AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN PHYSICAL ACTIVITY AND ALCOHOL DEPENDENCE

A Thesis in
Kinesiology

by

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ABSTRACT

The purpose of this study was to explore the relationships between heavy alcohol use, including alcohol abuse/dependence, and the frequency of exercise among a convenience sample of college students at the Pennsylvania State University.

Independent variables used in this study were: (a) gender, (b) academic standing, (c) semester standing, and (d) athletic status. The dependent variables for this study include; (a) self-reported physical activity scores measured by the Leisure Time Exercise Questionnaire (LTEQ), and (b) alcohol dependence measured by the Short Michigan Alcohol Screening Test (SMAST). The population available included 1,917 students, aged 18 or older, who were enrolled in one of nine sections of “Introductory Psychology” during Fall Semester, 2002. For this study, a total of 606 students completed the survey. There were 290 women (48%) and 316 men (52%) in the current sample.
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CHAPTER 1

Introduction and Statement of the Problem

Introduction

The Surgeon General’s Call to Action to Prevent and Reduce Underage Drinking estimates that approximately 1,700 college students die each year from alcohol-related injuries, and approximately 600,000 students are injured while under the influence of alcohol (U.S. Department of Health and Human Services [USDHHS], 2007). In addition to underage drinking, physical inactivity has been shown to be a major cause of death in the United States and accounts for over 300,000 deaths per year (McGinnis & Foege, 1993). The lack of physical activity is also a significant health problem in the college population (Kilpatrick, Hebert, & Bartholomew, 2005).

Although many researchers have focused on the demographics of alcohol consumption among college students and some researchers have focused on physical activity for the same group, few have focused on studying correlations between alcohol and physical activity (Dunn & Wang, 2003; Greenberg, Lewis, & Dodd, 1999; Johnson, Nichols, Sallis, Calfas, & Hovell, 1998).

Drinking and the consequences related to its consumption among university students has been an area of research interest since the early 1950’s (Straus & Bacon, 1953). Heavy consumption of alcohol among college students has been a significant problem on campuses across the United States (Gruenewald, Johnson, Light, & Saltz, 2003). Data from alcohol research has shown that over 80% of college students have
reported consuming alcohol (Johnston, O'Malley, Bachman & Schulenberg, 2004). The USDHHS identifies alarming rates of alcohol consumption and dependence among college students in its document Healthy People 2010 (USDHHS, 2000). Alcohol consumption can contribute to adverse effects that may include but are not limited to; personal injury, high-risk sexual behavior, heart disease, birth defects and/or property damages (Park, 2004; USDHHS, 2000; Wechsler & Isaac, 1992).

Straus and Bacon (1953) have been cited as the research pioneers on college student alcohol consumption and related problems. Engs followed with her nationally recognized research in the 1970’s and throughout the 1980’s (1975; 1977; Engs & Hanson, 1990). Wechsler and Isaac (1992) followed and coined the term “binge drinking” in the 1990’s to cover episodic heavy drinking and defined it as having four or more alcoholic beverages for women, and five or more alcoholic beverages for men, in a row on one occasion within the past two weeks. More recently, researchers have delimited binge-drinking occasions to a two-hour timeframe (White, Kraus, & Swartzwelder, 2006). Between 70% (American College Health Association [ACHA], 2006; Juhnke, Schroat, Cashwell, & Gmutza, 2003) and 90% of students drink alcohol (Johnston, O’Malley, & Bachman, 1994) and almost 40% of students engage in “binge” or problem drinking (Juhnke et al., 2003; Wechsler, Kuo, Lee, & Dowdall, 2000; Berkowitsz & Perkins, 1986). The significance of heavy alcohol use has been brought to the public’s attention after numerous incidents affecting social, legal, psychological, and anthropological problems such as dating, violence, driving under
the influence, riding with someone who is driving under the influence, physical or mental abuse, and rioting (Gruenewald et al., 2003; Wechsler et al., 2002; Wechsler, Lee, Kuo, & Lee, 2000; Perkins, 1997; Hansen, 1992; Wechsler & Isaac, 1992; Engs & Hanson, 1990). While binge drinking, and drinking in general, is associated with detrimental effects, physical activity in contrast has been correlated with positive health benefits.

Both physical and psychological health can be positively impacted by physical activity (USDHHS, 2000). Specifically, regular participation in physical activity is associated with a decreased risk for diseases including: atherosclerosis, several forms of cancer, diabetes, obesity, anxiety, reproductive complications, breathing problems, depression and death (Behrens & Dinger, 2003; USDHHS, 2000). Thus, promoting physical activity is a health priority in the United States and college students are provided with opportunities to participate in physical activity through a vast array of opportunities. These include, but are not limited to collegiate sports, intramural sports, recreation sports and fitness centers on and around college campuses. The focus of this research is to explore alcohol use/dependence among college students as well as their patterns of regular participation in physical activity. It will also be used to determine any correlation between these variables.

The latest physical activity recommendations for persons aged 18-24, is to participate in vigorous physical activity for a least one hour and fifteen minutes per week, or two hours and thirty minutes of moderate physical activity per week (USDHHS, 2008). The American College of Sports Medicine (ACSM) and the
American Heart Association (AHA) recommend periods of physical activity lasting thirty minutes for moderate physical activity five or more days per week and twenty minutes of vigorous physical activity three or more days per week (ACSM, 2008).

The American College Health Association (ACHA) reported that just over 42% of students had exercised vigorously for at least 20 minutes or moderately for 30 minutes on at least three or more of the past seven days (ACHA, 2005). The largest, most recent study, using the Behavioral Risk Factor Surveillance System (BRFSS) data found that 12% of the students surveyed had participated in no physical activity (Zahran, Zack, Vernon-Smiley, & Hertz, 2007). Most studies have found that very few students have satisfactorily met the guidelines for physical activity (Moore & Werch, 2008; Gyurcsik, Bray, & Brittain, 2004). A number of studies have found that college age males tend to exercise more than their female counterparts (Seo, Nehl, Agley, & Ma, 2007; Kilpatrick et al., 2005; Huang et al., 2003). Correlating alcohol consumption and physical activity has been a bit more difficult.

There have been a few attempts to find a relationship between college students’ involvement in physical activity and alcohol consumption, but this research has been limited and has been mostly confined to inter-collegiate athletes (Dunn & Wang, 2003). Only a few studies have focused on physical activity patterns and alcohol use among college students who don’t participate in intercollegiate athletics. The findings have been somewhat inconclusive or varied with regard to physical activity and alcohol consumption. Some research studies have concluded that students who report higher levels of physical activity also consume alcohol more
frequently (Kokatailo, Henry, Koscik, Fleming, & Landry, 1996; Wechsler, Dowdall, Davenport, & Castillo, 1995). Others studies have found increased “binging” among men and women who report high levels of physical activity, and for men who report low levels of physical activity (Dunn and Wang, 2003). Other studies have reported no significant relationship between physical activity and alcohol use (Johnson et al., 1998). This study contributes to this ambiguous literature by exploring correlations between physical activity and alcohol consumption at the Pennsylvania State University.

**Purpose of the Study**

The purpose of this study was to explore the relationships between heavy alcohol use, including alcohol abuse/dependence, and the frequency of exercise among a convenience sample of college students at the Pennsylvania State University. Independent variables used in this study were: (a) gender, academic standing, and semester standing; (b) athletic status; (c) physical activity scores; and (d) alcohol dependence. Information generated from this research will contribute to the growing body of literature concerning the prevalence of college student alcohol abuse and related factors and may be used in the development of more effective prevention and intervention strategies.

Bronfenbrenner’s (1979) Ecological Model will provide the basis for the Social-Ecological framework to better explain the theoretical basis for this research and support the variables related to physical activity and alcohol use/abuse. The
present model recognizes how a person’s behavior and development can be influenced by numerous interactions in and among these systems throughout one’s life. For example: (a) young people arrive at their campus with social, family, and drinking histories that influence their college drinking behaviors, and (b) once on campus, peers, residence, and lifestyle factors further influence what they believe, endorse, and practice around choices to use alcohol. These same influences may also be used to provide insight into an individual’s exercise patterns and drinking patterns to provide information to assist in the development of future studies concerning these areas.

Hypotheses

Research Question #1

Are different subdivisions of the collegiate population more likely to be classified as alcohol dependent?

1. Among a convenience sample of college students at the Pennsylvania State University, there will be no relationship between reported symptoms of alcohol dependence based on gender, GPA, semester standing, or athletic status.

Research Question #2

Are subdivisions of the collegiate population more likely to participate in higher levels of physical activity?
1. Among a convenience sample of college students at the Pennsylvania State University, there will be no relationship between an individual’s level of physical activity based upon gender, GPA, semester standing, or athletic status.

Research Question #3

Are alcohol dependence and an individual’s level of physical activity correlated?

1. Among a convenience sample of college students at the Pennsylvania State University, there will be no relationship between reported symptoms of alcohol dependence and an individual’s level of physical activity.

Delimitations

(1) The sample for the proposed research is delimited to undergraduates enrolled in the courses identified through the Pennsylvania State University Psychology Subject Pool during Fall Semester, 2002.

(2) The identified sample is one of convenience and findings, therefore, may not be generalized to other populations, settings, or times.

(3) The sample is further delimited to participants on the date of recruitment and data collection.

(4) The proposed data analysis will be based on a secondary data set approved for use by the Pennsylvania State University Office for Research Protections (IRB # 14978).
(5) The data set for this research was collected in 2002, but this appears to be satisfactory for research of this type with a number of studies using data collected a few years prior to being reported (Moore & Werch, 2008; Dunn & Wang, 2003; Lowry et al., 2000).

(6) The sample population will include a greater ratio of first year students.

(7) The survey was conducted during the final week of classes during the Fall Semester, 2002.

Assumptions

(1) The research participants supplied truthful and thoughtful responses.

(2) The management of questionnaires was standardized across all data collection points.

(3) The psychometric properties of the proposed research variables, identified above, were valid measures of each construct, and appropriate to the proposed research design.
Definitions

1. **Alcohol Dependence**. The Short Michigan Alcohol Screening Test (SMAST; Selzer, Vinokur, & Van Rooijen, 1975, p. 117-126) will be used to measure respondents’ alcohol use behaviors. Scores equaling 13 points, or higher, indicate the presence of alcohol dependence (Selzer et al., 1975).

   a. Alcohol consumption, even in small amounts, in the past 30 days
   b. Drinking habits are perceived as normal
   c. Confrontation with a person of significance who expresses worry or concern on the subject of their level of consumption
   d. Reporting ever feeling guilty about their drinking
   e. Having friends or relatives who think they are a normal drinker
   f. Perceiving the aptitude to cease drinking when desiring to do so
   g. Attendance at any meeting of Alcoholic’s Anonymous
   h. Problems produced due to drinking activities between the consumer and his/her near relatives
   i. Issues at work due to consumption of alcoholic beverages
   j. Neglecting obligations to family or work for two or more days in a row because of their drinking
   k. Having sought after help from others or organizations due to drinking
   l. Having been in a hospital because of their drinking
   m. Being arrested for drunk driving, driving while intoxicated, or driving under the influence of alcoholic beverages
n. Being held, even when not arrested, because of drunken behavior

2. **Leisure Time Exercise:** A self-report instrument of exercise assessment based on the frequency of strenuous, moderate, and mild leisure-time exercise done for at least 20 minutes during a typical week (Godin, Jobin, & Bouillon, 1986, pg. 359-362). A total exercise index (weekly metabolic equivalents- METS) is calculated by weighing the frequency of the individual intensities and summing these intensities for a total score using the formula below. Higher scores indicate greater amounts of leisure time physical activity.

\[
\text{METS} = 3(\text{mild}) + 5(\text{moderate}) + 9(\text{strenuous})
\]

3. **Gender:** Students listed whether they are male or female.

4. **Semester Standing:** Students were categorized as freshman (1\textsuperscript{st} - 2\textsuperscript{nd} semester), sophomore (3\textsuperscript{rd} - 4\textsuperscript{th} semester), junior (5\textsuperscript{th} - 6\textsuperscript{th} semester), senior (7\textsuperscript{th} - 8\textsuperscript{th} semester), or other (9\textsuperscript{th} semester or higher).

5. **Grade Point Average (GPA):** Students self-reported what they believed their present, or anticipated GPA was going to be.

   Less than 2.0
   
   2.0 – 2.49
6. **Athletic Status:** Students listed whether they were, or were not, a varsity athlete at the time of the survey.

The research to date investigating relationships between alcohol dependence and physical activity has been very limited. Therefore, it is important to pursue the proposed research to determine whether a select group of the Pennsylvania State University students share similar or different alcohol dependence and physical activity characteristics. It is possible that these subjects will report higher levels of physical activity along with heavier alcohol use as documented previously (Kokotailo et al., 1996; Wechsler et al., 1995), or no significant relationship between physical activity and alcohol use will be detected (Johnson et. al., 1998).

It is hypothesized that there will be no relationship in regard to alcohol dependence with any occurrence of exercise among the college students used for this sample. It is also hypothesized that there will be no correlation between the subgroups of students based on their GPA, semester standing, or participation in a varsity sport. Research of this nature is important to college-level health and human performance professionals in targeting prevention programs.
CHAPTER 2
Review of Related Literature

Introduction

An extensive review of related literature was conducted to establish the extent of college students’ alcohol use/dependence and their current levels of physical activity to determine the status of current research on the topics introduced in Chapter One. The studies have been categorized to align with the following variables under study: (a) alcohol consumption/dependence, (b) physical activity, (c) gender, (d) academic standing, (e) semester standing, (f) athletic status and (g) Bronfenbrenner’s Ecological Model.

Alcohol Consumption

It is commonly accepted that alcohol is the drug of choice for most college students due the ease of accessibility among students and socially accepted norms (Luquis, Garcia, & Ashford, 2003). The same researchers also found that college students believe the use of alcohol and other drugs among their college attending peers to be harmless behaviors (Luquis et al., 2003). Other college students consider the consumption of alcohol to be more hazardous with 66% of the surveyed students considering the activity to be a problem on college campuses (Wechsler, Seibring, Liu, & Ahl, 2004).

