of college students who knowingly restricted their caloric intake on days when they planned to drink alcohol, 39% did so to avoid weight gain, and 68% did so to increase the intoxicating effects of alcohol. Our findings suggest that students who engage in these specific behaviors are at increased risk of experiencing alcohol-related problems.

In addition to the CEBRACS factors and total score being positively correlated with the drinking measures administered, the four factors and total score were also positively correlated with the measure of body shape satisfaction (BSQ) and the measure of eating disorder symptomology (EAT-26). These findings indicate that people with poorer body satisfaction and more disordered eating behaviors are more likely to engage in compensatory behaviors related to alcohol consumption than those with more positive views of their body and less severe disordered eating symptomology. The positive correlation between body shape satisfaction and these four factors and total score is parallel with other findings which suggest that binge drinking

is associated with greater weight concerns (Vickers et al., 2004), and results indicating positive associations between eating disorder symptoms, dieting frequency, exercise preoccupation, and body dissatisfaction (Ackard, Croll, & Kearney-Cooke, 2002). There is limited literature available to suggest that poorer body satisfaction is correlated with binge drinking, as most focus is on the relationship between disordered eating and alcohol consumption. One study looking at the relationship between alcohol consumption and Body Dysmorphic Disorder, found that 29% of participants with Body Dysmorphic Disorder had co-occurring alcohol dependence (Grant, Menard, Pagano, Faye, & Phillips, 2005). This may indicate a similar link between poor body shape satisfaction and alcohol consumption, but there is a need for research to better understand the motivational components of the relationship between body shape satisfaction and alcohol consumption. As such, it is difficult to determine if poor body image satisfaction results in compensatory behaviors related to alcohol consumption in order to increase the effects of alcohol, a desire to maintain a certain body shape or weight, or as the result of some other motivation. Although the causality is undetermined, it is important to consider that women who experience more significant body image issues may be at higher risk for compensatory behaviors related to alcohol consumption, and vice versa. The findings that the EAT-26 was also associated with higher CEBRACS scale and total scores is consistent with what would be expected as the EAT-26 is comprised of questions related to dietary restraint, bulimic-like behaviors, and restriction, all of which are factors within the CEBRACS. Furthermore, as mentioned previously, disordered eating has been linked to desires to increase intoxicating effects of alcohol (Burke et al., 2010).

Inconsistent with our hypotheses was the finding that the CEBRACS's bulimia factor was not significantly correlated with the DDQ, but was significantly correlated with the RAPI. These

results suggest that while college females who endorse bulimic-like behaviors in response to alcohol consumption are experiencing more alcohol related problems than their peers who are not engaging in bulimic-like behaviors, the number of drinks they consume in a typical week is not significantly different. This finding is interesting as previous research from over 50 studies indicates that individuals with Bulimia are much more likely to have problematic alcohol use compared to individuals with Anorexia (Lilenfeld & Kaye, 1996), which would support a hypothetical relationship between the bulimia factor and typical alcohol consumption. However, evidence regarding the relationship between Bulimia and amount and frequency of alcohol use is mixed. Some findings indicate that individuals with Bulimia report increased alcohol consumption (Anderson, Simmons, Martens, Ferrier, & Sheehy, 2006), while others suggest that their alcohol consumption does not differ from non-Bulimic individuals (Dunn, Larimer, & Neighbors, 2002). There are consistent findings, however, that suggest that Bulimic individuals are more likely to experience negative consequences of alcohol use when compared to individuals without symptoms of Bulimia (Anderson et al., 2006; Dunn et al., 2002; Ross & Ivis, 1999). Another possible explanation of the non-significant relationship between the CEBRACS bulimia factor and the DDQ may result from what the bulimia scale is actually measuring. Although the questions on the factor target Bulimic-like symptoms, the questions do not directly capture a DSM-5 diagnosis of Bulimia. Therefore, it may not be that the relationship between Bulimia and the number of drinks consumed during a typical week is insignificant, but rather that what is captured by the CEBRACS bulimia scale is not significantly related to the amount of alcohol consumed during a typical week. The relationship between the bulimia factor and alcohol consumption was not reported in the original Rahal et al. 2012 article. This relationship should be explored further.

