ABSTRACT

COLLEGE: A TIME TO INCREASE KNOWLEDGE AND ATTENUATE HEALTH? A STUDY INTO COLLEGE’S INFLUENCES ON STUDENTS’ ALCOHOL CONSUMPTION, PHYSICAL ACTIVITY, AND, DIET

by Lauren M. Kincheloe

Many behavior choices for one’s adult life are established during the college experience, a time in which health behaviors often. Multiple health behavior change research examines the relationship of two or more health behaviors in people, and may be a method of providing more efficient health interventions. Using data from 321 students' first semester of college, this study examines the relationship between and changes students' readiness to change their physical activity patterns, dietary choices, and alcohol consumption utilizing the Trantheoretical Model framework. Across the semester, significant changes were observed in the students' readiness to change certain health behaviors and gender differences were observed. Binge drinking and high fat food avoidance stages of change, and exercise and fruit and vegetable intake stages of change, showed the only significant health behavior relationships. Further understanding changes in students' readiness to change their health behaviors may aid universities in improving students' health behavior patterns.
COLLEGE: A TIME TO INCREASE KNOWLEDGE AND ATTENUATE HEALTH? A STUDY INTO COLLEGE’S INFLUENCES ON STUDENTS’ ALCOHOL CONSUMPTION, PHYSICAL ACTIVITY, AND DIET

A Thesis

Submitted to the
Faculty of Miami University
in partial fulfillment of
the requirements for the degree of
Master of Science
Department of Kinesiology and Health
by
Lauren M. Kincheloe
Miami University
Oxford, OH
2012

Advisor: __________________________
Rose Marie Ward, PhD

Reader: __________________________
Susan Lipnickey, PhD, JD

Reader: __________________________
Mark S. Walsh, PhD
# Table of Contents

## Chapter 1: Proposal

<table>
<thead>
<tr>
<th>Section</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Multiple Health Behavior Change Research</td>
<td>3</td>
</tr>
<tr>
<td>Transtheoretical Model of Change</td>
<td>8</td>
</tr>
<tr>
<td>Alcohol Use and College Students</td>
<td>13</td>
</tr>
<tr>
<td>Physical Activity and College Students</td>
<td>22</td>
</tr>
<tr>
<td>Dietary Patterns and College Students</td>
<td>28</td>
</tr>
<tr>
<td>Methods</td>
<td>35</td>
</tr>
<tr>
<td>Participants</td>
<td>35</td>
</tr>
<tr>
<td>Procedure</td>
<td>35</td>
</tr>
<tr>
<td>Measures</td>
<td>36</td>
</tr>
<tr>
<td>Proposed Analysis</td>
<td>37</td>
</tr>
<tr>
<td>Statement of Purpose</td>
<td>37</td>
</tr>
<tr>
<td>Research Questions</td>
<td>37</td>
</tr>
<tr>
<td>References</td>
<td>44</td>
</tr>
</tbody>
</table>

## Chapter 2: Manuscript

<table>
<thead>
<tr>
<th>Section</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>59</td>
</tr>
<tr>
<td>Transtheoretical Model</td>
<td>60</td>
</tr>
<tr>
<td>Multiple Health Behavior Change Research in College Students</td>
<td>61</td>
</tr>
<tr>
<td>Methods</td>
<td>62</td>
</tr>
<tr>
<td>Participants</td>
<td>62</td>
</tr>
<tr>
<td>Procedure</td>
<td>62</td>
</tr>
<tr>
<td>Measures</td>
<td>63</td>
</tr>
<tr>
<td>Results</td>
<td>64</td>
</tr>
<tr>
<td>Discussion</td>
<td>67</td>
</tr>
<tr>
<td>Limitations</td>
<td>70</td>
</tr>
<tr>
<td>Implications and Future Research</td>
<td>71</td>
</tr>
<tr>
<td>References</td>
<td>73</td>
</tr>
<tr>
<td>Bibliography</td>
<td>80</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Tables</td>
<td>100</td>
</tr>
<tr>
<td>Figures</td>
<td>111</td>
</tr>
<tr>
<td>Appendix A: Consent Form</td>
<td>115</td>
</tr>
<tr>
<td>Appendix B: Debrief Sheet for Time 1</td>
<td>116</td>
</tr>
<tr>
<td>Appendix C: Debrief Sheet for Time 2</td>
<td>117</td>
</tr>
<tr>
<td>Appendix D: Measures/Questions</td>
<td>118</td>
</tr>
</tbody>
</table>
List of Tables