Few will argue that drinking and the problems as a result of drinking has reached alarming levels on college campuses (Walters, Bennett, & Noto, 2000). The
College Alcohol Study (CAS), which uses data collected from all the United States, measured the alcohol use patterns among college students and found that 80% of college students reported consuming alcohol in the past year (Wechsler et al., 2002). An older study published in 1997 reported that nearly 92% of the surveyed college had consumed alcohol in the past year (Thombs, Wolcott, & Farkash, 1997). More recent studies have found between 75% and 90% of college students reporting that they have consumed alcohol in the past year (Carey, Borsari, Carey, & Maisto, 2006; Martens, O’Conner, & Beck, 2006; Shinew & Parry, 2005). A study conducted at the University where the present research is being conducted found that 90% of the surveyed students had reported consuming alcohol (Moore, 2004).

As for differences among college students and their non-college attending peers, results from the 2001 National Household Survey on Drug Abuse found no significant difference in the average amount of drinks consumed by those in college and those not attending (Slutske, 2005). However, the National Institute on Drug Abuse (NIDA) and the American College Health Association (ACHA) found that binge and heavy use rates among college students to be higher than non-students in the same age group (Johnston et al., 2004; O’Malley & Johnston, 2002). The percentage of binge drinkers and heavy drinkers among college students was reported at 43.4% and 18.6%, respectively, compared to 39.4% and 13.5%, respectively for non-students in the same age group (ACHA, 2005). The Substance Abuse and Mental Health Services Administration Office of Applied Studies (SAHMHSA) also reported that more college students (63.7% vs. 53.5%) had consumed alcohol in the
past month compared to their peers not enrolled as full-time college students (USDHHS, 2007). Some studies have focused beyond the percentage of students consuming to show the alarming numbers of students who are consuming alcohol at or above the binge threshold.

A study commissioned by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) found 40% of college students binge drink and about 20% of students reported binging more than three times in the past two weeks (NIH, 2002). The CAS reported slightly higher findings for the percentage (46.5%) of students reporting binge drinking (Nelson, Naimi, Brewer, & Wechsler, 2005). Data from the CAS also found a significant increase in the number of frequent college binge drinkers from 1993 to 2001 (Wechsler et al., 2002).

Results on binge drinking appear to be similar to what has been found in an older National Survey on Household Drug Abuse where 42% of college students had reported drinking greater than 5 drinks on a single occasion in the past month (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002). Healthy People 2010 reported similar results with 39% of college students reporting that they had binged in a two-week period prior to the survey (USDHHS, 2000). More recent studies, have found just over 40% of college students reporting binge or heavy drinking (Bewick et al., 2008; Gilles, Turk, & Fresco, 2006; O’Malley & Johnston, 2002). Other studies have found closer to 50% of college students reporting levels of high consumption (Chen, Durfour, & Yi, 2004/2005; Moore, 2004; Hingson, Heeren, Winter, & Wechsler, 2003; Maney, Theodorou, & Vasey, 2001). One study found nearly 60%
of the surveyed students participating in heavy episodic drinking (Gilles et al., 2006). Some studies have delved farther into these drinking episodes to report the number of drinks consumed and the frequency of drinking sessions.

One smaller study reported the average total number of drinks consumed in a weekend at 8.18, but it should be noted that this number included subjects from the data pool who were non-drinkers (Moore, 2004). Another study of students attending a university in the Northeast found the mean number of drinks was 12.5 per week (Carey et al., 2006). Using information from students who reported alcohol consumption, the average quantity of drinks consumed was just fewer than seven per drinking incident (Read, Beattie, Chamberlain, & Merrill, 2008). Others have found students averaging 4.8 drinks during a typical drinking day and 4.6 days of heavy drinking in the past 30 days (Scott-Sheldon, Carey, & Carey, 2007). Slightly lower rates were found in small study of 231 students who claimed 3 days of average alcohol use in the past 30 days as well as just over 3 days of binge drinking for the same time period (Simons, Christopher, & Mclaury, 2004). A study conducted at a private university in the Northeastern U.S. found one-third of the surveyed students drinking one-to-two times per week and almost 15% drinking on three or more occasions per week (Murphy, Hoyme, Colby, & Bosari, 2006). One study surveyed students from a Midwestern university which reported the mean of 2.53 drinking days per week (Shinew & Parry, 2005). Gilles et al. (2006) reported 42% of participants engaged in alcohol consumption two or more times a week. There appears to be
discrepancies for the percentage of female college students regarding the frequency of their consumption and average number of drinks consumed per drinking session.

**Gender and Alcohol**

The CAS found roughly 40% of college females participating in binge drinking through the years of 1993-2001 (Wechsler et al., 2002). One study found that 60% of female college students reported using alcohol (Leenders, Sherman, & Ward, 2003). Another small study of female Midwestern college students found 61% of the surveyed students participated in binge drinking at least once in the two weeks prior to the survey (Vickers et al., 2004). Additionally, the ACHA (2006) reported 26% of female respondents were consuming 5-8 drinks in their previous partying session and 7% reported consuming nine or more drinks. Females from a smaller study reported a mean of 2.8 drinking episodes in the past 30 days and a mean score of 1.88 days of binging in the past 30 days (Harrell & Karim, 2008). Another study found females to self-report consumption levels with an average of 4.3 drinks per occasion and this occurred nearly twice a week (Shinew & Parry, 2005). Similar results were found with females from a more recent reporting 3.4 drinking episodes in the previous two weeks and consuming an average of 3.9 drinks in each of those drinking sessions (White et al., 2006). The most alarming information comes from the CAS report where significant ($p < .001$) increases in the number of females who reported frequent binge drinking and the number of females consuming ten or more drinks, per drinking session, in the past 30 days (Wechsler et al., 2002). Even though
the numbers were high among female college students, the numbers for males were more alarming.

Although it was not the norm, one group of researchers reported no gender differences in frequency of drinking, but they did find a non-significant trend towards greater monthly consumption for men (Murphy et al., 2006). Numerous reports have shown that men consume significantly greater amounts of alcohol than females (Corbin, Fromme, & Vaughan, 2008; Harrell & Karim, 2008; LaBrie, Pedersen, Neighbors, & Hummer, 2008; Carey et al., 2006; Chen et al., 2004/2005; Chiauzzi, Green, Lord, Thum, & Goldstein, 2005; Shinew & Parry, 2005; Dreer et al., 2004; O’Malley & Johnston, 2002; Humara & Sherman, 1999). Throughout the years of alcohol research high numbers of consumption have been reported.

A survey from 1989 found male students reporting that nearly 75% had imbibed alcohol and usually consumed 5 or more drinks per drinking period (Wechsler & Isaac; 1992). Throughout the years of 1993-2001, the CAS has reported a consistent average of 50% of college males participating in binge drinking (Wechsler et al., 2002). The ACHA (2006) reported that 25% of male college students consumed between five and eight drinks during last drinking session and another 25% consumed nine or more drinks. One study found college males to be more likely classified as binge drinkers and these binge drinkers reported consuming in excess of 14 drinks per drinking event (Dreer et al., 2004). A smaller study using students in the Northeast reported similar results with college males claiming to have consumed 17 drinks in the previous week (Carey et al., 2006). Researchers used
information from 10,000+ freshman to find males averaging six drinks on at least one
drinking occasion and approximately 20% of the males consumed 10+ drinks and
these situations occurred in two weeks prior to the study (White et al., 2006). Male
college students from a Midwestern university reported an average drinking
frequency of 3.5 days in past 30 days with an average of 2.6 days of binging in those
30 days (Harrell & Karim, 2008). Another study found college men reporting almost
three days of drinking per week while consuming an average of 6.7 drinks on each
occasion (Shinew & Parry, 2005). The CAS found a significant increases (p < .001)
in the number of male frequent binge drinkers and the number of males who drank on
ten or more occasions in the past 30 day from 1993-2001 (Wechsler et al., 2002).
Overall, the literature reviewed for this study suggests that male college students tend
to consume greater quantities of alcohol and consume it more frequently than female
college students. A student’s grade point average (GPA) also seems to affect the
amount of alcohol being consumed.

GPA and Alcohol

Attempts to find a correlation between alcohol and GPA have been fairly
conclusive. A study completed among female college students found a negative
association between a student’s GPA and her drinking patterns and also found that
these female students with a lower GPA were more likely to binge drink (Vickers et
al., 2004). Using results from the College Alcohol Survey, Wolaver (2002) found
students who reported frequent levels of binge drinking or sessions of intoxication to
have significantly ($p < .05$) lower GPAs. Another study using the same, and newer, information from the College Alcohol Study also found consumption of alcohol to be negatively correlated with GPA (Williams, Powell, & Wechsler, 2002).

Similar findings were reported from a survey of nearly 10,000 students throughout Minnesota with students who reported high-risk drinking also saw a decrease in their GPA (University of Minnesota Boynton Health Service, 2008). Singleton (2007) reported that the amount of alcohol consumed was significantly correlated to students reporting a lower GPA. The Center for the Study of Collegiate Mental Health at Penn State also found an inverse relationship between alcohol abuse and college GPA (Penn State, 2009). A small study conducted with students attending Loyola University illustrated a significant negative correlation between the amount of alcohol consumed per month and the student’s cumulative GPA (Larrieu, 2009). The lower a student’s GPA, the more likely they are to participate in binge drinking. Semester standing also appears to have a relationship with a student’s level of alcohol consumption.

**Semester Standing and Alcohol**

Recent studies have found a greater number of college freshmen consuming alcohol than sophomores, juniors, and seniors and these freshmen are consuming it in greater quantities (Bewick et al., 2008; Vickers et al., 2004; Gruenewald et al., 2003). It was found that roughly 55% of all surveyed freshmen reported they had consumed
alcohol in the two weeks prior to the survey and the average number of drinking episodes for males was 4.4 and 3.4 for females (White et al., 2006). There was one study that reported no significant differences when comparing academic year in college with alcohol use (Shinew & Parry, 2005). Another study concluded that drinking levels were found to peak for college students around 21 or 22 years of age, (Chen et al., 2004/2005).

The most recent study looking at the consumption of alcohol throughout a student’s journey through college determined that quantities of consumption decreased as their level of studies increased (Bewick et al., 2008). This study, may or may not be useful, since it was completed among students attending a university in the United Kingdom (UK). Research conducted among 2,102 college students at the University of California looked into the peak drinking levels for students attending the Berkeley and Riverside campuses found freshman males are the most likely to drink to extremes (Gruenewald et al., 2003).

Other researchers have examined the alcohol consumption among college students throughout different semester standings without finding any statistical significance (Shinew & Parry, 2005). Another study, used results from the 2001-2002 National Epidemiologic Survey of Alcohol and Related Conditions, reported similar findings with no significant difference between semester standing and level of consumption (Chen et al., 2004/2005). Overall, it is unclear if one’s semester standing and their degree and frequency of consumption are related. Participation in an intercollegiate athletic activity may also play a role on a student’s drinking habits.
Numerous studies of athletes and non-athletes found that athletes use more alcohol than non-athletes, consume more frequently, and engage in alcohol-related risk behaviors more frequently (Dams-O’Conner, Martin, & Martens, 2007; Nelson & Wechsler, 2003; Hildebrand, Johnson, & Boyle, 2001; Leichliter, Meilman, Presley, & Cashin, 1998; Puffer, 1992; Nattiv & Puffer, 1991). In a study conducted by the Harvard School of Public Health, results indicated that college athletes were 50% more likely to binge drink, more likely to have binge drinkers as friends, and were more likely to view partying as an important part of their college experience (Nelson & Wechsler, 2003). There were only two studies that reported no significant differences between athletes and non-athletes and relationship to their alcohol consumption patterns (Gutgesell, Moreau, & Thompson, 2003; Overman and Terry, 1991).

The National Collegiate Athletic Association (NCAA) reported that almost 75% of their respondents had used alcohol in the year prior to completing the survey, and that the percentage of athletes consuming more than 10 drinks per session had increased from 13.5% to 17.8% in that time, respectively (NCAA, 2005). Earlier research of binge drinking compared athletes to the general student body and found 43% of athletes binged while nearly 47% of the general student body had binged, but it must be noted that athlete’s binge minimum was six drinks for athletes and five for the others (Pickle, 2001). Martin (1998) found athletes consuming significantly more
alcohol out-of-season than they did in-season. Once again, the males, more specifically male athletes are the worst offenders as research has shown.

In 1997, other research results showed over 60% of the men involved in college athletics engaged in binge drinking compared to 43% of male non-athletes engaged in binge drinking (Wechsler, Davenport, Dowdall, Grossman, & Zanakos, 1997). The same study also reported that 29% of male athletes had binged in the past two weeks compared to 18% of males not involved in college athletics (Wechsler et al., 1997). An earlier study found male athletes to have consumed significantly ($p < .001$) more alcohol than their male non-athlete counterparts (Leichliter et al., 1998). Overman and Terry (1991) were unable to find any significant differences in the number of drinking occasions between male and female athletes. A larger study found male athletes consuming more alcohol and consuming it more frequently than female athletes (Wechsler et al., 1997). Around the same time, another study also found male athletes consuming alcohol more frequently and at higher rates than their female counterparts (Leichliter et al., 1998).