As expected based on the correlational analyses, a series of hierarchical regression analyses revealed that the CEBRACS scores were predictive of the RAPI. When the BSQ was added into the model, it indicated that the BSQ added to the prediction of the RAPI scores. This suggests that body shape satisfaction is predictive of alcohol related problems even after accounting for the various CEBRACS factor scores. These findings indicate that poorer body satisfaction places an individual at risk for alcohol related problems. Although there is not currently research available looking at the relationship between body image and alcohol related problems, findings suggests that body shape satisfaction is correlated with binge drinking (Vickers et al.,2004 .), and binge drinking is correlated with alcohol related problems (Hingson et al., 2005). As such, it is necessary to further explore the relationship between body shape satisfaction and alcohol consumption and related problems.

Consistent with correlational analyses, the alcohol effects, dietary restraint and exercise, and restriction factors, as well as the CEBRACS total score, were predictive of the DDQ. As previously found, the bulimia factor was not a significant predictor of the DDQ, and could suggest that the factor did not fully capture Bulimia or that bulimic like behaviors are not indicative of amount of alcohol consumed. When the BSQ was added into the model, it accounted for statistically significant increases in the amount of variance accounted for in the factors of bulimia, dietary restraint and exercise, and restriction. Alcohol effects and total CEBRACS scores were not affected when BSQ was added. One explanation for these findings is that the three factors predicted by the addition of the BSQ are all related to disordered eating behaviors that are used to make up for calories consumed in alcohol. The alcohol effects factor however, reflects behaviors designed to enhance the effects of alcohol. Thus, the motivations for the compensatory behaviors are different. While individuals endorsing alcohol effects are doing

so to maximize the effects of alcohol, individuals who endorse the other three factors are doing so to limit calories consumed from alcohol. Furthermore, the CEBRACS total score may not have been affected by the addition of the BSQ, because the alcohol affects factor accounts of a large part of the variance. There is evidence to suggest that individuals who engage in disordered eating have poorer body satisfaction (Farrell, Shafran, & Lee, 2006), but there is no information regarding the relationship between the enhancement of alcohol effects and body shape satisfaction.

The results of the interaction of body image satisfaction and the factors of the CEBRACS and total scores in predicting the DDQ and RAPI scores were insignificant. This suggests that the relationship between compensatory behaviors measured by the CEBRACS did not vary as a function of BSQ scores. These findings were inconsistent with our hypotheses that body image satisfaction would moderate the relationship between the CEBRACS factors and the DDQ and RAPI. As this is the first study to explore the relationship between body shape satisfaction and compensatory behaviors related to alcohol consumption, it is important to study this potential moderation in different populations. More specifically, future studies should look at body shape satisfaction and compensatory behaviors in a population with more severe disordered eating, such as in a sample of females with a diagnosed eating disorder. In the present study, the findings that the interaction between body shape satisfaction and the factors of the CEBRACS are insignificant suggest that the factors of the CEBRACS are predictive of amount of alcohol consumption and alcohol related problems, regardless of an individual's body image satisfaction. Moreover, the BSQ was predictive of RAPI and in some cases DDQ scores regardless of the participants' engagement in compensatory behaviors.

Limitations/Future Directions

Despite important findings from the current study, we recognize that several limitations in the study confine the interpretation of the results. First, the sample consisted of primarily White/non-Hispanic female college students. Although this population is often considered to be at the highest risk for disordered eating and alcohol use, it is important to explore this relationship in a more diverse sample. Additionally, the cross-sectional nature of the study did not allow us to explore any causal relationships. Future studies should examine the causality between disordered eating, exercise, alcohol use, and alcohol related problems, thus providing a better etiological understanding of the relationship. A further limitation of the study is the use of only self-report measures through Web-based assessment. Although anonymity associated with web-based assessment might allow participants to more honestly respond to questions, it is also a possibility that the privacy will lead to inattentive participants. Additionally, self-report may be influenced by intentional and unintentional biases in reporting.

