

THE MODERATING EFFECTS OF FIVE FACTOR MODEL PERSONALITY TRAITS ON
THE PHYSICAL ACTIVITY AND ALCOHOL USE RELATIONSHIP

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DEDICATION

For Justin, who believed in me enough to move to Texas, and who loves me enough to keep me sane when graduate school tries to make me crazy.

ABSTRACT

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Several studies have shown a robust positive association between levels of physical activity (PA) and alcohol intake on both a cross-sectional between-persons level (e.g., Leasure & Neighbors, 2014; Moore & Werch, 2008), and on a within-person longitudinal daily level (Conroy et al., 2014). The relationship between alcohol consumption and PA has been of particular interest to researchers as a pathway to developing treatment and prevention strategies for problematic alcohol consumption behaviors. However, treatments focusing on increasing PA as a replacement for drinking behaviors have had mixed results, suggesting that interventions are not addressing individual differences in the way that their participants engage in both PA and alcohol-related behaviors. The current study investigated whether differences in Five-Factor Model (FFM) personality trait profiles moderate the PA-alcohol relationship. Results showed that while light PA, extraversion, and neuroticism were each predictive of alcohol consumption alone, there were no interaction effects among PA and personality variables as predictors of alcohol use. These results suggest that although light PA is positively related to alcohol use, personality traits do not influence the strength of this relationship, meaning that the effects of these predictors do not compound. Therefore, individuals high in traits of extraversion or neuroticism are not specifically at risk for higher levels of alcohol consumption than their less extraverted or neurotic peers if they also participate in light PA. However, this finding has less optimistic implications for the implementation of PA-based alcohol treatment interventions for these individuals.

KEY WORDS: Exercise, physical activity, alcohol, personality, traits, FFM, BFI, TIPI

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CHAPTER I

Introduction

Engaging in deliberate physical activity (PA) is a health-promoting behavior that generally clusters with other healthy lifestyle behaviors such as maintaining a balanced diet and healthy sleep habits (Leasure et al., 2015). In contrast, despite evidence that moderate amounts of its consumption may have health benefits (Marmot, Rose, Shipley, & Thomas, 1981), drinking alcohol is commonly not regarded as a healthy lifestyle behavior, given that excessive alcohol consumption has been linked to risk behaviors and negative consequences such as unprotected sexual intercourse, illnesses, and even death (Hingson, Heeren, Winter, Wechsler, 2005). Despite these contrasting perceptions, several studies have shown a robust positive association between levels of PA and alcohol intake on both a cross-sectional between-persons level (e.g., Leasure & Neighbors, 2014; Moore & Werch, 2008; Musselman & Rutledge, 2010; Piazza-Gardner & Barry, 2012), and on a within-person longitudinal daily level (Conroy et al., 2014). This combination of lifestyle behaviors emerges in some moderate drinkers, who, in addition to consuming alcohol, are physically active, eat healthily, and highly value their physical health (Slater, Basil, & Maibach, 1999).

The relationship between alcohol consumption and PA has been of particular interest to researchers as a pathway to developing treatment and prevention strategies for problematic alcohol consumption behaviors, including alcohol use disorders (Leasure et al., 2015). Thus, there are several characteristics of this relationship that have been studied. A daily diary study by Conroy and colleagues (2014) has shown that individuals tend to drink more on the days that they are more active. Other research has shown that

the associations between PA and alcohol consumption levels are stronger in men than in women and most pronounced in individuals under the age of 50 (Lisha, Martens, & Leventhal, 2011), suggesting that moderating factors may play an important role in the relationship between these behaviors.

The importance of underlying factors in this relationship has also been highlighted in studies that have attempted to implement PA as part of a treatment or prevention strategy for problematic alcohol consumption behaviors. Treatments that have focused on increasing PA as a replacement for drinking behaviors have had mixed results. While some studies (e.g., Correia et al., 2005; Murphy et al., 2012; Weinstock et al., 2014) have shown increases in participants' PA during their interventions, they usually have not shown significant decreases in alcohol consumption compared to control groups. Conversely, treatment studies using PA as an adjunctive facet of a traditional alcohol use intervention have found more consistent, promising results, although some studies continue to show no differences between treatment and control groups (see meta-analysis by Giesen et al., 2015).

The mixed results of these treatment studies suggest that both types of intervention strategies may be lacking in potency by not addressing individual differences in the way that their participants engage in both PA and alcohol-related behaviors. An intervention that works for one individual may be ineffective, or even iatrogenic, for another individual if the reasons or amounts that they participate in these behaviors are different. Thus, the most salient research question in the pursuit of understanding the relationship between alcohol and physical activity has become this: what are these individual differences that affect PA and alcohol consumption behaviors?