Comparing female athletes to non-athletes, one research finding was that 50% of female athletes reported participating in binge drinking compared to 44% of female non-athletes (Gutgesell et al., 2003). An older study found a significantly higher percentage of female athletes reporting to have participated in binge drinking (47% vs. 31%), and consuming significantly ($p < .001$) greater quantities than female non-athletes (Leichliter et al., 1998). Similar conclusions were found for women in the Wechsler et al. (1997) research where 50% of female athletes reported binging,
compared to 36% of female non-athletes binging. Martin (1998) found 79% of female athletes to have consumed alcohol in the past year and 56% had participated in binge drinking out-of-season, and 35% did so in-season. However, during this same timeframe one study reported just the opposite with fewer female athletes consuming alcohol and fewer female athletes binge drinking compared to non-athletes (Kokotailo, Koscik, Henry, Fleming, & Landry, 1998). Overall, the literature reviewed for this study suggests that athletes consume greater quantities of alcohol than their non-varsity sport participating counterparts. The percentage of college students meeting criteria for being alcohol abusers and/or alcohol dependent is also alarming.

Alcohol Abuse and Dependence

Students who qualify as alcohol abusers or dependent on alcohol are somewhat varied, but Slutske (2005) found that college students were significantly more likely to be diagnosed as alcohol abusers than their non-college attending peers, but were not more likely to be labeled as alcohol dependent (6.1% vs. 6.6%, respectively). One survey found a total of 36.0% of participants met the criteria for alcohol abuse/dependence and men were more likely than women to have an abuse/dependence diagnosis (Stepp, Trull, & Sher, 2005). Other researchers have found closer to 15% of college students either abusers or dependent (Slutske, 2005; Clements, 2002). Aertgeerts and Buntinx (2002) reported 3.6% of surveyed freshman
students as meeting the criteria for alcohol dependence and that nearly 63% of those students failed in their first year.

As for students meeting the criteria for being alcohol abusers or alcohol dependent, Slutske (2005) found that 11% of the female college students surveyed met those criteria. Looking into addiction to alcohol, male college students scored higher than female college students (Greenberg et al., 1999). Slutske (2005) also reported that 22.5% of surveyed males met the criteria for abusing alcohol or being dependent of alcohol. Overall, the literature reviewed for this study suggests that a small percentage of college students are meeting the criteria for alcohol abusers and/or alcohol dependent. Participation in physical activity can possibly play a role in the drinking patterns of college students.

Participation in Physical Activity

Latest recommendations for levels of physical activity is 150 minutes of moderate physical activity per week, 75 minutes of vigorous physical activity, or a combinations of the two levels per week for college students as shown by Table 1 (USDHHS, 2008; ACSM, 2008).
Table 1

*Current Physical Activity Guidelines*

<table>
<thead>
<tr>
<th></th>
<th>Meeting Minimal Requirements</th>
<th>Positive Health Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate PA</td>
<td>150-299 minutes</td>
<td>300+ minutes</td>
</tr>
<tr>
<td>Vigorous PA</td>
<td>75-149 minutes</td>
<td>150+ minutes</td>
</tr>
</tbody>
</table>

Note. A Combination of Moderate and Vigorous PA can be obtained by using the
Formula: (Moderate PA/2)+Vigorous PA

The ACHA (2006) conducted a study on 80 postsecondary institutions and
found that roughly 40% of the persons surveyed reported participating in moderate or
vigorous physical activity on at least three of the past seven days. This rate was down
from the previous year’s survey, which found just over 44% of the surveyed students
reported participating in moderate to vigorous physical activity (ACHA, 2005).
Research appears to be limited when it comes to physical activity among college
students.

The studies found for the current research that reported high levels of physical
activity used subjects who might not allow for generalizations across different
populations. For example, a study with southeastern college students found them to
exercise an average of 3.58 days per week, but these were students from elective
health content classes (Kilpatrick et al., 2005). Other researchers have shown high
levels of physical activity, such as a study conducted at a mid-Atlantic University’s
student recreation center that found students exercising an average of almost four
days per week for approximately 70 minutes per session (Zizzi, Keele, & Watson,
2006). Higher activity levels were also found in a study completed among
Midwestern college students where 56% of surveyed students reported participating
in at least 20 minutes of vigorous physical activity on three or more days in the past
seven days (Seo et al., 2007).

The LTEQ has been used to determine physical activity patterns across
different populations of college students. One study using the LTEQ was completed
among 363 college students and found students to have participated in moderate
physical activity an average of 2.29 times per week and strenuously exercised an
average of 2.06 times per week (Okun et al., 2003). Dinger (1999) reported that the
average college student failed to meet previous guidelines for physical activity by
reporting their vigorous physical activity to be 2.39 days per week or 2.6 days of
moderate physical activity per week. Consistent results were found among a sample
of Midwestern college students who reported exercising an average of 2.6 times per
week during a self-reported survey, but it should be noted that these were students
enrolled in physical activity classes (Leenders et al., 2003).

One small study of students from the Midwest found that nearly 20% of those
surveyed reached adequate levels of physical activity, according to older physical
activity guidelines which called for 20 minutes of moderate to vigorous activity three
times per week (Petosa, Suminski, & Hertz, 2003; USDHHS, 1996). This study also
found 45% of surveyed students had participated in fewer than three bouts of exercise
during four weeks prior to the survey (Petosa et al., 2003). Another study reported similar results reporting that a high number of college students reported participating in levels of physical activity that were far below the recommended standards (Huang et al., 2003).

A study of undergraduate college students found that 37.6% participated in vigorous physical activity for at least three sessions during the week prior to the survey (Lowry et al., 2000). Also, a study found 31% of those surveyed exercised moderately for five or more of the previous seven days and 53% had exercised vigorously for at least three of past seven days (Buckworth & Nigg, 2004). Bray and Born (2004) reported that 44% of surveyed students met their standards from the USDHHS recommendations for minimum weekly vigorous physical activity.

Almost half (47%) of the surveyed students failed to participate in any vigorous or moderate physical activity in the time preceding the survey (Suminski, Petosa, Utter, & Zhang, 2002). Similar findings by Moore and Werch (2008) reported that 45% of their surveyed students participated in very little physical activity. Students attending a Midwestern university reported that over 45% of surveyed students had engaged in between zero and three bouts of vigorous physical activity over the past four weeks and that 78% of the participants failed to meet the standard of 3 days of vigorous physical activity per week (Petosa et al., 2003). Another study found over half (56%) of surveyed students failed to meet current guidelines by only participating in a maximum of two episodes of vigorous physical activity in a week (Scott-Sheldon et al., 2007).
Overall, the literature reviewed for this study indicates that college students are not meeting the older recommended physical activity guidelines, or even the latest standards set forth by the CDC (USDHHS, 1996; USDHHS, 2008). It is possible that gender may play an important role in a college student’s level of physical activity.

**Gender and Physical Activity**

Gender differences and participation in physical activity have been well documented. One study reported no difference in physical activity between male and female college students (Behrens & Dinger, 2003). Other research studies, however, have reported that male college students were more likely to exercise than female college students. For example, the CDC reported male college students exercising more than female college students (USDHHS, 2000). Other studies of college students also found more males were exercising than females (Seo et al., 2007; Buckworth & Nigg, 2004; Suminski et al., 2002; Lowery et al., 2000; Dinger, 1999). More recent research evidence showed one-third of male college students participating in physical activity (Moore & Werch, 2008), whereas another research result was that 22.0% of college men and 11.3% of college women participated in no physical activity prior to completing the study (Suminski et al., 2002).

Female college students reported a significant decrease in their total physical activity throughout the first semester of their freshman year (Butler, Black, Blue, & Gretebeck, 2004). Dinger (1999) reported females averaged 2.06 days/week of
vigorous physical activity. Other research showed that freshman females averaged 2.82 sessions of vigorous physical activity for at least 20 minutes per week; nearly half (47%) of whom surveyed failed to meet USDHHS guidelines for physical activity (Gyurcsik et al., 2004). Similar findings were reported by Moore and Werch (2008) who found 55% of female college students to have reported infrequent patterns of exercise.

**GPA/Semester Standing and Physical Activity**

There have been limited studies completed to differentiate a student’s physical activity in regard to the academic standing or their semester status. When looking for correlations between a student’s GPA and their physical activity patterns, researchers were unable to find any relationship between the two criteria (Andreopoulos, Antoniou, Panayides, & Vassiliou, 2008). As for relating semester status and physical activity levels among college students, Dunn and Wang (2003) reported that a student’s physical activity level decreased as a student’s semester standing increased. Similar results were found in a more recent study the concluded that college students will decrease their levels of physical activity with each increase in a student’s semester standing (Zahran et al., 2007). Overall, the literature reviewed for this study found that a student’s GPA to have no effect on their current levels of physical activity, and that as students progress through their years of college education, they tend to decrease their level of physical activity.
Physical Activity and Alcohol Use/Dependence

Research studies have been somewhat inconclusive in regards to any association between physical activity and alcohol use or alcohol dependence. Some research scientists have found that students who report higher levels of physical activity were associated with heavier alcohol use (Moore & Werch, 2008; Vickers et al., 2004; Wechsler et al., 1995). More often, research results showed no relationship between physical activity and alcohol use (Seo et al., 2007; Johnson et al., 1998). These data are limited in regards to relating a student’s physical activity and their alcohol use or alcohol dependence.

Moore and Werch (2008) surveyed 391 freshman college students in Northeast Florida. The alcohol abuse prevention study was used to assess the relationship between vigorous exercise frequency and six measures of ATOD. Trained research staff recruited participants by approaching students in heavily populated areas throughout campus and asking them to participate in a study on an alcohol prevention program. The criteria for participating in the research was being at least 18 years of age, first year students, living on campus, and having consumed alcohol in the past thirty days. The measure used for physical activity assessed each student’s self-reported level of vigorous activity for the past seven days. No significant relationships were found between gender and exercise frequency with any of the ATOD items. As for athletes, the study was unable to find any relationship between an athlete’s level of physical activity and alcohol consumption (Moore & Werch, 2008).
Vickers et al. (2004) used a convenience sample of students from a wide variety of classes and course levels to obtain subjects to determine if binge drinking among the 412 female participants had any association to their participation in physical activity. There were over 700 students invited to participate and 96% of the students provided their written consent. The Aerobics Center Longitude Study Physical Activity Questionnaire was used to determine levels of physical activity for the population and to find metabolic equivalent values. The short form of the Core Alcohol and Drug Survey was used to determine each participant’s age, gender, ethnicity, GPA, and year in school. It was concluded that students who reported high levels of physical activity were significantly more likely (i.e., twice as likely) to participate in binge drinking. Conversely, students who reported lower levels of physical activity also were the least likely to participate in binge drinking. The study also found binge drinking to be negatively associated with GPA.

Nationwide research among 140 campuses totaling over 17,000 students found binge drinkers to be more physically active than those not participating in physical activity (Wechsler et al., 1995). This study was completed using data from public and private universities throughout the United States. The sample contained more juniors and seniors than freshman and sophomores who could possibly skew the binging statistics lower since it has been found that freshmen and sophomores contribute more heavily to binge drinking (Wechsler et al., 1995). Wechsler’s guidelines for binge drinking were used with men consuming five or more drinks in a row and four or more drinks consumed in a row for females over the previous two
weeks. Other questions pertaining to the survey were used from previous surveys, such as the Monitoring the Future Study (Johnston et al., 1994).

Dunn & Wang (2003) used information from the 1995 National College Health Risk Behavior Survey to assess physical activity levels among college students and its association with binge drinking. The research method entailed a mailed survey of 18-23 year old students attending one of the 136 institutions. It was determined that nearly 50% of men who reported low or high levels physical activity had binged compared to the significantly fewer (37%) non-active males who reported participating in binge drinking. This study also found males who reported low levels physical activity or high levels of physical activity were more likely to drink five or more drinks in the past 30 days than non-active males. Similar results were found for women participating in the study. Nearly 70% of females in the high-activity group had consumed alcohol in the past 30 days compared to 62% of the non-active females. Additionally, almost 40% of the females in the high-active group had binge drank compared to almost 30% of the non-active group. The results for women have been more inconclusive with data from several studies reporting differing results. Other studies have not been successful at finding any association between physical activity levels and binge drinking among college students.

Recently, research on a convenience sample of 1,200 students enrolled in four different Midwestern universities assessed self-reported physical activity (Seo et al. 2007). Individuals were asked to report how often they participated for 30 minutes in an activity that “made them sweat,” and how many episodes of physical activity
lasted more than 30 minutes where the individual did not work hard enough to break a sweat. Although no significant findings were revealed among the groups, it was found that 30% of those who were considered low-active were frequent-to very-frequent binge drinkers compared to roughly 20% at the same level for the participants who met vigorous and moderate guidelines (Seo et al., 2007).

Similarities between the current study and the ones previously completed are minimal. Many of the studies use Wechsler’s methodology for determining whether or not students are binge drinking. In doing so, it appears that there is yet to be a gold standard with which to measure binge drinking since it generalizes drinks among males and females and fails to integrate other factors in the equation such as weight, tolerance levels, and such. This research thesis is focused on college students’ alcohol dependence, which has been reported as statistically reliable (Hays & Revetto, 1992), and their level of physical activity as measured by using the LTEQ. The SMAST has been previously used to assess drinking problems among college students, but it has yet to be used with any measure of physical activity. Many of the studies use the previously accepted guidelines of physical activity measuring moderate and vigorous activity. The current research thesis examines generalized physical activity levels, however, in order to determine if there is a correlation between the physical activity levels of college students and their dependence on alcohol. Previous studies have used LTEQ, but once again, it has not been used in conjunction with the SMAST to determine possible correlates between the two. In using these two measures it will give insight into another avenue of drinking and
exercise among college among college students in order to plan interventions that might prevent or recognize students who may be at risk for developing or is currently alcohol dependent.

**Ecological Model**

Bronfenbrenner’s (1979) Ecological Model and a more simplified Social-Ecological (SE) framework will be used to serve as a theoretical guide to this research (Dahlberg & Krug, 2002; Stokols, Pelletier, & Fielding, 1996; Gruenewald, Miller, & Andrews, 1993). The Centers for Disease Control and Prevention commonly employs the SE model to identify factors influencing each individual’s decision making process (CDC, 2009). Using this model it is possible to understand how individuals are influenced by interactions in and across a number of what Bronfenbrenner termed “ecosystems.” These ecosystems affect a person’s life and the decisions which are made about health promoting or risk taking behaviors. For this study, the Ecological Model can help to provide insight as to why college students are exhibiting the heavy or binge drinking and the physical activity behaviors that have been discussed previously.