Table 1: The Processes of Change 100
Table 2: Studies Examining Physical Activity Patterns in College Students 102
Table 3: Fruit and Vegetable Consumption in College Students 104
Table 4: Single Behavior Stage of Change Movement From Time 1 to Time 2 105
Table 5: Multiple Health Behavior Relationships at Time 1 107
Table 6: Correlation Table for Health Behavior Change in Stage of Change Variables 108
Table 7: Percent of Students Moving the Same Number of Stages of Change from Time 1 to Time 2 109
Table 8: Gender Breakdown of Change in Stage of Change from Time 1 to Time 2 110
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Stage distribution of students for binge drinking at time 1 and time 2</td>
<td>111</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Stage distribution of students for intention to exercise at time 1 and time 2</td>
<td>112</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Stage distribution of students for high fat food avoidance at time 1 and time 2</td>
<td>113</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Stage distribution of students for fruit and vegetable consumption at time 1 and time 2</td>
<td>114</td>
</tr>
</tbody>
</table>
Chapter One
Proposal

Transitioning into college is a significant time period in a student’s life, and health behaviors often change due to decreased parental influence (Hogan & Aston, 1986), social influences, changed physical environment, altered self-efficacy in a new environment, varied academic expectations, and altered social norms (Gruber, 2008; Nelson, Kocos, Lytle, & Perry, 2009; Quintiliani, Allen, Marino, Kelly-Weeder & Li, 2010; Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). Many behavior habits for one’s adult life are established during the college experience and are pertinent in leading a healthy lifestyle (Von Ah et al., 2004). Unfortunately, not all of these chosen behaviors are healthy with many chronic disease risk factors (U.S. Department of Health and Human Services, 1991) such as weight gain, physical inactivity, high alcohol consumption, and poor eating patterns all becoming more prevalent on college campuses in the United States (Douglas et al., 1997; Nelson et al., 2009).

Throughout college, the presence of risky health behaviors increases alongside students’ increasing knowledge (Douglas et al., 1997; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Spencer, 2002). Looking at multiple behaviors at a New Jersey university 50% percent or more of college students regularly consumed a diet high in saturated fats, and engaged in binge drinking, while 30% did not consume the recommended dosage of fiber, or partake in enough cardiovascular exercise (less than 2 days per week) (Spencer, 2002). Moreover in California, in the 30 days prior to completing a health behavior survey, 70 percent of students had consumed at least one alcoholic drink, and 20 percent had consumed alcohol on more than ten days in the preceding month (Patrick et al., 1997). Additionally, only 44% of all students partook in at least 20 minutes of aerobic physical activity three or more days in the past week and even less (31.3%) had participated in stretching exercises (Patrick et al., 1997).

This pattern of poor health behaviors also is demonstrated through the American College Health Association’s annual National College Health Assessment (ACHA-NCHA-II). Over 70% of students reported not participating in moderate aerobic or cardio exercise more than three days a week, and over 85% not partaking in strength training activities more than three days a week (National College Health Association, 2010). Additionally, in relation to dietary patterns, almost three-fourths (73.7%) of college students do not consume five or more servings of fruits and
vegetables per day, while about one-fifth report consuming three or more high fat foods the previous day (Douglas et al., 1997). For college students the four years after high school graduation consist of an influx of risky health behaviors including a steady decrease in the rate of physical activity and daily intake of fruit, in addition to an increase in the number of alcohol drinking days and overall binge drinking (Cullen et al., 1999). These unhealthy habits put students at risk for chronic disease and more steps need to be taken to improve the health of college youth (Douglas et al., 1997; Spencer, 2002).