Current research has begun to address this question by examining motivations for drinking and PA, social factors that influence these behaviors, and other health behaviors that are linked to both alcohol consumption and PA levels (Leasure et al., 2015). Another factor that has been implicated as a possible moderator of this relationship is personality; however, the personality characteristics of individuals who both engage in PA and drink alcohol are almost completely unstudied. One study has demonstrated the role of impulsivity as a moderator of the positive PA-alcohol association, but it focused primarily on impulsivity as a behavioral construct as opposed to a personality factor and did not consider any other personality characteristics (Leasure & Neighbors, 2014). Another study found that conscientiousness predicted both physical activity and alcohol consumption behaviors but did not change the correlation between alcohol use and physical activity, suggesting that it instead explained unique variance in each factor. No other significant relationships with personality were found (Abrantes et al., 2017).

Although research examining the role of personality traits on the PA-alcohol relationship is scarce, there is a wealth of research examining the role of personality traits in PA and alcohol consumption behaviors separately. These analyses are most often performed through the lens of the Five Factor Model (FFM) of personality, which conceptualizes adult personality as being varying levels of five underlying traits: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (McCrae & Costa, 1987). Interestingly, each of these personality factors has its own unique relationship to patterns of alcohol consumption and PA, complicating the picture of the positive association between these variables.

When examining the relationship between personality traits and alcohol consumption, previous research has found several consistent patterns. High levels of extraversion have been consistently linked to greater amounts of alcohol consumption (e.g., Hakulinen et al., 2015; Heinrich et al., 2016), although some research has also found extraversion to be a negative predictor of alcohol dependence (Donadon & Osorio, 2016), suggesting that highly extraverted individuals may fall into the “moderate drinker” category. High levels of neuroticism have also been associated with greater amounts of alcohol consumption (Hakulinen et al., 2015), and subfacets of neuroticism such as anxiety sensitivity have been shown to have indirect effects on the development of alcohol-related problems (Pearson & Hustad, 2014); however, one study suggests that neuroticism is more likely to personify moderate drinkers than binge drinkers (Lac & Donaldson, 2016). Higher levels of openness to experience and lower levels of conscientiousness have been associated with drinking for longer lengths of time (in years), suggesting that individuals with these personality characteristics are more likely to start drinking at a younger age and solidify their drinking habits early on (Donadon & Osorio, 2016). Further studies have also linked low levels of conscientiousness to heavier alcohol consumption overall (Hakulinen et al., 2015). The relationship between agreeableness and alcohol has the least research support; however, it has been suggested that individuals who abstain from alcohol use or have decreased their alcohol consumption over time have higher levels of agreeableness than individuals who drink alcohol more frequently (Hakulinen et al., 2015).

Previous research has also established patterns for the relationships of the FFM traits to PA, which is broadly defined as any movement that requires energy, and exercise

behaviors, which are defined as planned, structured, and intentional movements intended to improve or maintain physical fitness. Individuals who score highly on extraversion scales are more likely to report exercising on a regular basis than their less-extraverted peers (e.g., De Moor, Beem, Stubbe, Boomsma, & De Geus, 2006; Mottus, Epskamp, & Francis, 2016; Raynor & Levine, 2009, Yap & Lee, 2013). Similarly, individuals who are highly conscientious also report exercising more frequently or participating in athletic activities more often than individuals who score lower on measures of conscientiousness (Malinauskas, Dumciene, Mamkus, & Venckunas, 2014; Mottus et al., 2016; Raynor & Levine, 2009). On the other hand, individuals who exercise regularly are more likely to report low neuroticism scores (De Moor et al., 2006; Wilson & Dishman, 2014). The roles of openness and agreeableness in relation to PA are less clear-cut than the roles of the previously discussed personality traits. Although one meta-analysis found that higher levels of openness were associated with more frequent exercise, the authors noted that the relationship had a fairly small effect size, and this finding has yet to be replicated in further research (Wilson & Dishman, 2014). No consistent significant associations have been found between levels of agreeableness and levels of PA or exercise behavior (Wilson & Dishman, 2014; Yap & Lee, 2013).

When the results of the previous research examining these relationships are combined, each personality trait has its own relationship profile with respect to PA and alcohol. High levels of neuroticism are associated with higher amounts of alcohol use and lower amounts of PA (De Moor et al., 2006; Hakulinen et al., 2015). High levels of conscientiousness display the opposite pattern of lower levels of alcohol use and higher levels of PA (Hakulinen et al., 2015; Malinauskas et al. 2014). High levels of

extraversion are associated with higher levels of both alcohol use and PA (De Moor et al., 2006; Heinrich et al., 2016). High levels of openness are also associated with higher (or at least longer) amounts of alcohol use and higher levels of PA (Donadon & Osorio, 2016; Wilson & Dishman, 2014). High levels of agreeableness are associated with lower levels of alcohol use, but no consistent relationship has been established between agreeableness and PA levels (Hakulinen et al., 2015; Wilson & Dishman, 2014).

Some of these trait patterns, such as extraversion (high/high), support the positive association between PA and alcohol use, while others, such as neuroticism (high/low) or conscientiousness (low/high), seem to suggest that these two variables would be more likely to show a negative association. This raises the question of whether PA and alcohol use behaviors, which have previously shown a robust positive association with one another (e.g., Leasure & Neighbors, 2014; Moore & Werch, 2008), are positively associated across all personality types. If differences are found among these varied personality profiles, this may shed light on some of the individual differences seen across studies attempting to use exercise as a component of treatment for problematic alcohol behaviors.