Starting at the center for Bronfenbrenner’s ecosystems is the individual, who is surrounded by numerous Microsystems that generally include that individual’s family, peers, the classroom, and sometimes religion. An individual’s family appears to play an important role since there has generally been so much time spent with them through the course of maturing. Once young adults arrive at college and are separated from family, it may permit the new peer group to have increased time and
thus, influence his/her decisions. The outer layers of this system (e.g., peers, taking
courses) also provide insight as to how these college students may be most
influenced.

The layers surrounding the various Microsystems are defined as the
“exosystem.” These exosystems include institutions, organizations, or influences
such as local school system, the community, and mass media. Looking deeper into
this exosystem it suggests how a university can play a vital role in which decisions a
person makes. At the school systems level, alcohol awareness programs or social
norms campaigns, such as normative interventions can be used to reduce or modify
alcohol consumption. Universities are trying to play more of a role to influence
students’ decision making skills about alcohol consumption through mandatory
freshman alcohol awareness/education classes (Charlotte Observer, 2007). One pilot-
tested alcohol intervention for frequent binge drinkers, however, found that alcohol
awareness classes for students actually increased the amount of alcohol these students
consumed (Maney et al., 2001). The result was attributed to the developmental
processes of these research participants more than the education itself.

Some universities have offered freshman orientation classes, alcohol
awareness weeks and other special events and curriculum infusion, where faculty
introduce alcohol-related facts as well as alcohol-related issues into their regular
academic courses (Ryan & DeJong, 1998). Maney’s et al. (2003) noted alcohol free
alternatives and activities were significantly ($p < .05$) related to the likelihood of less
alcohol consumption and engaging fewer alcohol related risks. Universities seem to
have the ability to influence the decisions their students are making, thus showing their importance in these exosystems.

Likewise, mass media can play a vital role in the decision making process through billboards promoting alcohol, drink specials in the papers, and happy hour ads/drink specials on various buildings. Research has shown that media messages such as drink specials, happy hours, or tail gates have been shown to increase alcohol use and related risks (Wechsler et al., 2004). Several studies have also found alcohol advertising to foster attitudes of more favorable beliefs concerning alcohol as well as increased drinking (Casswell & Zhang, 1998; Grube & Wallack, 1994).

Additionally, the outermost layers of the Bronfenbrenner’s Model are included in the “macrosystem”. These layers include economic factors, society, nationality, culture, and political systems. An economic factor that may influence an individual’s drinking patterns is the overall price for the goods used to produce the beverages. An increase in the cost of transporting the finished product to the place of purchase may also influence an individual’s overall drinking pattern. Government taxation on the finished product might also lead to changes in consumption of alcoholic beverages. The macrosystem is able to influence all the other systems. It is possible that if students are overestimating the amount of alcohol being consumed that society could also have a clouded opinion of what is happening.

The relationship among these exosystems may be better explained in a less complicated manner using a simplified social ecological (SE) model (Dahlberg & Krug, 2002). The SE model, adapted from Bronfenbrenner’s, can be used to provide
a conceptual framework that allows for specific strategies for the scope of work to be completed in this particular study (Elder et al., 2007). Some SE frameworks use four levels that include the individual, relationships, community, and society (Dahlberg & Krug, 2002). For this study the SE model used will be used to provide insights as to why and how the patterns of behavior discussed in this research may be occurring.

The main point for the SE framework is the individual who can be identified by their biological and personal history factors. Some of these factors for the individual include, but are not limited to; age, education, socioeconomic status, history of alcohol use, age of first consumption, history of physical activity and/or genetic predisposition. Individuals may also be influenced by the persons with whom they associate.

The second level includes relationship factors that increase the risk of alcohol use/dependence and participation in physical activity. These are relationships with peers, intimate partners and family members. Among college students these relationships might consist of participating in intramural activities, being involved in a fraternity or sorority, participating with an intercollegiate sports team, activities within a religious organization, and/or work groups.

Next, the individual is influenced by their community. The community in this study consists of the university where the research was conducted, workplaces of the students, the neighborhoods in which the students reside. One might consider the reputation of the university in regards to drinking patterns (perceived and actual) among students. It is also important to look at the laws concerning consumption and
the ability of the school/community to enforce these laws within the community in question. Other areas of focus might include the availability of obtaining alcohol. For example, how many establishments are available for the sale of alcoholic beverages and how close are students to these establishments?

Last, it is necessary to look at the broader scope of the society in which we live. There are many influences society can impose on individuals. One has to look at how physical activity and alcohol consumption are viewed by society. There are numerous movies that portray college students as raging alcoholics who have nothing better to do than sit around and consume mass quantities of alcoholic beverages. An individual could even consider all the advertising being done to entice people to drink.

In conclusion, Bronfenbrenner’s Ecological Model, and the SE framework, focus on an individual’s relationship among the various contexts in his/her world that influence behavior. This relationship occurs among and between the mentioned layered systems to influence what an individual becomes as he/she develops throughout life. This review of research literature shows that numerous college students are participating in heavy alcohol use and many are not meeting the guidelines for physical activity. It is the intention of the present research, to examine individual, peer, and social variables of gender, GPA, semester standing, and athletic participation to better understand the relationships, or lack thereof, between physical activity levels and alcohol dependence among the sampled college population.
Bronfenbrenner’s Ecological Model and the SE framework will serve as the theoretical foundation for discussing these relationships.

Conclusion

This chapter contained a presentation of published research on the topics of alcohol use/dependence and physical activity among college age populations. The rationale for the proposed research was presented in relationship to Bronfenbrenner’s Ecological Model and a SE framework. The next chapter contains a presentation of research methods.
CHAPTER 3

METHODS

This chapter contains four sections: (1) purpose and general research questions, (2) participants and procedures, (3) measures, (4) data analysis and management. These sections will be used to detail information concerning each of the four areas. It will also provide insight as to why this research is being done, the procedures for subject recruitment, and how the data will be analyzed.

General Research Question

This study will explore the relationship between alcohol dependence and exercise among the college students used for this sample. It will also explore relationships between a student’s GPA, semester standing, or participation in a varsity sport and their self-reported physical activity levels and their alcohol abuse/dependence. Research of this nature is important to college-level health and human performance professionals in designing prevention programs targeting alcohol abuse.

Participants and Procedures

Participants for this study were students enrolled in the Pennsylvania State University’s introductory psychology courses at the University Park campus. The population included 1,917 students, aged 18 or older, who were enrolled in one of nine sections of “Introductory Psychology” during Fall Semester, 2002.
Students from the population of interest were identified through the University’s “Psychology 2” Pool. Researchers within and outside of the Department of Psychology were eligible to access the Psychology 2 subject pool upon application and approval of the research purposes and design. The application entitled, “Quality of Life and Family Health History in Relationship to Alcohol, Tobacco and Exercise,” was approved on November 27th, 2002, by the Department of Psychology and posted on the Psychology 2 Subject Pool web page as Experiment #879. Enrolled students could volunteer to participate by registering in advance. Students enrolled in an “Introduction to Psychology” course were required to complete a total of five clock hours of service through participation in the Psychology 2 subject pool program (or a similar activity as deemed appropriate by course instructors). In that participating in Experiment #879 would generate one hour of credit for participants, each of the identified pool of participants had a one in five likelihood of enrolling in experiment #879. A total of 634 students volunteered to participate in the experiment and provided usable data, representing a 33.07% participation rate.

Seven sections of introductory psychology were available with a maximum of 300 available seats were opened on December 2nd-4th, and 9th-12th, 2002 for students to volunteer to participate. Systematic and consistent procedures for data collection were employed. Students were provided with two copies of informed consent forms, as shown in Appendix B; one questionnaire; one electronic scan form; and one pencil. Participants were instructed to read through the informed consent forms carefully and to sign both copies. Once consent forms were signed, the participants were instructed
to complete the 95-item questionnaire. Upon completion of the survey, participants returned one copy of the signed consent form, as well as the questionnaire, a completed scan form, and pencil to the experimenter. A “log out” sheet was placed in the front of the classroom where participants were required to sign out to ensure receipt for participation. Once scan sheets were collected for each of the seven data collection sections, Penn State’s University Testing Service (UTS) was hired to optically scan the completed forms and convert into a text file. Data were imported into a Statistical Packages for the Social Sciences (SPSS), Version 17 data-editing file for cleaning, coding, and data analysis.

Measures

In 2002, the Pennsylvania State University’s Child Youth Family Consortium (CYFC) funded a research endeavor titled the “Quality of Life: Alcohol, Tobacco, Exercise, and Family Health Questionnaire,” (Appendix A). The questionnaire used in this study contained eight subscales measuring physical, psychological, or demographic attributes. The following three subscales were used for this study (1) alcohol dependence, (2) leisure-time exercise, (3) and demographics. Each of the subscales is described below in terms of conceptual basis and psychometric properties. For this study the main variables to be examined are alcohol dependence (SMAST), exercise frequency (LTEQ) and minimum exercise time (M-LTEQ). The SMAST and M-LTEQ will be examined in detail to determine similarities and differences between various subgroups. They will be broken down by gender, GPA,
semester standing, and varsity athletic status. Finally, each of these subgroups will be used to determine the presence of any correlation between SMAST and LTEQ.

**Alcohol Dependence**

Part of the “Quality of Life” (Appendix A) survey included the Short Michigan Alcohol Screening Test (SMAST), which has been used to assess the degree to which individuals exhibit symptoms of being dependent on alcohol (Selzer et al., 1975; Hays & Revetto, 1992). The SMAST assesses whether individuals have problems related to alcohol use and whether participants’ were self-identified as alcohol dependent. The SMAST is used to identify people with alcohol abuse disorder diagnoses (including alcohol dependence) from those who do not have alcohol abuse disorders and it also discriminates more efficiently than 14 other measure of alcohol use (Hays & Revetto, 1992). Internal consistency for the SMAST has been established (alpha = 0.93). Sensitivity and specificity have been shown to be 0.83 and 0.87, respectively (Hays & Revetto, 1992).

**Leisure-Time Exercise Questionnaire (LTEQ)**

Another part of the “Quality of Life” survey was the LTEQ, which measures the frequency of self-reported mild, (e.g., yoga, archery, fishing), moderate (e.g., fast walking, volleyball, tennis), and strenuous (e.g., running, football, basketball) exercise performed during a typical week for at least 15 minutes (Godin et al., 1986).
A total score is calculated by summing the frequency of strenuous, moderate, and mild exercise using the following equation:

Total LTEQ Score = (9 X Strenuous) + (5 X Moderate) + (3 X Mild).

The test-retest reliability validity of the LTEQ has been found to be satisfactory (r = 0.74; Godin & Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993). Modified LTEQ scores will be used to allow for a base comparison of physical activity scores that can be used to determine an individual’s minimum moderate and vigorous activity level in conjunction with the recommended physical activity levels set forth by the CDC (2008). The M-LTEQ will take the physical activity frequencies for each individual and multiply it by a 15 minute base. In doing so, it will give a minimum physical activity time that each individual will have participated in the previous week.

Demographics

Participants were asked to provide demographic information including their gender, semester standing, GPA, and varsity athletic status.

Data Analysis and Management

Data were analyzed using statistical analyses using the SPSS Version 17.0 software program. Penn State’s UTS at the University Park Campus optically scanned the data to text format and uploaded it into an SPSS data editor file.
 Frequencies and descriptive analyses (i.e., means, standard deviations, and ranges) were computed to examine the presence of any anomalies in the dataset.

**Scoring**

A total alcohol dependence score was computed by summing items 30-42 from the “Quality of Life: Alcohol, Tobacco, Exercise, and Family Health Questionnaire.” Higher scores indicate a greater incidence of symptoms related to alcohol dependence on the SMAST items.

The LTEQ was scored based on the following formula: Weekly leisure activity score = (9 X Item 85) + (5 X Item 86) + (3 X Item 87). Higher scores on the LTEQ indicate a greater extent of the respondent’s engagement in leisure time physical activity.

The M-LTEQ will use the frequencies from the LTEQ moderate and vigorous activity to get an absolute minimum of physical activity for individuals from the previous week.

The following variables will be reported in this thesis.

1. SMAST
2. LTEQ/M-LTEQ
3. Gender
4. GPA
5. Semester
6. Varsity athletic status
**Statistical Analysis**

The Statistical Package for the Social Sciences (SPSS+[R]) for Windows Version 17.0 was used for statistical analyses (SPSS, 2009). Alpha (α) was set at 0.05 a priori. Statistical analyses include descriptive statistics (means, standard deviations, frequencies, and percentages). Cross-tabulations will be performed to determine whether these differences may be a function of gender, athletic status, GPA, and year in school. A Pearson Correlation test was calculated to determine if physical activity and alcohol dependence are significantly related based on gender, semester standing, athletic status or GPA.
CHAPTER 4
Results and Discussion

Introduction

The purpose of this study was to explore the relationships between heavy alcohol use, including alcohol abuse/dependence, and the frequency of exercise among a convenience sample of college students at the Pennsylvania State University. Independent variables used in this study were: (a) gender, (b) academic standing, (c) semester standing, and (d) athletic status. The dependent variables for this study include: (a) self-reported physical activity scores measured by the Leisure Time Exercise Questionnaire (LTEQ) and (b) alcohol dependence measured by the Short Michigan Alcohol Screening Test (SMAST). The three null hypotheses presented in Chapter I stated that there were no significant linear relationships between the aforementioned independent variables and an individual’s self-reported symptoms of alcohol dependence, or their participation in physical activity. This chapter contains descriptive data, a review of the results of each tested hypothesis, and a summary of the findings related to alcohol consumption and physical activity among college students.