Future directions should include the use of the CEBRACS in more diverse samples across the country. Additionally, future studies should explore the motivational components of engaging in disordered eating, exercise, and specific compensatory behaviors related to alcohol use. Thus far, drinking motives have been well studied (Cooper, Frone, Russel, & Mudar, 1995), and provide a greater understanding of individual's decision to consume alcohol. Not as thoroughly explored, however, are drinking motivations as they relate to disordered eating. One study aimed to explore drinking motives and eating pathology found that problematic eating behavior, particularly Bulimic-like behaviors, was most strongly associated with the use of alcohol as an avoidant coping mechanism (Anderson et al., 2006). Further exploration of this relationship should be employed. Additionally, exercise motivations should be examined in order to better understand how exercise serves as a compensatory behavior to alcohol consumption,

rather than an alternative motivation such as overall health benefits or stress-reduction. Finally, it is important to better understand the driving forces behind caloric restriction related to alcohol consumption. Prior findings indicate the reasons of caloric restriction are two-fold – enhancing the effects of alcohol and limiting caloric intake (Peralta, 2002). More knowledge differentiating between motivations including enhancing the effects of alcohol vs. limiting weight gain could be of great value in planning preventions and interventions.

Clinical Implications

Given the association of compensatory behaviors including disordered eating and exercise in response to alcohol consumption and the associated alcohol related problems, and the general comorbidity between disordered eating and alcohol consumption, it is imperative that these findings be used to inform clinical decisions. Furthermore, the present data provides evidence that these behaviors are present in non-clinical populations. Modifications should be made to prevention, assessment, and interventions related to alcohol consumption and disordered eating. When educating at-risk populations about alcohol use or eating disorders, it is important to consider the co-occurrence when providing information. Similarly, when an individual presents with either eating or alcohol related problems, it is important to assess for potential comorbidity. It is especially important that high school and university clinicians are aware of and address this, as these populations are considered to be at most risk for co-occurring alcohol and disordered eating.

As noted in previous findings, many universities in the United States offer services such as National Alcohol Screening Day and National Eating Disorders Screening Day, which identify students who are exhibiting symptoms of Alcohol Abuse or Eating Disorders, and encourages them to seek additional help. The present study and other results suggest that

disordered eating and alcohol consumption frequently co-occur, thus perhaps incorporating Eating Disorder screening questions at National Alcohol Screening Day, and Alcohol Abuse screening questions at National Eating Disorders Screening day would better inform the clinician on the services necessary for the individual (Heidelberg & Correia, 2009).

In addition to the need for screening measures that address the comorbidity of these behaviors, it is also important to consider potential interventions. One possible intervention is the brief intervention, more specifically, the Brief Alcohol Screening and Intervention for College Students (BASICS) (Dimeff, Baer, Kivlahan, & Marlatt, 1999). BASICS and similar programs aim to reduce alcohol consumption and promote healthy behaviors among college students, while taken a non-judgmental approach. Typically BASICS entails an initial interview in which the individual is assessed by the clinician, followed by a 50 -minute feedback session in which the clinician uses motivation interviewing and harm reduction principles, and the individual is provided important information about coping skills for risk reduction and personalized feedback. If additional appointments are needed, additional “booster sessions” may be scheduled to follow up with the individual’s progress. Specifically, individuals receive basic feedback about his or her drinking pattern and risks, as well as basic information about alcohol and its affect. Specific modules are offered depending on an individuals needs, such as information about sexual assault, comparisons of student drinking habits to college norms, and alcohol tolerance. The nature of the BASICS program is designed to address the needs on an individual basis. Since the feedback sessions allow for a variety of components to be discussed, it is possible that an adaptation made to the intervention could address eating behaviors in response to alcohol consumption. Brief interventions such as BASICS have been successful across the country (Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Borsari & Carey, 2005). Although there is not currently a brief

intervention designed to address both alcohol consumption and related problems and disordered eating, the findings from this study and previous results suggest there is a strong need for such an intervention, and that such an intervention would be feasible.