The Current Study

The current study is a secondary analysis of data collected by Henderson and colleagues (2015) examining daily (within-person) and usual (between-person) relations between PA and alcohol consumption behaviors. This data set contains demographic and other baseline information on each participant as well as accelerometer data of their daily PA and survey data of their daily alcohol use over a 14-day follow-up period. Analysis of the data by Henderson and colleagues found some marginal associations between light

PA and alcohol use on a daily level, suggesting the need for further study of the effects of moderating factors on this relationship.

The current study seeks to answer the question: how do differences in personality trait profiles moderate the PA-alcohol relationship? Based on the literature, I developed several hypotheses: (a) that people who are more physically active on average will consume more alcohol (between-person effect), and (b) on days when people are more active than usual, they will consume more alcohol (within-person association). Further, because the accelerometer data included information regarding activity intensity, I also examined whether relations with alcohol use differ for lifestyle (light) and exercise (moderate and vigorous) activity. FFM personality traits (extraversion, neuroticism, conscientiousness, agreeableness, openness) were examined as potential moderators of these daily and usual relations. Given previous research regarding personality traits and their relationship to PA and alcohol use, my next hypotheses were: (c) that extraversion and openness will be enhancing moderators, in which increasing levels of these moderators increases the salience of the PA-alcohol use relationship and (d) neuroticism and conscientiousness will be buffering moderators, in which increasing levels of these moderators decreases the salience of the PA-alcohol use relationship. Given the lack of previous research on agreeableness and its relationship to PA, no hypothesis was formed regarding its moderating effects on this relationship.

CHAPTER II

Method

Participants

The sample for the current study consists of 263 undergraduate participants recruited from a mid-sized regional Southern University. Of the 263 total participants, the majority were female (60.8%) and averaged 21.68 years of age ($SD = 5.34$). Ethnicity closely resembled the overall student population demographics of the institution, with the majority identifying as Caucasian (57.8%), followed by African American or Black (19.0%), Asian (1.1%), American Indian or Alaskan Native (0.7%), Native Hawaiian or Pacific Islander (0.3%), and “Other” (12.2%). Twenty-five percent of participants identified as Hispanic. Additionally, some participants declined to report their ethnicity (8.7%). Based on BMI standards, approximately half of participants (51.3%) fell into the “Normal Weight” category, while a quarter (25.1%) fell into the “Overweight” category. An additional 19.0% of participants fell into the “Obese” category, while 4.6% fell into the “Underweight” category. Table 1 contains a detailed list of demographic data.

Table 1

Demographics

	<i>N</i> (Total = 263)	Percentage
Gender		
Male	103	39.2%
Female	160	60.8%
Ethnicity		
Caucasian	152	57.8%
African American	50	19.0%
Asian	3	1.1%

(continued)

	<i>N</i> (Total = 263)	Percentage
American Indian or Alaskan Native	2	0.7%
Native Hawaiian or Pacific Islander	1	0.3%
Other	32	12.2%
Declined to Report	23	8.7%
BMI Category		
Underweight	12	4.6%
Normal Weight	135	51.3%
Overweight	66	25.1%
Obese	50	19.0%

Note. BMI = Body Mass Index.

Measures

Demographic information was collected via self-report. Participants were asked to provide details regarding their age, gender, race, ethnicity, and employment status, along with baseline levels of physical activity and alcohol use over the past 30 days. At baseline, participants were also asked to provide self-report data on personality characteristics using either the Ten-Item Personality Inventory (TIPI) (Gosling, Rentfrow, & Swann Jr., 2003) or the Big-Five Inventory (BFI) (John, Donahue, & Kentle, 1991).

The TIPI is a ten-item self-report scale of FFM personality traits. Each item consists of two descriptive words using the common stem “I see myself as:” and is rated on a seven-point scale, with 1 corresponding to “Disagree Strongly” and 7 corresponding to “Agree Strongly.” The instrument was designed to take approximately one minute to complete while still retaining the breadth necessary to represent each pole of the five FFM dimensions. The convergent validity of the TIPI compared to previously existing FFM measures such as the BFI (John, Donahue, & Kentle, 1991) are substantial, with a

mean convergent correlation of $r = .77$, and an absolute mean of discriminant correlation of $r = .20$, with no individual correlation exceeding $r = .36$. The test-retest reliability of the TIPI is also substantial (mean $r = .72$), and the patterns of external correlates of the TIPI match closely with the patterns of the BFI. Internal consistency measures of the TIPI are relatively low, due to the presence of only two items for each subscale. Specifically, the Cronbach alphas are .68, .40, .50, .73, and .45 for the Extraversion, Agreeableness, Conscientiousness, Emotional Stability (Neuroticism), and Openness to Experience scales respectively.