Potentially compounded by the changes in exercise, alcohol, and dietary habits, weight fluctuates upon entering college and is a continuous health issue for college students. Females gain an average of 1.7 pounds, and males gain an average of 4.2 pounds from entering college to the end of senior year; in addition, the average student does not meet the recommended exercise and dietary guidelines (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). In 2006, the National College Health Assessment of four-year universities demonstrated about 31% of students were overweight (using self-reported height and weight), with about 30% of these being obese (American College Health Association, 2007). More recently, in the Spring 2010 ACHA-NCHA-II this percentage increased with over 35% of students reporting being overweight (American College Health Association, 2010). Weight gain is often associated with dietary patterns (Mozaffarian, Hao, Rimm, Willett, & Hu, 2011) and lack of physical activity (Lee, Djousse, Sesso, Wang, & Buring, 2010), two health behaviors addressed in this study.

Gender differences also exist, with college men consistently having greater rates of risky health behavior participation, including a greater frequency and quantity of alcohol consumption than females (Cullen et al., 1999; Johnson, Nichols, Sallis, Calfras, & Hovell, 1998; Patrick et al., 1997; Spencer, 2002). Weight gain is less for females throughout the four years of college (Economos, Hildebrandt, & Hyatt, 2008; Racette et al., 2008) and females consume more fruits and vegetables than males (Economos et al., 2008). Furthermore, more males than females report consuming fast food, and also at a significantly higher frequency (Driskell & Morse, 2009). Interventions aimed at college students should take note of these gender effects, as sex-specific interventions may be necessary for optimal effect.

Each of these behaviors seen in college student can lead to more serious health issues such as heart disease (Spencer, 2002), obesity, or addiction problems later in life for these young adults (Douglas et al., 1997). The greatest rates of mortality and morbidity in the United States
are due to cancer and heart disease, which are most often as a result of multiple risky health behaviors such as alcohol abuse, lack of physical activity, and inadequate diets (Prochaska, Spring, & Nigg, 2008). Utilizing the 2001 National Health Interview Survey, researchers looked at multiple chronic disease risk factors in the United States population (N = 29,183) (Fine, Philogene, Gramling, Coups, & Sinha, 2004). Four common factors were found with three being the health behaviors in question; risky alcohol consumption, physical inactivity, and unhealthy dietary practices. Gaining a deeper understanding of college students’ health behaviors will allow administrators and health professionals to develop successful interventions aimed at improving the health of college students, and mitigating the observed increase in poor health behaviors upon entering college. This study examines the changes in freshmen college students’ alcohol consumption, physical activity, and diet upon entering university, in addition to the interrelationships amongst these three health behaviors.

**Multiple Health Behavior Change Research**

*Healthy People 2020* is a “set of goals and objectives … designed to guide national health promotion and disease prevention …” in the United States (U.S. Department of Health, 2010). The objectives refer to physical activity, diet, tobacco and substance abuse, as well as a plethora of other risk factors and diseases focused on altering multiple health behaviors in order to achieve prime health (U.S. Department of Health, 2010). Multiple health behavior change (MHBC) research is a developing field focused on studying numerous health behaviors and identifying interrelationships between them. The findings from this research can potentially lead to more successful and efficient health programs focused on multiple health behaviors, as opposed to just one. Understanding these health behaviors, the associated attitudes and beliefs, as well as how health behavior constructs relate to one another (Noar, Chabot, & Zimmerman, 2008) can help us achieve these *Healthy People 2020* initiatives and become a nation in optimum health.

Research in the MHBC area raises questions with regard to intervention structuring. There have been inquiries into whether MHBC programs should focus on the multiple behaviors sequentially or simultaneously (Hyman, Pavlik, Taylor, Goodrick, & Moye, 2007). Hyman et al. (2007) examined whether long term changes in smoking, reducing dietary sodium levels, and increasing physical activity were more effective counseling all three behaviors at one time, addressing new behaviors sequentially, or continuing with standard procedures (control).
Addressing behaviors simultaneously may be more beneficial and effective than sequential counseling. Additional studies (Prochaska, Delucchi, & Hall, 2004; Prochaska et al., 2005; Smeets, Kremers, De Vries, & Brug, 2007) have found similar support for simultaneous counseling with multiple health behaviors which may be pertinent in further intervention program designs.