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Table 1
Summary of Descriptive Data for Sample

	N	Minimum	Maximum	Mean	SD
Age	365	18	24	19.34	.94
DDQ Total	363	0	47	8.91	7.70
RAPI Total	366	0	44	7.05	8.13
EAT-26	366	0	66	11.36	10.72
BSQ	366	34	190	94.52	32.90
CEBRACS Total	365	21	77	31.54	12.50
Alcohol Effects	366	7	36	11.02	6.15
Bulimia	366	6	19	6.54	1.96
Diet. Rest. & Ex	366	6	30	11.16	5.69
Restriction	365	2	10	2.80	1.46

Note: Total n=367; due to missing data on individual measures, actual data ranged from 363 to 366

DDQ Total: Daily Drinking Questionnaire, number of drinks per week

RAPI Total: Rutgers Alcohol Problem Index

EAT-26: Eating Attitudes Test

BSQ: Body Shape Questionnaire

CEBRACS Total: Compensatory Eating Behaviors Related to Alcohol Consumption Scale

Alcohol Effects: Factor reflecting behaviors designed to enhance effects of alcohol

Bulimia: Factor reflecting bulimic like behaviors

Diet. Rest. & Ex: Factor reflecting dietary restraint and exercise

Restriction: Factor reflecting extreme dietary restriction

Table 2

Intercorrelations and Correlations between CEBRACS Factors and Measures of Alcohol, Eating, and Exercise

	Factor 1 Alcohol Effects	Factor 2 Bulimia	Factor 3 Diet. Rest. & Ex.	Factor 4 Restrict	CEBRACS Total
Intercorrelations Among CEBRACS Factors					
Alcohol Effects	.95				
Bulimia	.39**	.84			
Diet. Rest. & Ex.	.54**	.29**	.90		
Restriction	.68**	.46**	.68**	.68	
CEBRACS Total	.88**	.53**	.85**	.83	.93
Correlations Between CEBRACS Factors and Other Variables					
DDQ Total	.40**	.07	.30**	.22**	.37**
RAPI Total	.45**	.38**	.30**	.35**	.46**
EAT-26	.38**	.34**	.54**	.60**	.56**
BSQ	.39**	.32**	.39**	.43**	.47**

Note: Total n=367; due to missing data on individual measures, actual data ranged from 362 to 366

Values on diagonals are internal consistencies, off-diagonal values are correlations between factors

DDQ Total: Daily Drinking Questionnaire, number of drinks per week

RAPI Total: Rutgers Alcohol Problem Index

EAT-26: Eating Attitudes Test

BSQ: Body Shape Questionnaire

*p<.05 **p<.01 ***p<.001

Table 3

Hierarchical Linear Regression Predicting Alcohol Related Problems in Drinkers with CEBRACS Alcohol Effects Factor

	R^2 (R^2 Change)	β	t	p
Step 1	.20(.20*)			
Alch. Effects		.59	9.52	<.001
Step 2	.22(.022*)			
Alch. Effects		.51	7.66	<.001
BSQ		.04	3.17	.002
Step3	.22(.001)			
Alch. Effects		.62	2.70	.007
BSQ		.05	2.06	.04
Alch EffectsxBSQ		-.00	-.050	.61

Note: $N = 365$; Dependent Variable: RAPI

* $p < .001$

Table 4

Hierarchical Linear Regression Predicting Alcohol Related Problems in Drinkers with CEBRACS Bulimia Factor

	R^2 (R^2 Change)	β	t	p
Step1	.14(.14*)			
Bulimia		1.55	7.69	<.001
Step 2	.18(.04*)			
Bulmia		1.27	6.12	<.001
BSQ		.05	4.22	<.001
Step3	.18(.28)			
Bulimia		2.19	2.49	.013
BSQ		.10	2.22	.027
BulimiauxBSQ		-.01	-1.08	.283

Note: $N = 365$; Dependent Variable: RAPI

* $p < .001$

Table 5
 Hierarchical Linear Regression Predicting Alcohol Related Problems in Drinkers with
 CEBRACS Dietary Restraint & Exercise Factor

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step1</u>				
Diet. Rest. & Ex.	.09(.09*)	.43	6.05	<.001
<u>Step2</u>				
Diet. Rest. & Ex.	.14(.04*)	.31	4.05	<.001
BSQ		.06	4.23	<.001
<u>Step3</u>				
Diet. Rest. & Ex.	.14 (.01)	-.12	-.49	.628
BSQ		.02	.57	.571
DietRestxBSQ		.00	1.85	.065