The BFI is a 44-item self-report scale of FFM personality traits. Each item consists of a short phrase using the common stem “I see myself as someone who...” and is rated on a 5-point Likert scale, where 1 corresponds with “Disagree strongly” and 5 corresponds with “Agree strongly. The instrument was designed to address the need for a short instrument to measure the components of the FFM that are commonly used across studies (John & Srivastava, 1999). This scale was developed using prototype definitions agreed upon by expert ratings and confirmed by subsequent factor analysis of observer personality ratings. Given its use of eight to ten items for each scale, the BFI has been found to show good content coverage and psychometric properties. In U.S. and Canadian samples, the alpha reliabilities of the BFI scales typically range from .75 to .90 and average above .80. In addition, three-month test-retest reliabilities range from .80 to .90 with a mean of .85. Validity evidence also shows expected convergence and divergence with other FFM instruments and peer ratings.

The Actical physical activity monitor (Philips Respironics, Bend, OR) is a research-grade accelerometer designed to track an individual’s energy expenditure and

step count that can be worn on the wrist. It can collect data in segments as short as one second and track 25 fitness-related statistics based on this data collection. For this study, raw physical activity (PA) counts were recorded in 60-second periods over the 14-day follow-up. Periods of time with no activity over the course of 60 minutes were counted as non-wear time (Wilson et al., 2014). Activity count classifications for PA levels were adopted from Giffuni, McMurray, Schwartz, & Berry (2012): Sedentary (< 100 counts/min), Light (100 to 1725 counts/min); Moderate (1726 to 4116 counts/min); and Vigorous (4117+ counts/min). For the purposes of the current study, PA was divided into two categories: exercise and lifestyle activity. Daily moderate and vigorous activity (1726-4117+ counts/min) were combined into the exercise category, and light activity (100-1725 counts/min) comprised the lifestyle activity category (Giffuni et al., 2012). PA was calculated as the total number of minutes within a given intensity level for that day beginning at 6am and ending at 12am. Activity was not tracked between 12am and 6am to account for sleep. To be included in the daily activity count, activities needed to last for at least 10 minutes. The Actical accelerometer has been validated in several studies as providing reliable and valid objective assessment of physical activity in a natural environment (Crouter, Dellavalle, Horton, Haas, Frongillo & Bassett, 2011; Hendelman, Miller, Baggett, Debold, & Freedson, 2000).

Alcohol intake was measured using a self-report question in the daily survey. Each day, participants were asked to respond to the following question: “Since yesterday, did you use alcohol?”. Response options were dichotomous “Yes/No” for each day. This daily data collection method allowed researchers to avoid problems and inconsistencies with individuals’ recall that may be associated with retrospective measures such as the

Timeline Follow-Back (Sobell & Sobell, 1992) over a more extended period when assessing alcohol assumption (Carney, Tennen, Affleck, Del Boca, & Kranzler, 1998).

Procedures

Participants were recruited via the university's Department of Psychology online research participation site. Students were incentivized to participate in the study by receiving required research credits for their undergraduate-level psychology courses. To begin the study, researchers met with participants for a baseline session in which the students were oriented to the goals and requirements of the study and completed a survey asking for demographic, personality, and alcohol use information. Participants gave informed consent at the time that baseline data was collected and agreed to be available for data collection over a 14-day follow-up period after their orientation session. At the time of the baseline session, researchers also distributed Actical physical activity monitors to participants that were individually calibrated based on activity information and measurements collected in the baseline session. Participants were directed to wear the monitor on their wrist continuously for the 14-day period of the study, including when they were sleeping. Participants were instructed to remove the Actical monitor only when participating in water-related activities (e.g., swimming, showering, etc.). Finally, participants provided a current email address to receive daily emailed links to a survey that asked them whether they had used alcohol the previous day.

The alcohol use surveys were sent out to participants daily for each of the 14 days of the follow-up period, with participants receiving instructions to complete each survey no later than 12:00pm the following day. Researchers also sent text messages to participants' cell phones throughout the day as motivational reminders to complete the

surveys to improve response rate. At the end of the 14-day follow-up period, participants met with researchers to return the Actical and the daily survey e-mails and reminders ceased. Because the Actical monitor was initially activated at different times for each participant, the researchers offset start times such that periods of physical activity monitoring began at midnight of day 1.

Data Analysis

The current study drew on the methods used to examine the hypotheses posed in the parent study (Henderson et al., 2015). As continuous alcohol data were not collected for a portion of the sample, daily alcohol use was measured by an item indicating whether the participant had drunk any alcohol over the previous 24 hours (0 = no, 1 = yes). Multilevel logistic regression models with days nested within people (Snijders & Bosker, 1999) were used to test hypotheses regarding within- and between- person associations between PA (daily and aggregate [usual] for the various activity levels [e.g., light, moderate, vigorous]) and alcohol use. PA was divided into two categories: exercise (deliberate physical activity to increase or maintain physical fitness) and lifestyle activity (any physical activity throughout the day such as walking from a car to an office). Daily moderate and vigorous activity counts were combined into the exercise category, and light activity counts comprised the lifestyle activity category.