Contrastingly, evidence that MHBC occurs sequentially is demonstrated in multiple studies (King et al., 1996; Noar et al., 2008; Spring et al., 2004). The rationale for sequential interventions is that success in improving one health behavior can produce an overall increase in self-efficacy and motivation to change a subsequent behavior. Moreover, succeeding in one goal may make the next seem manageable and attainable (Emmons, Marcus, Linnan, Rossi, & Abrams, 1994; King et al., 1996). Vandelanotte et al. (2007) found success in a computer based physical activity and fat consumption intervention in both the sequential and simultaneous multiple health behavior focused programs. There was slightly better long-term maintenance in the sequential intervention, but the researchers suggested further research to determine the better mode of implementation (Vandelanotte et al., 2007). This consistent dichotomy of findings for styles of interventions demands further research into the best method of implementing MHBC programs.

Interactions between multiple health behaviors are very common, and recognizing these co-occurrences between health behaviors may help in creating successful and efficient interventions (Prochaska, Nigg, Spring, Velicer, & Prochaska, 2010; Prochaska et al., 2008). Multiple health behavior change interventions, focus on two or more behaviors individuals engage in that effect their health, and may be focused on the individual themselves, or a whole population (Prochaska et al., 2008). These studies often demonstrate that one risky behavior is directly linked to another behaviors with underlying mental processes, attitudes, or issues potentially producing both behaviors (Nigg, Lee, Hubbard, & Min-Sun, 2009; Prochaska et al., 2010). As a result, programs focusing on one behavior may result in positive effects for an untargeted behavior (Johnson et al., 1998). There are multiple hypotheses in MHBC research of the effects health behavior interventions may have on participants. The first is the concept of overburdening (Clark et al., 2005; Clark et al., 2002). The premise is that single risk factor interventions show greater increases in positive health behaviors, than the multiple behavior focused programs. This stems from the idea that focusing on multiple behaviors may overwhelm
participants and is found mostly true for action-stage-oriented stage (see Transtheoretical Model section) interventions (Clark et al., 2005).

The second hypothesis, the enhancement hypothesis, states multiple health behavior interventions show greater increases in positive health behaviors than single risk factor interventions (Clark et al., 2005; Clark et al., 2002). Targeting multiple behaviors at one time is more successful than focusing on individual behaviors, perhaps as a result of an interaction between the health behaviors. The last hypothesis is the idea of additivity (Clark et al., 2005; Clark et al., 2002). Contrasting to the idea of enhancement, additivity assumes there is no interaction effect between the multiple health behaviors and the interventions work independently of each other (Clark et al., 2005; Clark et al., 2002). Both the idea of enhancement and additivity are viewed as desirable outcomes because one MHBC intervention produces changes in more than one behavior and demonstrates the idea of “more bang for the buck” (Clark et al., 2002). Recently, MHBC interventions have proven to be successful at producing behavior change, shown to be more cost effective than single health behavior programs, as well as produce an increase in one’s self-efficacy to change risky behaviors (Prochaska et al., 2008; Prochaska, 2008).

Multiple health behavior change research is a growing field and it has only been within the past ten to fifteen years that studies examining multiple health behavior relationships have become more prevalent. In 1999 the Behavior Change Consortium (BCC) was developed, consisting of 15 National Institute of Health (NIH) funded behavior change projects (Ory, Jordan, & Bazarre, 2002). These projects aimed at reducing smoking, improving physical activity and nutrition, as well as promoting other health related behaviors (Ory et al., 2002). Most projects in the BCC focus on multiple behavior and multiple theoretical based interventions to further understand interrelationships between different health-related factors, especially nutrition and diet with physical activity (Ory et al., 2002). Each individual study produced its own findings, in addition to the consortium as a whole creating the RE-AIM Model for planning and implementing successful health behavior change interventions (Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004) as well as the overall emphasis on the importance of treatment fidelity (Bellg et al., 2004).