Reliability Analyses

Cronbach’s Alpha reliability test was used to determine the internal consistency of the SMAST and LTEQ. The Alpha reliability coefficient estimate was low for this sample regarding SMAST scores (α = 0.50). Internal consistency for
LTEQ was somewhat higher with a reliability coefficient estimate of \( \alpha = 0.70 \), as shown in Table 2.

Table 2.

<table>
<thead>
<tr>
<th></th>
<th>Number of Cases</th>
<th>Number of Items</th>
<th>Established</th>
<th>PSU Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMAST</td>
<td>475</td>
<td>13</td>
<td>.93\textsuperscript{a}</td>
<td>.50</td>
</tr>
<tr>
<td>LTEQ</td>
<td>606</td>
<td>03</td>
<td>.74\textsuperscript{b}</td>
<td>.70</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Hays & Revetto, 1992  
\textsuperscript{b} Jacobs et al., 1993

**Descriptive/Demographic Information**

Descriptive statistics are presented in Table 3, and demographic information follows in Table 4. For this study, a total of 606 students completed the survey. There were 290 women (48\%) and 316 men (52\%) in the current sample. These numbers are similar to gender statistics reported by the University during this time period (PSU Budget Office, 2003).

In regard to semester standing, 603 (99.5\%) students answered this question on their survey. The students who failed to report their semester standing were labeled as system missing for this part of the survey. The highest number of students completing the survey was freshman, with 360. Sophomores followed with 158 students taking part in the survey. These two groups accounted for over 85\% of the
sample population. Additionally, there were 51 juniors, 28 seniors and six students who classified themselves as 9th semester or higher.

Of the 478 who self-reported their GPA (shown in Table 4), 209 (44%) recorded their GPA to be between 3.0 and 3.49. The GPA ranges of 2.5 to 2.99 and 3.5 to 4.0 followed with 120 (25%) and 111 (23%), respectively. There were 26 (5.4%) students who reported their GPA as being between 2.0 and 2.49. Lastly, twelve (2.5%) students reported having a GPA of less than a (2.0).

There were only a few athletes found to be present in the sample population. Out of the 475 (78%) students who reported their athletic status, only 21 (4.4%) claimed to be athletes at the University (see Table 4).
Table 3.

*Descriptive Statistics*

<table>
<thead>
<tr>
<th></th>
<th>Number of Subjects</th>
<th>Number of Items</th>
<th>Mean Item Scores</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMAST</td>
<td>475</td>
<td>13</td>
<td>3.49&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.73</td>
</tr>
<tr>
<td>LTEQ</td>
<td>606</td>
<td>751</td>
<td>59.42&lt;sup&gt;b&lt;/sup&gt;</td>
<td>53.27</td>
</tr>
<tr>
<td>Gender</td>
<td>606</td>
<td>2</td>
<td>0.48&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.50</td>
</tr>
<tr>
<td>GPA</td>
<td>478</td>
<td>6</td>
<td>2.82&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.98</td>
</tr>
<tr>
<td>Semester</td>
<td>603</td>
<td>5</td>
<td>0.61&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.89</td>
</tr>
<tr>
<td>Athletes</td>
<td>475</td>
<td>2</td>
<td>0.20&lt;sup&gt;f&lt;/sup&gt;</td>
<td>0.40</td>
</tr>
</tbody>
</table>

<sup>a</sup>Responses ranged from 0-13  
<sup>b</sup>Responses ranged from 0-750  
<sup>c</sup>Responses ranged from 0-1  
<sup>d</sup>Responses ranged from 0-5  
<sup>e</sup>Responses ranged from 0-4  
<sup>f</sup>Responses ranged from 0-1
Table 4.

Demographic Statistics

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>290</td>
<td>48%</td>
</tr>
<tr>
<td>Men</td>
<td>316</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>606</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman (1st-2nd semester)</td>
<td>360</td>
<td>60%</td>
</tr>
<tr>
<td>Sophomore (3rd-4th semester)</td>
<td>158</td>
<td>26%</td>
</tr>
<tr>
<td>Junior (5th-6th semester)</td>
<td>51</td>
<td>8%</td>
</tr>
<tr>
<td>Senior (7th-8th semester)</td>
<td>28</td>
<td>5%</td>
</tr>
<tr>
<td>Other (9th semester or higher)</td>
<td>6</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>603</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade Point Average</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 2.0</td>
<td>12</td>
<td>2%</td>
</tr>
<tr>
<td>2.0-2.49</td>
<td>26</td>
<td>6%</td>
</tr>
<tr>
<td>2.5-2.99</td>
<td>120</td>
<td>25%</td>
</tr>
<tr>
<td>3.0-3.49</td>
<td>209</td>
<td>44%</td>
</tr>
<tr>
<td>3.5-4.0</td>
<td>111</td>
<td>23%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>478</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Athletic Status</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athlete</td>
<td>21</td>
<td>4%</td>
</tr>
<tr>
<td>Non-athlete</td>
<td>454</td>
<td>96%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>475</td>
<td>100%</td>
</tr>
</tbody>
</table>
Short Michigan Alcohol Screening Test

Data pertaining to the Short Michigan Alcohol Screening Test (SMAST) is located in Table 5 (pg. 55). The SMAST is used to determine an individual’s level of alcohol dependence. Students scoring 0-2 on the SMAST were labeled as having no dependence. Those scoring a three were classified as being borderline dependent, and those scoring a four or higher are considered to be alcohol dependent. Overall, 475 (78%) students completed the necessary information to be properly scored for the SMAST.

Less than half (44%) of the students surveyed met the criteria for alcohol dependence and almost one-third (31%) met the criteria for being borderline alcohol dependent. Thus, most (75%) of the respondents met the criteria for a level of dependence on alcohol. From this dataset, 114 (50%) males who were classified as being alcohol dependent, while another 65 (29%) were borderline dependent. It also was found that one-third (33%) of the females were found to be borderline dependent and slightly more than that rate (38%) were classified as alcohol dependent. Women respondents accounted for 29% of those reporting no signs of alcohol dependence while fewer (21%) of men respondents were in this category. Overall, a higher percentage of men were found to be alcohol dependent and females in the study were more apt to show no signs of alcohol dependence.

Also shown in Table 5 is the analysis of an individual’s SMAST scores and their self-reported GPA. Those having a lower GPA were significantly \( p < 0.05 \) more likely to report signs of alcohol dependence. For students who reported their
GPA to be 2.49 or lower, more than half (58%) met the criteria for alcohol dependence. The percentage of individuals meeting the criteria for alcohol dependence decreased as one’s GPA increased. Those who reported their GPA to be 3.5 or higher had the lowest percentage (38%) in the alcohol dependent category. As for students demonstrating no level of dependence, the results showed fewer than 30% met these criteria across all levels of GPA. Overall, respondents were more likely to meet the criteria for being alcohol dependent when they reported a lower GPA.

The relationship between an individual’s semester standing and SMAST scores revealed interesting results and is illustrated in Table 5. All of the students who reported their semester standing at nine or higher met the criteria for being alcohol dependent, while 68% of the seniors (7th or 8th semester) completing the survey were reported to be alcohol dependent. Sophomores (5th or 6th semester) were third on the list for having the highest percentage of students being labeled as alcohol dependent with 51%. The data showed that as a student’s semester increased, so did their chances of being classified as alcohol dependent. As for the freshmen, 105 (38%) were found to be alcohol dependent and 83 (30%) were in the borderline classification. The sophomore class had 66 (51%) students who scored high enough to place into the alcohol dependent group. This percentage placed the sophomores higher than the freshmen and juniors, but under the seniors and those who have completed nine or more semesters. Freshmen (31%) were found to have the highest percentage of students reporting no signs of alcohol dependence, followed by
sophomores (19%) and seniors (18%). The low percentage of juniors (11%) reporting no level of alcohol dependence might seem substantial, but this group had the highest percentage of students (50%) in the borderline dependent group. The freshmen and sophomores followed in the borderline category with 30% and 29%, respectively.

Finally, there were some differences among those whom listed themselves as athletes and non-athletes (see Table 5). Only twenty-one students in the survey reported themselves as varsity athletes compared to the 454 non-athletes. Nevertheless, out of those 21 student athletes, 11 (52%) met the criteria for being alcohol dependent compared to 196 (43%) of the non-student athletes. About one-third (32%) of non-athletes were found to be borderline dependent compared to the four (19%) athletes in this category. Athletes were found to have a higher percentage of students (29%) showing no signs of alcohol dependence, compared to 25% of the non-athletes, although this information cannot be generalized given the low numbers overall.
Table 5.

**Short Michigan Alcohol Screening Test (SMAST)**

<table>
<thead>
<tr>
<th>Level of Dependence</th>
<th>None</th>
<th>Borderline</th>
<th>Dependent</th>
<th>Total</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>29%</td>
<td>33%</td>
<td>38%</td>
<td>100%</td>
<td>(247)</td>
</tr>
<tr>
<td>Male</td>
<td>21%</td>
<td>29%</td>
<td>50%</td>
<td>100%</td>
<td>(228) *</td>
</tr>
<tr>
<td><strong>GPA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2.00</td>
<td>25%</td>
<td>17%</td>
<td>58%</td>
<td>100%</td>
<td>(12)</td>
</tr>
<tr>
<td>2.00-2.49</td>
<td>15%</td>
<td>27%</td>
<td>58%</td>
<td>100%</td>
<td>(26)</td>
</tr>
<tr>
<td>2.50-2.99</td>
<td>22%</td>
<td>32%</td>
<td>46%</td>
<td>100%</td>
<td>(120)</td>
</tr>
<tr>
<td>3.00-3.49</td>
<td>28%</td>
<td>29%</td>
<td>43%</td>
<td>100%</td>
<td>(209)</td>
</tr>
<tr>
<td>3.50-4.00</td>
<td>27%</td>
<td>35%</td>
<td>38%</td>
<td>100%</td>
<td>(111)</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshmen</td>
<td>31%</td>
<td>30%</td>
<td>38%</td>
<td>100%</td>
<td>(274)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>19%</td>
<td>29%</td>
<td>51%</td>
<td>100%</td>
<td>(129) **</td>
</tr>
<tr>
<td>Junior</td>
<td>11%</td>
<td>50%</td>
<td>39%</td>
<td>100%</td>
<td>(44)</td>
</tr>
<tr>
<td>Senior</td>
<td>18%</td>
<td>14%</td>
<td>68%</td>
<td>100%</td>
<td>(22)</td>
</tr>
<tr>
<td>Over 9 semesters</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>100%</td>
<td>(5)</td>
</tr>
<tr>
<td><strong>Athletic Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athlete</td>
<td>29%</td>
<td>19%</td>
<td>52%</td>
<td>100%</td>
<td>(21)</td>
</tr>
<tr>
<td>Non-athlete</td>
<td>25%</td>
<td>32%</td>
<td>43%</td>
<td>100%</td>
<td>(454)</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level.
** Correlation is significant at the 0.01 level.
**Modified Leisure Time Exercise Questionnaire (M-LTEQ)**

Data relative to The Modified Leisure Time Exercise Questionnaire (M-LTEQ) scores is found on Table 4 (pg. 57). The LTEQ was used to determine an individual’s minimum level of participation in physical activity for the week prior to the survey. These absolute minimum physical activity scores were analyzed across gender, GPA, semester standing, and athletic status to determine if there was any relationship between M-LTEQ scores and the independent variables. The M-LTEQ scores were separated into three groups based on recommended activity levels set forth by the Centers for Disease Control and Prevention (CDC).

The first grouping was for students who were unlikely to have engaged in the minimum time requirement for weekly physical activity. While it is possible that some of the respondents may have scored beyond the minimum physical activity level, the survey method used for this research made this type of analysis impossible. The minimum physical activity time recommended by the CDC is determined by engaging in one of the following; 75 minutes of vigorous activity, 150 minutes of moderate activity, or a combination of the two (Vigorous + Moderate/2 = 75).

The next group was for those who had completed at least the minimum level as stated above. Again, some respondents may have reached the suggested time for increased health benefits, but the nature of the questioning for this survey made it impossible to determine just exactly how many were able to reach this level. The final grouping was for those who it was known to have reached the physical activity level for increased health benefits. The physical activity time necessary to achieve
increased health benefits require 150 minutes of vigorous activity, 300 minutes of moderate activity, or a combination of the two (Vigorous + Moderate/2 = 150).

There were 606 (100%) students who completed this portion of the survey. This next section will document the results for these respondents.

The survey found that at least 36% of the students had participated in enough physical activity to meet the minimum requirements set forth by the CDC. Slightly more males (38% vs. 34%) than females exercised enough to at least meet the minimum level. At least 5% of males and at least 3% of females are known to have participated in enough exercise time to achieve positive health benefits. The CDC recently reported that “most” (51%) Americans are meeting the minimum criteria for physical activity (CDC, 2009). At first glance, the number of students in this study who reported meeting the recommended minimum guidelines appears to be well-below the 51% found by the CDC, but the 36% found in this study is the minimum number of students who met the guidelines, and not the total.

Those who reported a lower GPA were also more likely to report less physical activity time. Most (80%) of the students who reported their GPA to be under 2.5 failed to meet the recommended physical activity guidelines (see Table 6). The percentage of students meeting the recommendations for physical activity increased, however as self-reported GPA’s increased. Even with the increasing percentages of students participating in physical activity, there were a maximum of 60% of the students reporting their GPA to be higher than 3.0 did not meet the guidelines. Over 40% of the students who reported their GPA as being above a 3.5 achieved at least
the minimum recommendations, while there were at least 3% who possibly exercised enough to reach the positive health benefits category. Overall, the data from this study found students reporting a higher GPA participated in more physical activity than students reporting a lower GPA.