When PA distributions were examined in the parent study, they were found to be highly positively skewed, and a logarithmic transformation was applied to improve the normality of the data. The transformed PA data were also used in the current study and included as predictors of daily alcohol use. In addition to PA data, personality data were tested as predictors of daily alcohol use. These personality scores were formed by

calculating z-scores for each participant's personality data in order to equate measures of personality traits on the BFI and the TIPI across the sample. After each of these predictors was tested, interactions between personality z-scores and activity levels were also tested as predictors of daily alcohol use. Product interaction variables were formed by centering the main effects of the PA and personality predictor variables and multiplying these centered variables together (Aiken & West, 1991).

CHAPTER III

Results

The final dataset consisted of 2423 daily reports from 174 students. Descriptive statistics for these data are shown in Table 2. Participants reported an average of 1.23 drinking days over the two-week period ($SD = 1.71$, range = 0-6). On average, they reported an average of 392.58 minutes of lifestyle activity ($SD = 145.44$), and 29.11 minutes of exercise ($SD = 23.30$) per day. Participants did not provide a response for their daily alcohol use in 37% of the total number of days available; activity data were captured at a higher rate (92%), yielding a final sample of 151 students over 1430 days.

Table 2

Descriptive Statistics

	Mean	Standard Deviation
Age	21.68	5.34
Days of Alcohol Use	1.23	1.71
Activity Counts		
Lifestyle Activity	392.58	145.44
Exercise	29.11	23.30
BFI Scores		
Extraversion	26.92	6.39
Agreeableness	40.38	6.34
Conscientiousness	34.71	5.10
Neuroticism	21.61	6.35
Openness	36.12	5.72
TIPI Scores		
Extraversion	8.13	2.46
Agreeableness	8.32	1.93
Conscientiousness	9.54	2.24
Neuroticism	9.27	2.19
Openness	8.31	2.49

Note. BFI = Big-Five Inventory; TIPI = Ten-Item Personality Inventory. Days of alcohol use are calculated as days of use over two weeks. Activity counts are measured in minutes per day.

Regression Analyses Main Effects

First, we tested whether physical activity and day of the week variables predicted daily alcohol use using multilevel regression. These results are shown in Table 3.

Analyses revealed that the only significant predictors at the daily level were day of the week, in which the social weekend (Thursday-Sunday) was positively associated with a higher likelihood of drinking (b 's = .79 – 1.68, standard errors (SE) = .24 - .27, z 's = 2.97 – 6.88, p 's < .01). This relationship appeared to be strongest on Saturday. This “social weekend” predictor pattern was consistent with the findings of the parent study. On the other hand, neither lifestyle activity (b = -.25, SE = .52, z = -.49, p = .63) nor exercise (b = .69, SE = .52, z = .20, p = .84) were significant predictors of alcohol use on a daily level.

Next, we added personality variables along with the physical activity predictors. These results are also shown in Table 3. Analyses revealed that lifestyle activity significantly predicted usual alcohol use (b = 2.34, SE = 1.18, z = 1.99, p = .05), as did extraversion (b = .44, SE = .15, z = 2.91, p < .01) and neuroticism (b = .33, SE = .16, z = 2.03, p = .04). Exercise and other personality variables (i.e., conscientiousness, agreeableness, openness) were not significant predictors of alcohol use on a usual level.

Regression Analyses Interaction Effects

Finally, after determining the presence of main effects for extraversion and neuroticism, four product interaction variables were formed by combining each of these personality variables with each of the two physical activity variables (i.e., lifestyle activity and exercise). The results of these interaction analyses are shown in Table 3.

Analyses revealed that none of the product interaction variables significantly predicted alcohol use on a usual level.

Table 3

Alcohol Use Regression Analyses

Predictors	<i>b</i>	S.E.	<i>z</i>	<i>p</i>
Daily Level				
Lifestyle Activity	-0.25	0.52	-0.49	0.63
Exercise	0.69	3.40	0.20	0.84
Thursday	0.79**	0.27	2.97	<0.01
Friday	1.21**	0.24	5.03	<0.01
Saturday	1.68**	0.24	6.88	<0.01
Sunday	1.15**	0.26	4.51	<0.01
Usual Level				
Lifestyle Activity	2.34*	1.18	1.99	0.05
Exercise	-6.11	6.50	-0.94	0.35
Extraversion	0.44**	0.15	2.91	<0.01
Agreeableness	0.09	0.16	0.56	0.58
Conscientiousness	0.07	0.15	0.46	0.65
Neuroticism	0.33*	0.16	2.03	0.04
Openness	<0.01	0.16	0.06	0.95
Interaction Effects				
Lifestyle Activity X Extraversion	-1.02	1.16	-0.88	0.38
Lifestyle Activity X Neuroticism	-0.71	1.12	-0.63	0.53
Exercise X Extraversion	-2.54	8.39	-0.30	0.76
Exercise X Neuroticism	8.78	7.26	1.21	0.23

Note. S.E. = standard error. Personality traits ratings are z-scores based on the combination of both Big-Five Inventory (BFI) and Ten-Item Personality Inventory (TIPI) scores. * = Significant at .05 level. ** = Significant at .01 level. Listed interactions represent a trimmed model of usual-level interactions after removing non-significant main effect variables.