Note: N =365; Dependent Variable: RAPI

*p<.001

Table 6
 Hierarchical Linear Regression Predicting Alcohol Related Problems in Drinkers with
 CEBRACS Restriction Factor

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>				
Restriction	.12 (.12*)	1.93	7.05	<.001
<u>Step 2</u>				
Restriction	.15(.03*)	1.46	4.91	<.001
BSQ		.05	3.65	<.001
<u>Step 3</u>				
Restriction	.15(.00)	1.76	1.50	.153
BSQ		.06	2.01	.045
RestrictionxBSQ		-.00	-.26	.795

Note: N =364; Dependent Variable: RAPI

*p<.001

Table 7 Hierarchical Linear Regression Predicting Alcohol Related Problems in Drinkers with CEBRACS Total Score

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>				
CebTot	.21(.21*)	.30	9.80	<.001
<u>Step 2</u>				
CebTot	.22(.01*)	.26	7.63	<.001
BSQ		.03	2.31	.022
<u>Step 3</u>				
CebTot	.22(.00)	.26	2.28	.023
BSQ		.03	.99	.324
CebTotxBSQ		.00	-.00	.998

Note: N =364; Dependent Variable: RAPI

*p<.001

Table 8 Hierarchical Linear Regression Predicting Drinking Patterns with CEBRACS Alcohol Effects Factor

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>				
Alch. Effects	.16(.16*)	.50	8.26	<.001
<u>Step 2</u>				
Alch. Effects	.16(.00)	.47	7.14	<.001
BSQ		.02	1.21	.226
<u>Step 3</u>				
Alch. Effects	.16(.51)	.61	2.70	.007
BSQ		.03	1.12	.237
Alch.EffectsxBSQ		-.00	-.15	.514

Note: N =361; Dependent Variable: DDQ

*p<.001

Table 9 Hierarchical Linear Regression Predicting Drinking Patterns with CEBRACS Bulimia Factor

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>	.01(.01)			
Bulimia		.29	1.41	.161
<u>Step 2</u>	.44(.04*)			
Bulimia		.03	.15	.879
BSQ		.05	3.81	<.001
<u>Step 3</u>	.44(.00)			
Bulimia		.17	.19	.852
BSQ		.06	1.22	.224
BulimiaxBSQ		-.00	-.16	.877

Note: N =361; Dependent Variable: DDQ

*p<.001

Table 10 Hierarchical Linear Regression Predicting Drinking Patterns with CEBRACS Dietary Restraint & Exercise Factor

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>	.09(.09*)			
Diet. Rest.& Ex.		.40	5.86	<.001
<u>Step 2</u>	.10(.01**)			
Diet. Rest.& Ex.		.34	4.62	<.001
BSQ		.26	2.05	.041
<u>Step 3</u>	.10 (.00)			
Diet. Rest. & Ex.		.07	.32	.752
BSQ		.00	.01	.990
Diet.Rest.xBSQ		.00	1.20	.232

Note: N =361; Dependent Variable: DDQ

*p<.001

**p<.05

Table 11 Hierarchical Linear Regression Predicting Drinking Patterns with CEBRACS Restriction Factor

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>	.05(.05*)			
Restriction		1.14	4.22	<.001
<u>Step 2</u>	.06(.02***)			
Restriction		.82	2.74	.006
BSQ		.03	2.51	.012
<u>Step 3</u>	.06(.00)			
Restriction		.41	.35	.726
BSQ		.03	.92	.356
RestrictionxBSQ		.00	.36	.721

Note: *N* =361; Dependent Variable: DDQ

**p*<.001

***p*<.05

****p*<.01

Table 12 Hierarchical Linear Regression Predicting Drinking Patterns with CEBRACS Total Score

	R ² (R ² Change)	β	<i>t</i>	<i>p</i>
<u>Step 1</u>	.14(.14*)			
CebTot		.23	7.50	<.001
<u>Step 2</u>	.14(.00)			
CebTot		.21	6.22	<.001
BSQ		.01	.89	.393
<u>Step 3</u>	.14(.00)			
CebTot		.28	2.40	.017
BSQ		.03	.88	.378
CebTotxBSQ		-.00	-.57	.567

Note: *N* =361; Dependent Variable: DDQ

**p*<.001

***p*<.05

****p*<.01