Semester standing, shown in Table 6, also yielded some interesting results pertaining to physical activity times. The freshmen class had the lowest percentage (62%) that was falling below the recommended minimum levels of physical activity. They were followed by the sophomores who had at most (66%), juniors (67%), seniors (75%), and finally, those who listed their semester standing to be past nine semesters (80%). Freshmen were found to have at least 39% who met the minimum requirements for physical activity. The other classes followed in order with physical activity decreasing as semester standing increased. Only 5% of the freshmen students participated in enough physical activity to reach the positive health benefits section. The only other group found to have been achieving positive health benefits was sophomores at 3%.

The physical activity difference between athletes and non-athletes showed that athletes exercise far more than the average college student, as shown in Table 6. This study found that at least 73% of the surveyed athletes had reached at least the minimum physical activity levels compared to approximately one-third (33%) of the non-athletes. Also, at least 15% of the athletes had participated in enough physical activity to achieve positive health benefits (at least 15%) as compared to the non-athletes (at least 3%).
Table 6.

Cross Tab Analysis of Physical Activity

<table>
<thead>
<tr>
<th></th>
<th>Maximum Below Recommended</th>
<th>Minimum Achieved Recommended</th>
<th>Minimum Positive Benefits</th>
<th>Total</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>66% (209)</td>
<td>31% (97)</td>
<td>3% (10)</td>
<td>100% (316)</td>
<td>*</td>
</tr>
<tr>
<td>Male</td>
<td>62% (180)</td>
<td>33% (97)</td>
<td>5% (13)</td>
<td>100% (290)</td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>64% (389)</td>
<td>32% (194)</td>
<td>4% (23)</td>
<td>100% (606)</td>
<td></td>
</tr>
<tr>
<td><strong>GPA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2.00</td>
<td>81% (13)</td>
<td>13% (2)</td>
<td>6% (1)</td>
<td>100% (16)</td>
<td></td>
</tr>
<tr>
<td>2.00-2.49</td>
<td>78% (31)</td>
<td>20% (8)</td>
<td>3% (1)</td>
<td>100% (40)</td>
<td></td>
</tr>
<tr>
<td>2.50-2.99</td>
<td>64% (88)</td>
<td>34% (47)</td>
<td>2% (3)</td>
<td>100% (138)</td>
<td></td>
</tr>
<tr>
<td>3.00-3.49</td>
<td>64% (167)</td>
<td>31% (81)</td>
<td>5% (12)</td>
<td>100% (260)</td>
<td></td>
</tr>
<tr>
<td>3.50-4.00</td>
<td>59% (91)</td>
<td>38% (58)</td>
<td>3% (5)</td>
<td>100% (154)</td>
<td>*</td>
</tr>
<tr>
<td><strong>Semester</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshmen</td>
<td>62% (222)</td>
<td>34% (121)</td>
<td>5% (17)</td>
<td>100% (520)</td>
<td>**</td>
</tr>
<tr>
<td>Sophomore</td>
<td>66% (104)</td>
<td>32% (50)</td>
<td>3% (4)</td>
<td>100% (158)</td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>67% (34)</td>
<td>33% (17)</td>
<td>0% (0)</td>
<td>100% (51)</td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>75% (21)</td>
<td>25% (7)</td>
<td>0% (0)</td>
<td>100% (28)</td>
<td></td>
</tr>
<tr>
<td>Over nine semesters</td>
<td>80% (4)</td>
<td>20% (1)</td>
<td>0% (0)</td>
<td>100% (5)</td>
<td></td>
</tr>
<tr>
<td><strong>Athletic Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athlete</td>
<td>27% (7)</td>
<td>58% (15)</td>
<td>15% (4)</td>
<td>100% (26)</td>
<td></td>
</tr>
<tr>
<td>Non-athlete</td>
<td>66% (386)</td>
<td>31% (181)</td>
<td>3% (19)</td>
<td>100% (586)</td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
Hypothesis Testing

Research Question #1

The first sets of analyses were related to the question of whether different subdivisions of the collegiate population were more likely to be classified as alcohol dependent. The first hypothesis predicted that there would be no relationship between alcohol dependence and the following independent variables; gender, GPA, semester standing, or athletic status. The null hypothesis was not rejected in regards to SMAST scores and athletic status, but it was rejected for SMAST scores and gender ($p < .05$), GPA ($p < .05$), and semester standing ($p < .05$). Frequencies and cross tabulations were run for each independent variable, as reported previously, as well as a Pearson Correlation (see Table 7). Summaries of these findings are found in the four following paragraphs.

Gender

This study found half (50%) of males meeting the criteria to be labeled as alcohol dependent in this study compared to fewer females (38%). The level of dependence found for students according to their semester status found seniors to be the most alcohol dependent (68%). The null hypothesis was rejected since significantly ($p < .05$) more men (50%) than women (38%) reported alcohol dependence, as illustrated in Table 7.
**GPA**

There was a negative correlation between alcohol dependence and GPA (shown in Table 7). The percentage of students meeting the criteria for alcohol dependence significantly \( p < .05 \) decreased as individuals’ GPAs increased. Over half (58%) of students reporting GPAs below 2.49 were found to be alcohol dependent, while only 38% of the students reporting alcohol dependence when their GPA was higher than 3.5. The null hypothesis was rejected; there was a significant \( p < .05 \) negative correlation between GPA and SMAST scores.

**Semester Standing**

As shown in Table 7, there was a significant \( p < .01 \) positive relationship between SMAST scores and semester standing among this population. Students reporting a higher semester status were more likely to be alcohol dependent. The significant relationship between these two variables enables the null hypothesis to be rejected.

**Athletes**

Although a higher percentage of athletes were classified as being alcohol dependent, no level of significance (reported in Table 7) was reported, and the null hypothesis was not rejected. Just over half (52%) of the athletes met the criteria for being alcohol dependent as compared to 43% of non-athletes.
Table 7.

*Pearson Correlations*

<table>
<thead>
<tr>
<th></th>
<th>SMAST</th>
<th>LTEQ</th>
<th>ATHLETE</th>
<th>GENDER</th>
<th>SEMESTER</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMAST</td>
<td>1</td>
<td>.057</td>
<td>.015</td>
<td>.116*</td>
<td>.177**</td>
<td>-.096*</td>
</tr>
<tr>
<td>LTEQ</td>
<td>1</td>
<td>.209**</td>
<td>.070</td>
<td>-.083</td>
<td>.084*</td>
<td></td>
</tr>
<tr>
<td>ATHLETE</td>
<td></td>
<td>1</td>
<td>.041</td>
<td>-.042</td>
<td></td>
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<tr>
<td>GENDER</td>
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<td>SEMESTER</td>
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<tr>
<td>GPA</td>
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<td>1</td>
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</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

*Research Question #2*

The second set of analyses was related to the question of whether different subdivisions of the collegiate population are more likely to meet the recommended standards for physical activity. The second hypothesis predicted that there would be no relationship between one’s level of physical activity and the following independent variables; gender, GPA, semester standing, or athletic status. The null hypothesis was not rejected in regard to physical activity scores with gender, and semester standing, but was rejected for physical activity scores with GPA ($p < .01$) and athlete ($p < .05$) status. Frequencies and cross tabulations were run for each independent variable, as reported previously, as well as a Pearson Correlation (see Table 7).
Gender

As shown in Table 7, there was no significant difference in regards to physical activity scores among men and women in this study, and thus, the null hypothesis cannot be rejected.

GPA

There was a significant \((p < .05)\) relationship, as shown in Table 7, between physical activity and GPA. Students with higher GPAs were more likely to participate in greater amounts of physical activity, and students with a lower GPA. At most, 81% of those who reported their GPA to be less than 2.0 failed to meet the minimum weekly requirements for physical activity. The null hypothesis was rejected, see Table 7.

Semester Standing

Almost half (at least 40%) of the freshmen were found to have reported participating in enough physical activity to have met the minimum requirements while a quarter (25%) of seniors in the study reported meeting the minimum requirements. Although levels of physical activity decreased as an individual’s semester standing increased, this relationship was not found significant (see Table 7). The null hypothesis cannot be rejected in regards to physical activity scores and semester standing.
**Athletes**

As might be expected, physical activity levels differed significantly \( (p < .01) \) between athletes and non-athletes. Approximately two-thirds (73%) of the surveyed athletes reported participating in the required allotment of time for physical activity compared to at least 34% of those who did not report participating in varsity athletics. Athletes were also found to have at least 15% meeting the physical activity times necessary to achieve greater health benefits. The null hypothesis was rejected with regard to physical activity levels between athletes and non-athletes, as shown in Table 7.

**Research Question #3**

The final analysis related to the question of whether an individual’s alcohol dependence was related to their level of physical activity. The hypothesis for this analysis was that no correlation would be found between the two variables. A Pearson Correlation was performed to determine the level of significance between the subjects’ SMAST scores and level of physical activity (LTEQ). The relationship between the two variables was not significant (see Table 7), so for this data set the null hypothesis was not rejected since physical activity and alcohol dependence were not significantly \( (p = .057) \) correlated, in this study.
CHAPTER 5
CONCLUSION and FUTURE RESEARCH DIRECTIONS

This section provides an in-depth discussion of the research results reported throughout Chapter 4. The structure of this chapter is organized in the following order: (a) a comparison of the current research study with other research studies composed of similar populations; (b) an examination of the limitations of the current thesis, and (c) suggestions for future research.

Sample versus Population and Other Comparisons

This section details comparisons between the current sample and similar samples of college-aged populations. Demographic information, reliability estimates, and mean subscale scores were used for these comparisons.

Demographic information from the current sample is similar to that of other samples within comparable populations. This sample population included 52% males along with 48% women. The Pennsylvania State University Budget Office reported similar statistics for all males (53%) and females (47%) at Penn State during this same time period (Penn State University Budget Office, 2003). The majority of the study participants were freshmen (60%) completing their first or second semester of undergraduate studies, followed by sophomores (27%), juniors (8%), seniors (4%), and those indicating “other” (< 1%).

The reliability estimates for the SAST were computed. The current sample yielded a SAST reliability estimate that was low ($\alpha = 0.50$). This estimate is
inconsistent with the previously reported estimate ($\alpha = 0.93$) found by Hays and Revetto (1992). With regard to the LTEQ, there were a total of 610 participants who completed this portion of the survey. The mean physical activity score was 59 minutes, which is below the 75 minutes recommended by the CDC. Standard deviation for the LTEQ set was 53. It was determined that 64% of the surveyed population failed to meet the criteria for having engaged in the minimum level of exercise. The LTEQ made it possible to determine accurate exercise times for each individual and to measure those times across different variables.

_First Research Question: Alcohol Dependence_

The U.S. Department of Health and Human Services reports that approximately 600,000 students are injured annually while under the influence of alcohol (USDHHS, 2007). Information about critical factors affecting college alcohol consumption could help to serve agencies and universities in planning programs and regulations to decrease these numbers. The first hypothesis stated that there would be no correlation between an individual’s SMAST scores based on gender, GPA, semester standing, or athletic status.

Contrary to the stated hypothesis, there were significant ($p < .05$) relationships between three of the four categories. This study found what previous studies found when looking at differences between male and female students with a higher percentage of males meeting the criteria being alcohol dependent (Slutske, 2005; Stepp et al., 2005; Aertgeerts & Buntinx, 2002; Greenberg et al., 1999). Overall,
44% of the students completing this survey met the SMAST criteria for alcohol dependence. In contrast, Aertgeerts and Buntinx (2002) reported 3.6% of surveyed freshman students as meeting the criteria for alcohol dependence. Other research has found closer to 15% of college students be found to be either abusers or dependent of alcohol (Slutske, 2005; Clements, 2002). Nevertheless, the one study that reported results similar to the current study with over one-third (36.0%) of participants meeting the criteria for alcohol dependence, did so by using subjects who had been previously diagnosed with a borderline personality disorder (Stepp et al., 2005). One of the largest studies found only 6% of surveyed college students to be alcohol dependent using the DSM-IV (Knight et al., 2002).

Greenberg et al., (1999) found that male college students scored higher than female college students in regard to alcohol dependence. The current study also found more males than females as meeting the dependence standards (a score of four or higher) set forth for the SMAST. As for students meeting the criteria for being alcohol abusers or alcohol dependent, Slutske (2005) found that 11% of the female college students surveyed met those criteria, and one-quarter of surveyed males met the same criteria. The current survey found over three times this rate (38%) among the surveyed females as being dependent.

Related studies reported students with a higher GPA were less likely to abuse alcohol (Vickers et al., 2004; Wolaver, 2002). This study also found a significant \(p < .05\) negative relationship between GPA and alcohol dependence, i.e. the higher one’s GPA was, the less likely they were to be alcohol dependent. Over half (58%)
of the students who reported having below a 2.5 GPA were found to be alcohol dependent in this study. A recent study on 28,000 students also found an inverse relationship between alcohol abuse and GPA (Penn State Live, 2009).

A related study completed among female college students found a negative association between a student’s GPA and their drinking patterns and also found that these female students with a lower GPA were more likely to binge drink (Vickers et al., 2004). Using results from the College Alcohol Survey, Wolaver (2002) also found students who reported frequent levels of binge drinking or sessions of intoxication to have significantly ($p < .05$) lower GPAs. Another study using the same, and newer, information from the College Alcohol Study also found consumption of alcohol to be negatively correlated with GPA (Williams et al., 2002).

Similar findings were reported from a survey of nearly 10,000 students throughout Minnesota with students who reported high-risk drinking also saw a decrease in their GPA (University of Minnesota Boynton Health Service, 2008). Data from this study comparing a student’s semester status and their SMAST scores conflicts with data from other researchers.

Similar studies looking at drinking patterns across semester standings reported a greater number of college freshmen consuming alcoholic beverages compared to sophomores, juniors, and seniors (Bewick et al., 2008; Vickers et al., 2004; Gruenewald et al., 2003). This was not the case for this study. Students in this study were more likely to meet the criteria for being alcohol dependent as their semester standing increased. Aertgeerts and Buntinx (2002) reported 3.6% of surveyed
freshman students as meeting the criteria for alcohol dependence, and nearly two-thirds (63%) of those students failed in their first year. The current study found over one-third (38%) of the surveyed freshman to be alcohol dependent. The sample population for this study was taken from a pool that was mainly composed of freshman and sophomores (84%) who were enrolled in an introductory level psychology class. The few subjects who identified themselves as seniors (7th or 8th semester) were found to have a high percentage who met the criteria for being dependent (68%). All (n = 5) of the students who listed their semester standing as nine or higher were found to be alcohol dependent, although this total number would not be high enough to be a practicable and generalizable finding.