CHAPTER IV

Discussion

The primary purpose of the current study was to investigate the moderating effects of FFM personality traits on the association between PA and alcohol use. I did this by first examining the main effects among daily- and usual-level PA, alcohol use and personality variables, and then, investigating the significance of interaction effects among these relationships. My results showed a positive association between light PA and alcohol use on a between-persons level. On a within-person level, the only significant association was between day of the week and alcohol use, indicating that participants were more likely to drink alcohol on the social weekend (Thursday-Sunday) than during the week. I also found that both extraversion and neuroticism were positively associated with alcohol use; however, neither of these personality variables had a significant moderating effect on the association between PA and alcohol use.

Given the results of the parent study (Henderson et al., 2015), which utilized the same dataset, the limited relationships between PA and alcohol use found in this sample were unsurprising. These relationships were represented by the results that showed light PA was associated with alcohol use on a between-person level, while moderate/vigorous PA was not. Additionally, no significant associations were found between either light or moderate/vigorous PA and alcohol use on a within-person level. Although these analyses were consistent with the findings of the parent study, they suggest a more limited scope of the PA-alcohol use relationship in our sample than has been shown on both between-persons (e.g., Leasure & Neighbors, 2014, Moore & Werch, 2008) and within-person

(Conroy et al., 2014) levels in previous studies that informed my initial predictions in this study.

My prediction that extraversion and openness would serve as enhancing moderators to the PA-alcohol use relationship was not supported by my results. Consistent with previous literature (e.g., Hakulinen et al., 2015; Heinrich et al., 2016), a main effect showing a positive association between extraversion and alcohol use was found. However, despite previous literature showing that extraversion is also positively associated with PA (e.g., De Moor et al., 2006; Mottus et al., 2016, Yap & Lee, 2013), no significant interaction effect emerged when extraversion was tested as a moderating variable of the PA-alcohol use relationship. Additionally, openness was not found to be significantly associated with alcohol use in my results, suggesting that usual levels of alcohol consumption may not correlate with years of alcohol consumption, which has been associated with openness in previous literature (Donadon & Osorio, 2016).

Additionally, my prediction that neuroticism and conscientiousness would serve as buffering moderators in the PA-alcohol use relationship was similarly unsupported. Although my finding that neuroticism is positively associated with alcohol consumption was in concordance with previous literature (Hakulinen et al., 2015), no interaction effect emerged when neuroticism was tested as a moderator of the PA-alcohol relationship. In contrast, conscientiousness did not significantly predict alcohol use, which differs from previous literature that has shown a negative correlation between levels of conscientiousness and levels of alcohol consumption (Hakulinen et al., 2015).

Taken together, these results suggest that although light PA is positively related to alcohol use, personality traits do not influence the strength of this relationship. Indeed,

extraversion and neuroticism predict alcohol consumption as main effects, but they do not interact with PA levels to predict whether a person is more likely to drink. Therefore, individuals high in traits of extraversion or neuroticism are not specifically at risk for higher levels of alcohol consumption than their less extraverted or neurotic peers if they also participate in light PA. On the other hand, this finding has less optimistic implications for the implementation of PA-based alcohol treatment interventions for these individuals. Although personality traits appear not to influence the strength of the PA-alcohol use relationship, high levels of extraversion and neuroticism are positively associated with drinking on their own. This association means that even if an exercise-based intervention is implemented, these individuals will continue to possess independent risk factors for alcohol consumption that are not addressed by these interventions.

Interestingly, research on drinking motives has revealed differences in drinking behaviors among individuals who drink to cope with negative affect and those whose drinking is socially motivated (Cooper, 1994). These differences suggest that those who experience more negative affect (higher in neuroticism) and those who are more likely to seek out social situations (higher in extraversion) may be drinking for different reasons. These differences in motivations, which could be related to higher levels of these differing personality traits, may partially explain why previous PA-based intervention studies have had mixed results in their effectiveness. These results suggest that problematic drinking behaviors among individuals who exhibit higher levels of these personality traits may need to be addressed by more personalized, motivation-based treatment strategies as opposed to PA interventions alone.

Limitations and future directions

Although the current study broke new ground in the study of personality traits as moderating factors of the PA-alcohol relationship, it had several limitations that deserve attention. First, the study utilized an undergraduate sample who reported relatively low levels of drinking overall; therefore, our findings may not be generalizable to a wider population of individuals, particularly those who would seek treatment for an alcohol use disorder. This sample limitation may also partially explain the differences between the results of the current study and past studies that have found broader associations between PA and alcohol use in adult samples with a wider range of age (e.g., Conroy et al., 2014).

Second, alcohol use was measured dichotomously in this study, which may have been partially responsible for the lack of associations between predictor and criterion variables. Because I could not differentiate between participants who consumed a wider range of alcohol, these differences could not be accounted for. In other words, a participant who consumed one drink of alcohol on a day could have been lumped in with another participant who was binge drinking on the same day; it would have been valuable to see whether PA and personality traits were associated with alcohol use continuously measured.

Third, the FFM personality measures used in the current study had several disadvantages. Perhaps the most significant disadvantage in these measurements for the current study was that the personality measure was changed from the BFI to the TIPI in the middle of data collection. This change necessitated the use of personality z-scores in our analyses, which may not have accurately represented the data collected from either instrument. Additionally, although the TIPI has been shown to have substantial

convergent validity with the BFI (Gosling, Rentfrow, & Swann Jr., 2003), its Chronbach's alphas for internal consistency are generally lower than those of the BFI (i.e., $\alpha = .40-.68$ vs. $\alpha = .75-.90$), indicating that measures of personality traits may have been more reliable for participants who used the BFI than for those who used the TIPI. Finally, these personality measurement instruments were both self-report measures. The use of self-report measures always introduces a challenge to the validity of a study's findings, particularly if individuals have reasons for engaging in impression management, possess a lack of insight, or are experiencing fatigue. Due to the length of our intake battery, there is the possibility that participants may have experienced this fatigue, especially if they filled out the longer, 44-item BFI as opposed to the 10-item TIPI. Nevertheless, these self-report measures of personality traits have been found to display acceptable validity levels and are widely used in personality research.

Ideally, the current study should be replicated in a wider sample, using one consistent measure of personality traits. These modifications would make for more generalizable, and potentially more accurate, results. Additionally, future studies may benefit from using not only a dichotomous alcohol use variable, but also a measure of number of drinks consumed per day. This addition would allow for more accurate representations of alcohol consumption behaviors and would allow for analyses of differences among levels of alcohol consumption. In addition to addressing the limitations of the current study, future research should also examine other potential moderators of the PA-alcohol use relationship to continue adding to the literature surrounding the effectiveness of exercise-based interventions for alcohol use disorders.

Conclusion

The current study provides evidence for the importance of personality traits in the consideration of the effectiveness of exercise-based interventions for alcohol use disorders. Although personality traits appear not to directly moderate the relationship between PA and alcohol use, extraversion and neuroticism both display independent associations with alcohol use, which could have implications for the effectiveness of exercise-based treatment methods in individuals with high levels of certain personality traits. This study adds significantly to previous literature on the moderating effects of personality in the PA-alcohol use relationship, which found that conscientiousness was associated with PA and alcohol consumption behaviors but did not show significant findings related to extraversion or neuroticism (Abrantes et al., 2017). Although more research is certainly needed to examine other potential moderators of the PA-alcohol use relationship, the current study adds significantly to the almost completely unstudied role of personality in this unique, important relationship.

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- college-related alcohol beliefs as mediators. *Addictive Behaviors*, 39, 879-884.
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VITA

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EDUCATION

- 2016 – Present Clinical Psychology Doctoral Program
Sam Houston State University, Huntsville, TX
Master's Thesis: The Moderating Effects of Five Factor Model
Personality Traits on the Physical Activity and Alcohol Use
Relationship
- 2010 – 2014 Bachelor's of Science (Psychology)
Fordham University, Bronx, NY
Graduated Summa Cum Laude, in Cursu Honorum
Honors Thesis: Predicting Success: Does substance abuse predict
diversion program outcomes in severely mentally ill offenders?

CLINICAL EXPERIENCE

- Fall 2017 – Present **Student Clinician.** *SHSU Psychological Services Center*,
Huntsville, TX. Served as a therapist at a community mental health
center under the supervision of a doctoral-level mental health
professional. Additionally, conducted diagnostic assessments of
learning disabilities and other mental health concerns.
- 2014 – 2016 **Forensic Case Manager.** *Queens TASC Mental Health Diversion
Program*, Queens, NY. Conducted assessment interviews with
potential clients, wrote psychosocial evaluations and progress
notes, and made collateral phone calls. Managed a caseload of
offenders by making program referrals, supervising urine
toxicology screenings, conducting face-to-face meetings,
communicating with Rikers Island staff, and preparing HRA 2010e
forms. Reported on client progress in treatment to the Queens
County Criminal and Supreme Courts' mental health recovery
court parts. Conducted Cognitive Behavioral Therapy journaling
with mental health clients.
- 2013 – 2014 **Mental Health Intern.** *Queens TASC Mental Health Diversion
Program*, Queens, NY. Assisted forensic case managers with tasks
such as conducting assessment interviews with potential clients,

writing psychosocial evaluations and client progress notes, making collateral phone calls and implementing Cognitive Behavioral Therapy journaling with mental health clients.

2012 – 2013 **Psychiatry Volunteer.** *Beth Israel Medical Center*, Manhattan, NY. Participated as a member of a multidisciplinary team on three inpatient psychiatric units under Dr. Igor Galynker on weekly rounds.

TEACHING EXPERIENCE

2017 – 2018 **Instructor.** *Sam Houston State University*, Huntsville, TX. Taught a 15-week online section of PSYC 3331 (Abnormal Psychology) to approximately 30 Sam Houston State University undergraduate students.