The majority of the literature reviewed for this study found athletes drinking more alcohol and consuming it more frequently than their non-athlete counterparts. This study found no significant difference between athletes and non-athletes in regard to their level of alcohol dependence. This is similar to related studies that reported no significant differences between athletes and non-athletes and relationship to their alcohol consumption patterns (Gutgesell et al., 2003; Overman & Terry, 1991). It should be noted that there were only twenty students in the study who identified themselves as varsity athletes, and just over half (52%) met the requirements for being alcohol dependent compared to 43% of non-athletes meeting the same requirements. Therefore, these findings can not be generalized outside of this study. This is similar to other studies that found athletes to use more alcohol than non-athletes, consume more frequently, and engage in alcohol-related risk behaviors more

Second Research Question: Physical Activity

Overall, this study found nearly two-thirds of the surveyed participants failed to meet the recommended physical activity standards. One researcher found results similar to the current study with over half (56%) of surveyed students failing to meet current guidelines (Scott-Sheldon et al., 2007). Literature reviewed for this study also consistently found a significantly higher percentage of males exercising more than females.

The limited data on correlations between GPA and physical activity have led to inconclusive findings. The author was able to locate only one study that employed these two variables and the researchers were unable to find any relationship between them (Andreopoulos et al., 2008). In this study, however, there was a significant ($p < .05$) positive relationship between GPA and physical activity. Students with higher GPAs reported higher levels of physical activity. This could occur as a result of the students retaining more information concerning the positive outcomes associated with participating in adequate levels of physical activity.

Previous research has indicated that a student’s level of physical activity decreases as a student’s semester standing increases (Zahran, et al., 2007; Dunn & Wang 2003). Similar results were found in this study. It was determined that there was a significant ($p < .05$) negative correlation between a student’s semester standing
and their participation in physical activity. This could be caused by a decrease in available time students are able to devote to exercise since classes become more demanding at the upper levels. It may also be a result of the students spending more time consuming alcohol, or it may be a result of a significant personal relationship. Another possibility may be that students are taking their required university physical activity credits in their first two years of school which led to that more of these students being physically active.

It was not surprising to discover a higher percentage of athletes participating in elevated levels of physical activity. At least three-fourths (75%) of the athletes reported participating in physical activity at levels high enough to meet the physical activity guidelines while at least one-third (34%) of the non-athletes were found to do the same. This would seem very likely if the athletes were working out with their team since most varsity teams are gathering at least 5 days per week. Only a small percentage of these athletes, however, reported participating in enough activity to achieve the positive health benefits. In-season athletes typically have practice five-to-six days per week. With that many practice sessions, you would expect conditioning for the sports to exceed the time frame required for reaching the positive health benefits. Nevertheless, some of the athletes could have been off-season, or maybe they participate in a sport where cardiovascular endurance is not the highest priority, such as golf, fencing, or baseball. This population contained a high number of freshmen and if they were trying to make a team, they may have been training in addition to their team workouts.
Discussion

The Pennsylvania State University is consistently ranked as one of the top party schools in the United States. The Princeton Review 2010 classified Penn State as the number one party school in the United States (Princeton Review, 2009). Alcohol appears to be a big part of collegiate life at Penn State. There are numerous bars located in close proximity to the campus which allow for easy access to alcoholic beverages. There are also three beer distributors in State College as well as a number of bottle shops and restaurants where alcohol can be purchased or consumed. With all the places alcohol could be obtained, it is understandable how alcohol could play a important part in a college student’s life.

Could information concerning a student’s alcohol dependence and self-reported GPA be used to help the University in any way? Is it possible that institutions could use a student’s GPA to identify and keep closer tabs on students who appear to be having trouble, i.e., those students with a GPA lower than 2.0. Also, what happens to the students who are unable to continue with classes due to academic problems caused by alcohol dependence? The university could consider problems of this nature to be the responsibility of the individual even though it might be affecting an individual’s roommate(s), classmates, professors, and such.

Some researchers may find this information useful in regard to overall dependence. An individual who is dependent in one area may also be dependent in another. It’s possible that individuals who are dependent of alcohol might also suffer from drug addiction. This information could be useful in the future to aid in finding a
more reliable measurement for alcohol dependence that can be used for the collegiate
population in order to obtain a more accurate count of those students who are truly
alcohol dependent rather than those who might currently be abusing alcohol
intermittently.

The lower reliability estimate for the SMAST could be attributed to the
relatively small number of scale items (i.e., 13 items), since at least one other study
reported higher reliability estimates (Ware et al., 1996). It is also possible that the
time in which the survey was administered affected the reliability. The survey was
completed the week before finals during the Fall Semester. However, it possible that
the patterns of responses were inconsistent for the SMAST subscale within this
sample. Each item of the SMAST represents a different symptom of alcohol
dependence that an individual might experience throughout their lifetime. Although
DSM-IV diagnosed individuals may respond positively to a majority of these items, a
university sample may respond inconsistently because fewer respondents would be
classified as being truly alcohol dependent. Rather than interpreting the total SMAST
scores for collegiate students meeting the criteria for alcohol dependence, it might be
better used it as an indicator of the number of abusive alcohol consumption for this
population.

The number of students in this study labeled as alcohol dependent could
indicate a major problem with alcohol abuse on the campus. Other alcohol-related
statistics such as; DUI offenses, battery, rape, theft, public intoxication, would
provide added insights as to the abuse(s) occurring on and around campus.
University officials might consider using all these numbers to implement changes to current alcohol policies in an attempt to decrease the number of students drinking and the frequency of these drinking sessions in an attempt to make students safer during their education at Penn State. Efforts to curtail this problem drinking could produce a safer environment for students as well as others in the community.

The LTEQ showed that a number of students were not participating in the recommended amounts of physical activity. Some might say that students do not have enough to time to participate in sufficient physical activity times, but the number of students who were found to be alcohol dependent would suggest that students have plenty of time to engage in physical activity during their leisure times. It seems as if these students are choosing to participate in alternative activities that could cause harm to themselves and others. The University has made an effort to increase opportunities for students’ involvement in physical activity by renovating old building space into fitness centers and by building new fitness centers on campus. The results of this survey showed that activity levels decreased as students progressed through their studies. What is happening to these students that they show this decline in physical activity levels? It could be that they are using the extra time to study. Or, it could be that they are using this time for participating in drinking activities. The results from this study can not be used to make statements about upperclassmen since only a small number participated in the survey. This same study using results across the entire student population would have been more beneficial in reporting statistics across the different variables.
Limitations of the Current Study

The SMAST has been used in a number of studies looking to address alcohol dependence across different populations (Taylor, James, Bobadilla, & Reeves, 2008; Taylor, 2006; Gutgesell, 2001; Barry & Fleming, 1993; Thombs, 1991). It is used to self-identify individuals who may be suffering from alcohol dependence or borderline alcohol dependence. As typically used, the SMAST is a little more than an initial screening. A more comprehensive assessment, one that allows a researcher to inquire about drinking quantities, frequencies, and negative consequences, might be a better indicator of students who are alcohol dependent. This would address issues that are overlooked by the SMAST questioning. This type of measurement, if completed after the initial SMAST survey, would be more time intensive and not possible for a large study of this nature, especially with the anonymity of the participants. One of the SMAST questions asks about attending meetings for Alcoholics Anonymous. That could possibly inflate some students’ scores if they have attended one of those meetings for a reason other than their drinking behaviors SMAST may also be inflated for students who may have attended

All of the students (n = 6) who reported their semester status above nine were found to meet the standards for alcohol dependence and two-thirds (68%) of those who classified themselves as seniors in their 7th or 8th semester were also found to meet the criteria for being alcohol dependent. Although the number of these students is small in regard to the overall sample population, they could possibly skew the overall percentage of students meeting the criteria for being alcohol dependent. The
low number of students who listed themselves as being in their seventh semester or higher makes it difficult to generalize the information across similar populations.

Fewer than 36% of the surveyed students reported participating in enough physical activity to meet the minimum recommendations. Modifying the LTEQ does not allow for accurate reporting of physical activity among the college population. The numbers found can not be translated into statistics for comparison with the recommended physical activity levels given by the CDC. The numbers found in this report underestimate the time spent participating in physical activity by this population.

The LTEQ asks students to report the number of times they spent in the various degrees of physical activity for at least fifteen minutes. This report used these frequencies and multiplied them by fifteen (minutes) to get total exercise time in the moderate and vigorous activity levels. Once again, in modifying the LTEQ scores, the physical activity times for the students would only account for the least amount of time these students participated in moderate and vigorous physical activity. Ideally, having students record their total vigorous and moderate physical activity time would have yielded more accurate times to be used against the CDC’s recommended times, but that option was not available.

Finally, students self-reporting their physical activity over the given time period presents the issue of accurate recall among those students. It is possible that students could overestimate or underestimate their exercise times. This subjective assessment may have allowed for error in student recall, but is typically used for this
type of research. As was mentioned for the SMAST, more detailed questioning
would be desirable for an in-depth look at the students’ physical activity levels. This
type of questioning would have made it possible to ask questions as to why the
students are, or are not, exercising. It may have given added insight as to what kind
of exercise they are participating in and what is motivating them to exercise.
Although this type of questioning would allow for added insight, it was not possible
with the number of students participating in this survey.

**Recommendations for Future Research**

Further research is necessary in the areas of alcohol consumption and physical
activity among persons attending college. This research is pertinent to the safety and
lifelong well-being of all those involved. This section will look at issues dealing with
this current research in an attempt to better understand future implications for alcohol
and physical activity research among the college attending population.

The classes used for this research subject pool were composed of mostly
freshman level psychology classes. Almost 14% of the students in this study reported
themselves as having completed their sophomore year. This small number of
students who were in or above their junior year does not allow for generalizations
across these groups. Also, the groups which were found to have the highest
percentage of students meeting the criteria for being alcohol dependent were seniors
and those who reported their semester status at nine or higher. Approximately two-
thirds (68%), of the seniors were found to be alcohol dependent according to data
using the SMAST. All of the students who reported their semester status above nine were found to meet the standards for alcohol dependence. Further research needs to be done to attempt to determine why such a high percentage of the seniors, and those past their ninth semester, were found to be alcohol dependent. The reasons for students taking introductory level classes after their sophomore year may include some of the following; previously failing the course, being unable to fit the course into one’s schedule, and changing majors. The question still remains as to why such a high percentage of these students in their seventh semester or higher meet the criteria for being alcohol dependent.

Universities have been making efforts to combat alcohol abuse, but the consumption of alcohol still remains a serious problem on many campuses. Current programs aimed at curtailing alcohol consumption do not appear to be working. These are all questions that call for further research. The percentage of students failing to participate in enough physical activity to achieve positive health benefits is also alarming.

Physical inactivity has been shown to be a major cause of death in the United States and accounts for over 300,000 deaths per year (McGinnis & Foege, 1993). First it is necessary to take a look at the physical activity standards to better understand the situation at hand. The lowest amount of vigorous activity necessary to meet the standard is 75 minutes. This hour-and-fifteen-minute time can be broken into sessions as little as ten minutes. Is it possible that this set minimum does not meet the needs of each individual? Every individual is different and one set standard
for physical activity hardly seems logical. For those students who were unable to meet the suggested physical activity times, it is likely that some students may have never learned about the importance of physical activity. Their K-12 schooling experience may have been ineffective due to the teachers or even due to budget constraints for the school district in which they lived. Others may be lacking money necessary to join one of the fitness clubs on campus. Some may contend that they do not have enough time to participate in physical activity, but the number of students found to be abusing alcohol would lead one to believe that these students have an abundance of time.

The data from this research possibly indicates that students are not meeting the minimum requirements for physical activity. Further research needs to be done to investigate how much time students are spending in physical activity, what types of physical activity they are participating, and why they are or are not participating in physical activity.

Overall, results from this research show a high percentage of those meeting the criteria for being alcohol dependent, and also found that a number of students may not be exercising. It is evident that alcohol-related activities continue to flourish at Penn State. The most recent occurrence was a student who was found dead in a stairwell due to his night of binge drinking (PSU, 2009). Efforts have been made around campus to offer alternatives (i.e., HUB Late Night) to drinking, but this high level of drinking has continued to occur (Maney et al., 2003).
As for the students in this study who failed to meet the recommended level of participation in physical activity, it appears that students do not place a high priority on exercising. The possibilities for this reasoning abound, but research needs to be done to get more of these students to participate in regular physical activity. Something needs to be done to increase the students’ physical activity levels and decrease their overall drinking routine. In conclusion, more research needs to be completed to provide a more detailed look into the reasons why so many students are not exercising and to see if they are drinking excessively.
REFERENCES


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National Institute of Health (2002). College drinking hazardous to campus communities task force calls for research-based prevention programs. Retrieved June 29, 2006 from


APPENDIX A

Questionnaire:
Quality of Life: Alcohol, Tobacco, Exercise and Family Health

First Year Students’ Quality of Life and Family Health History Relationship to Behavioral Dependencies on Alcohol, Tobacco, or Exercise

Exercise Behavior

Using the scale provided below please read each statement carefully and complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviors that have occurred for you in the past 3 months.