EDITORIAL RESPONSIBILITIES

Spring 2018 **Ad-hoc Reviewer.** 2018 Association for Psychological Science Student Caucus's RISE Research Award.

PUBLICATIONS

Boland, J. K., Damnjanovic, T., & Anderson, J. L. (in press). Evaluating the Role of Functional Impairment in Personality Psychopathology. *Psychiatry Research*.

Boland, J. & Rosenfeld, B. (2017). The role of controlled substance use in diversion outcomes among mentally ill offenders: A pilot study. *International Journal of Offender Therapy and Comparative Criminology*.
<https://doi.org/10.1177/0306624X17735093>

Kopeykina, I., Kim, H. J., Khatun, T., **Boland, J.,** Haeri, S., Cohen, L. J., & Galynker, I. I. (2016). Hypersexuality and couple relationships in bipolar disorder: A review. *Journal of Affective Disorders*, 195, 1-14. doi:10.1016/j.jad.2016.01.035

PRESENTATIONS

Boland, J., Damnjanovic, T., & Anderson, J. (2018, March). *Evaluating the Role of Functional Impairment in Personality Psychopathology*. Poster presented at the Society for Personality Assessment Annual Convention, Washington, D.C.

Boland, J. & Rosenfeld, B. (2018, March). *The Role of Controlled Substance Use in Diversion Outcomes among Mentally Ill Offenders*. Poster presented at the annual American Psychology-Law Society Conference, Memphis, TN.

Boland, J., Damnjanovic, T., & Anderson, J. (2017, November). *Evaluating the Role of Functional Impairment in Personality Psychopathology*. Paper presented at the annual Texas Psychological Association Conference, Houston, TX.

Camins, J.S., Henderson, C.E., Magyar, M.S., Schmidt, A.T., Crosby, J., Reinhard, E.E., & **Boland, J.K.**, (2017, March). *Adolescent behavior typing in at-risk youth: Validation using a latent variable approach*. Paper presented at the annual American Psychology-Law Society Conference, Seattle, WA.

Boland, J., Garcia-Mansilla, A., & Rosenfeld, B. (2014, May). *Does Substance Abuse Predict Diversion Program Outcomes in Severely Mentally Ill Offenders?* Poster presented at the Association for Psychological Science Annual Convention, San Francisco, CA.

Boland, J., Garcia-Mansilla, A., & Rosenfeld, B. (2014, April). *Predicting Success: Does Substance Abuse Predict Diversion Program Outcomes in Severely Mentally Ill Offenders?* Paper presented at the Fordham Undergraduate Research Symposium, Bronx, NY.

Boland, J., Kogan, I., Yaseen, Z., Hayashi, F., Kreiter, A., & Galyunker, I. (2013, May). *Childhood Trauma and the Risk of Suicide: Analysis of the CTQ in Suicidal Psychiatric Inpatients*. Poster presented at the American Psychiatric Association Annual Meeting, San Francisco, CA.

Boland, J., MacDonall, J. (2013, April). *Generalizing Letter Discrimination to Different Font Styles*. Poster presented at the Fordham Undergraduate Research Symposium, Bronx, NY.

GRANTS, AWARDS, & SCHOLARSHIPS

March 2018 The Role of Controlled Substance Use in Diversion Outcomes in Mentally Ill Offenders. Outstanding student presentation in novel-topic research award given by the American Psychology-Law Society Student Committee; (Co-Investigator: Barry Rosenfeld), \$200.

Dec 2017 Evaluating the Role of Functional Impairment in Personality Psychopathology. Travel grant awarded by the Society for Personality Assessment; (Co-Investigators: Tatjana Damnjanovic, Jaime Anderson), \$200.

Dec 2017 The Role of Personality Psychopathology in Social Network Site Behaviors. Student research grant awarded by the Society for Personality Assessment; (Co-Investigator: Jaime Anderson), \$500.

2017-2018 Sam Houston State University Graduate Student Psychology Organization. Graduate Organization Leadership Scholarship. Awarded by Sam Houston State University Office of Graduate Studies, \$1000.

April 2014 Does Substance Abuse Predict Diversion Program Outcomes in Severely Mentally Ill Offenders? Travel grant awarded by Fordham University; (Co-Investigators: Alexandra Garcia-Mansilla, Barry Rosenfeld), \$500.

October 2012 Generalizing Letter Discrimination to Different Font Styles. Grant awarded by Fordham University; (Co-Investigator: James MacDonall), \$1500.

HONORS & LEADERSHIP POSITIONS

2017 – 2018	Association for Psychological Science Campus Representative
2017 – 2018	Vice President, Sam Houston State University Graduate Student Psychology Organization
2010 – 2014	Dean's List, Fordham University
2010	National Merit Scholarship Finalist

PROFESSIONAL MEMBERSHIPS

Association for Psychological Science
American Psychology-Law Society
American Psychological Association
Society for Personality Assessment
Texas Psychological Association
Psi Chi

HONORARY ORGANIZATIONS

Phi Beta Kappa (initiated in 2014 at Fordham University)
Fordham University Honors Program (2010-2014)