<table>
<thead>
<tr>
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<th>1</th>
<th>2</th>
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<tr>
<td>Never</td>
<td>Always</td>
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<tr>
<td>1.</td>
<td>I exercise to avoid feeling irritable.</td>
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<td>2.</td>
<td>I exercise despite recurring physical problems.</td>
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<td>3.</td>
<td>I continually increase my exercise intensity to achieve the desired effects/benefits.</td>
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<td>4.</td>
<td>I am unable to reduce how long I exercise.</td>
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<td>5.</td>
<td>I would rather exercise than spend time with family/friends.</td>
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<td>6.</td>
<td>I spend a lot of time exercising.</td>
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<td>7.</td>
<td>I exercise longer than I intend.</td>
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<td>8.</td>
<td>I exercise to avoid feeling anxious.</td>
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<td>9.</td>
<td>I exercise when injured.</td>
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<td>10.</td>
<td>I continually increase my exercise frequency to achieve the desired effects/benefits.</td>
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<td>11.</td>
<td>I am unable to reduce how often I exercise.</td>
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<td>12.</td>
<td>I think about exercise when I should be concentrating on school/work.</td>
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<td>13.</td>
<td>I spend most of my free time exercising.</td>
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<td>15.</td>
<td>I exercise to avoid feeling tense.</td>
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<td>16.</td>
<td>I exercise despite persistent physical problems.</td>
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<tr>
<td>17.</td>
<td>I continually increase my exercise duration to achieve the desired effects/benefits.</td>
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<td>18.</td>
<td>I am unable to reduce how intense I exercise.</td>
<td></td>
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<td>19.</td>
<td>I choose to exercise so that I can get out of spending time with family/friends.</td>
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<tr>
<td>20.</td>
<td>A great deal of my time is spent exercising.</td>
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<tr>
<td>21.</td>
<td>I exercise longer than I plan.</td>
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</table>
**Tobacco Use Questionnaire**

Carefully read each question and the possible answers provided. Answer each question by choosing a response that corresponds to the ONE choice that is most true for you. Mark your answer sheet accordingly. Take as much time as you need.

22. Do you smoke cigarettes?
   0 = No ➔ SKIP TO Q-29
   1 = Yes

23. How soon after you wake up do you smoke your first cigarette?
   0 = After 60 minutes
   1 = 31-60 minutes
   2 = 6-30 minutes
   3 = Within 5 minutes

24. Do you find it difficult to refrain from smoking in places where it is forbidden (e.g. in church, at the library, in cinema, etc)?
   0 = No
   1 = Yes

25. Which cigarette would you hate most to give up?
   0 = All Others
   1 = The first one in the morning

26. How many (#) cigarettes per day do you smoke?
   0 = 10 or less
   1 = 11-20
   2 = 21-30
   3 = 31 or more

27. Do you smoke more frequently during the first hours after waking than during the rest of the day?
   0 = No
   1 = Yes
   9 = Not applicable, I do not smoke
28. Do you smoke if you are so ill that you are in bed most of the day?
   0 = No
   1 = Yes
   Alcohol Use

Carefully read each question and the possible answers provided. Answer each question choosing ONE answer that is most true for you and marking your answer sheet accordingly.

29. Have you consumed alcohol, even just a few sips, in the past 30 days?
   0 = No ➔ SKIP TO Q-43
   1 = Yes

30. Do you feel you are a normal drinker?
   0 = No
   1 = Yes

31. Does a parent, wife/husband, or other near relative ever worry or complain about your drinking?
   0 = No
   1 = Yes

32. Do you ever feel guilty about your drinking?
   0 = No
   1 = Yes

33. Do friends or relatives think you are a normal drinker?
   0 = No
   1 = Yes

34. Are you able to stop drinking when you want?
   0 = No
   1 = Yes
35. Have you ever attended a meeting of alcoholic’s anonymous?
   0 = No
   1 = Yes

36. Has drinking ever created problems between you and your parent(s), wife/husband, or other near relative?
   0 = No
   1 = Yes

37. Have you ever gotten into trouble at work because of drinking?
   0 = No
   1 = Yes

38. Have you ever neglected your obligations, your family, or your work for two or more days in a row because of your drinking?
   0 = No
   1 = Yes

39. Have you ever gone to anyone for help because of your drinking?
   0 = No
   1 = Yes

40. Have you ever been in the hospital because of drinking?
   0 = No
   1 = Yes

41. Have you ever been arrested for drunk driving, driving while intoxicated, or driving under the influence of alcoholic beverages?
   0 = No
   1 = Yes

42. Have you ever been arrested, even for a few hours, because of other drunken behavior?
   0 = No
   1 = Yes
General Health

This part of the questionnaire relates to your views about personal health. Please answer every question by choosing the response that best applies to you and coding your answer sheet accordingly. If you are unsure about how to answer, please give the best answer you can.

43. In general, would you say your health is:

0 = very poor
1 = poor
2 = good
3 = very good
4 = excellent

The following items are about activities you might do during a typical day. Does your health now limit these activities? If so, how?

44. Moderate activities, such as moving a table, pushing a vacuum cleaner, or playing golf:

0 = No, not limited
1 = Yes, limited a little
2 = Yes, limited

45. Climbing several flights of stairs:

0 = No, not limited
1 = Yes, limited a little
2 = Yes, limited

During the past 4 weeks, have you had any of the following problems with your work or other regular activities as a result of your physical health?

46. Accomplished less than you would like:

0 = No
1 = Yes
47. Were limited in the kind of work or other activities:

0 = No  
1 = Yes  

*During the past 4 weeks, have you had any of the following problems with your work or other regular activities as a result of emotional problems (such as feeling depressed or anxious)?*

48. Accomplished less than you would like:

0 = No  
1 = Yes  

49. Didn't do work or other activities as carefully as usual:

0 = No  
1 = Yes  

50. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

0 = Not at all  
1 = A little bit  
2 = Moderately  
3 = Quite a bit  
4 = Extremely  

*These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks:*

51. Have you felt calm and peaceful?

0 = None of the time  
1 = A little of the time  
2 = Some of the time  
3 = A good bit of the time  
4 = Most of the time  
5 = All of the time
52. Did you have a lot of energy?

0 = None of the time
1 = A little of the time
2 = Some of the time
3 = A good bit of the time
4 = Most of the time
5 = All of the time

53. Have you felt downhearted and blue?

0 = None of the time
1 = A little of the time
2 = Some of the time
3 = A good bit of the time
4 = Most of the time
5 = All of the time

54. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

0 = None of the time
1 = A little of the time
2 = Some of the time
3 = A good bit of the time
4 = Most of the time
5 = All of the time

**Alcohol and Parental Background**

This part of the questionnaire examines your biological history of alcoholism. Please reach each question carefully and answer each item as honestly as you can.

55. Have you ever thought that one of your parents had a drinking problem?

0 = No
1 = Yes

56. Have you ever lost sleep because of a parent's drinking?

0 = No
1 = Yes
57. Did you ever encourage one of your parents to quit drinking?

0 = No
1 = Yes

58. Did you ever feel alone, scared, nervous, angry, or frustrated because of a parent's drinking?

0 = No
1 = Yes

59. Did you ever argue or fight with a parent when he or she was drinking?

0 = No
1 = Yes

60. Did you ever threaten to run away from home because of a parent's drinking problem?

0 = No
1 = Yes

61. Has a parent ever yelled at or hit you or other family members when drinking?

0 = No
1 = Yes

62. Have you ever heard your parents fight when one of them was drunk?

0 = No
1 = Yes

63. Did you ever protect another family member from a parent who was drinking?

0 = No
1 = Yes

64. Did you ever feel like hiding or emptying a parent's bottle of liquor?

0 = No
1 = Yes
65. Do many of your thoughts revolve around a problem drinking parent or difficulties that arise because of his or her drinking?

0 = No
1 = Yes

66. Did you ever wish a parent would stop drinking?

0 = No
1 = Yes

67. Did you ever feel responsible for or guilty about a parent's drinking?

0 = No
1 = Yes

68. Did you ever fear that your parents would get divorced due to alcohol misuse?

0 = No
1 = Yes

69. Have you ever withdrawn from and avoided outside activities and friends because of embarrassment and shame over a parent's drinking problem?

0 = No
1 = Yes

70. Did you ever feel caught in the middle of an argument or fight between a problem-drinking parent and your other parent?

0 = No
1 = Yes

71. Did you ever feel that you made a parent drink alcohol?

0 = No
1 = Yes

72. Have you ever felt that a problem-drinking parent did not really love you?

0 = No
1 = Yes
73. Did you ever resent a parent's drinking?

0 = No
1 = Yes

74. Have you ever worried about a parent's health because of his or her alcohol use?

0 = No
1 = Yes

75. Have you ever been blamed for a parent's drinking?

0 = No
1 = Yes

76. Did you ever think your father was an alcoholic?

0 = No
1 = Yes

77. Did you ever wish your home could be more like the homes of your friends who did not have a parent with a drinking problem?

0 = No
1 = Yes

78. Did a parent ever make promises to you that he or she did not keep because of drinking?

0 = No
1 = Yes

79. Did you ever think your mother was an alcoholic?

0 = No
1 = Yes

80. Did you ever wish that you could talk to someone who could understand and help the alcohol-related problems in your family?

0 = No
1 = Yes
81. Did you ever fight with your brothers and sisters about a parent's drinking?
   0 = No
   1 = Yes

82. Did you ever stay away from home to avoid the drinking parent or your other parent's reaction to the drinking?
   0 = No
   1 = Yes

83. Have you ever felt sick, cried, or had a "knot" in your stomach after worrying about a parent's drinking?
   0 = No
   1 = Yes

84. Did you ever take over any chores and duties at home that were usually done by a parent before he or she developed a drinking problem?
   0 = No
   1 = Yes

(a) Demographic Questions

The last series of questions deal with personal characteristics. Please choose the answer that best applies to you.

85. What is your gender?
   0 = Woman
   1 = Man

86. What is your semester standing?
   0 = Freshman (1st–2nd semester)
   1 = Sophomore (3rd–4th semester)
   2 = Junior (5th–6th semester)
   3 = (Senior) 7th–8th semester
   4 = (Other) 9th semester or higher
87. What is your present or anticipated Grade Point Average?

0 = Less than 2.0
1 = 2.0 – 2.49
2 = 2.5 – 2.99
3 = 3.0 – 3.49
4 = 3.5 – 3.99
5 = 4.0

88. Which of the following best represents your race?

0 = White
1 = Black / African American
2 = Indian (American)
3 = Eskimo
4 = Asian and Pacific Islander
5 = Puerto Rican
6 = Cuban
7 = Mexican / Mexicano / Mexican American
8 = Chicano
9 = Other Latin American or other Spanish

89. Are you currently a varsity athlete?

0 = No
1 = Yes

90. Are you currently participating in competitive sports?

0 = No
1 = Yes

Considering a 7-day period (a week) how many times on the average do you do the following kinds of exercise for more than 15 minutes (sic.) during your free time?

91. Strenuous exercise (e.g., heart beats rapidly running, football, basketball, cross country skiing, vigorous swimming, vigorous long distance bicycling): __________ (# times/week)

92. Moderate exercise (e.g., not exhausting; fast walking, baseball, tennis, easy bicycling, volleyball, alpine skiing, popular and folk dancing): __________ (# times/week)
93. Mild exercise (e.g., minimal effort; yoga, archery, fishing, bowling horseshoes, golf, easy walking): ______________ (# times/week)

94. Considering a 7-day period (a week) during your leisure time how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

Often       Sometimes       Never/Rarely
APPENDIX B:

Informed Consent
Informed Consent for Social and Behavioral Sciences Research

Project Title: A Pilot Study of First Year Students’ Quality of Life and Family History of Alcoholism in Relationship to Behavioral Dependency on Alcohol, Tobacco, or Exercise

Investigator: Dolores W. Maney, Ph.D.
Penn State University, Assistant Professor of Kinesiology
Recreation Building, Room 271-B
University Park, PA 16802
(814) 865-1364
dwm3@psu.edu

Dear Survey Participant,

The purpose of this research project is to determine how the behavioral choices of first-year students attending Penn State’s University Park campus can influence their quality of life. We also are interested in learning how a student’s family background may contribute to his or her health-related behaviors.

As a participant, you will be asked to complete a questionnaire that takes approximately 20 minutes to finish. First, you will be asked to report your daily health behaviors as related to tobacco, alcohol, and/or exercise choices, as well as your quality of life. Next, you will be asked to answer some questions about parental use of alcohol. Finally, you are asked to respond to basic demographic questions. By completing this questionnaire, you will be contributing to a line of research that seeks to optimize the understanding of the health-related quality of life indicators among first-year college students.

Please read each question carefully and respond as honestly as possible. You are free to withdraw from participating at any time, or to decline to answer any specific questions without penalty. The questions you will be asked are not meant to cause any risk or discomfort, although there is a small possibility that you might notice psychological discomfort such as embarrassment, or irritation. To minimize this possibility, you should understand that your participation in this project is voluntary and anonymous, meaning that it is impossible for us associate your name with your responses. If, however, following completion of the questionnaire you experience anxiety or discomfort as related to your responses, please feel free to seek assistance from Dr. Dolores Maney, lead investigator, or the PSU Center for Counseling and Psychological Services at (814) 863-0395 during the day, or (814) 234-3337 after regular business hours. You also may contact Sarah Gates, a graduate research assistant for this project, at (814) 865-5606 or scg153@psu.edu if you prefer.

Your consent to participate in this research project is implied by completing and submitting the attached questionnaire to the research assistant. Please remember that no personally identifying information will be used as we analyze the data. Therefore, please do not write your name, student identification number, or any other identifying information on the questionnaire or response sheet. If you agree to volunteer in this project you will receive a complimentary gift certificate for a free ice-cream cone at the Penn State Creamery. The gift certificate will be given to you when you submit your questionnaire responses.

Please note that to be eligible to participate in this research project, you must be 18 years of age or older. If you have questions at any time during the data collection session, they will be answered immediately. If questions arise following your participation, please feel free to contact me, Sarah Gates, at scg153@psu.edu, or via telephone at (814) 865-5606. For any information regarding the
rights of research participants, you may contact the Penn State Office for Research Protections at (814) 865-1775. Thank you for your consideration!

Sincerely,

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