In Rhode Island, the SENIOR project consisted of a 12 month Transtheoretical Model based multiple health behavior intervention project in older adults (Clark et al., 2005).
interventions focused on nutrition, namely increasing fruit and vegetable consumption (Clark, Nigg, Greene, Riebe, Saunders, 2002) and exercise together, as opposed to single behavior interventions, and looked at whether individuals whom were ready to change one behavior are more likely to change another, based upon the Transtheoretical Model of Health Behavior Change (Clark et al, 2005; Clarke et al., 2002).

The SENIOR project revealed that the Stages of Change for exercise were significantly associated with multiple physical activity measures and servings of fruit per day and that those in the action or maintenance stage of one behavior were more likely to be in the same stage in the other (Clark et al., 2005). However, only weak associations were found between exercise and diet in older adults and it was found that these two behaviors are not very correlated in this specific population (Clark et al., 2005). In contrast, however, other studies have shown the success of MHBC interventions portray interrelationships between exercise and diet behaviors in older adults (Tucker & Reicks, 2002). Even though the SENIOR project did not show these significant relationships, it was still very valuable in the knowledge and experiences gained from the research in older adults, and is a hallmark study for MHBC research.

Another success in MHBC research studied the relationships between smoking, low physical activity, and high dietary fat intake in manufacturing workers, Emmons et al. (1994) showed that smokers were more likely than nonsmokers to have the other risk factors. Moreover, individuals with low dietary fat intake were less likely to exemplify the other two behaviors, showing that for this population a reduction in dietary fat intake is associated with other positive health behaviors (Emmons et al., 1994). Additionally, smokers trying to refrain from smoking have shown significantly more confidence in their success when on a regular exercise regime opening up the discussion on the relationship between these two variables; physical activity and smoking (King, Marcus, Pinto, Emmons, & Abrams, 1996).

Examining health risk factors for coronary artery disease patients, researchers sought to determine the best method for patients to improve on risk behaviors (Allegrante, Peterson, Boutin-Foster, Ogedegbe, & Charlson, 2008). Participants had the option of choosing behaviors to change based on their personal risk reports assessing their risk factors. Results demonstrated greater success in patients whom chose health behaviors they were more likely to succeed in changing, but may not produce the greatest health benefits. This finding lead researchers to believe clients should be guided to select behaviors to based on ease of altering, in order to
increase confidence in success potentially leader to changes in more health beneficial behaviors (Allegrante et al., 2008). Moreover, over 50 percent of subjects chose to focus on increasing their physical activity (specifically aerobic exercise and strength training) pointing to the fact that physical activity is an important behavior to focus on in MHBC for its role as a gateway behavior in increasing the patient’s behavioral momentum for subsequent behaviors (Allegrante et al., 2008).

MHBC research is valid in a number of age groups, not only adults. In adolescents, while studying the relationships of physical activity, fruit and vegetable consumption, and amount of television watching in elementary, middle, and high school students researchers found that being at risk for one behavior almost always significantly increased the odds of being at risk for another (Driskell, Dyment, Mauriello, Castle, & Sherman, 2008). Across all three age groups the majority of students were at risk for multiple health behaviors, with the percentage at risk for at least two factors increasing during the progression from elementary (62%) to high school (73%) (Driskell et al., 2008). In California, researchers found health risk behaviors co-occurring in 29% of males and 40% of female adolescents (mean age 14.4 years), with physical inactivity and low fruit and vegetable consumption occurring in both males and females (Mistry, McCarthy, Yancey, Lu, & Patel, 2009). Although these findings may point to health behavior interventions being more successful in adolescents than college students, the limitation is that most elementary and high school students are not as independent (transportation, financially, food availability, etc.) as college students. Upon entering college, young adults primarily are the ones in control of their behavior choices and are a prime population for MHBC interventions.

Multiple health behavior change research in a college student population.

Acknowledging the multitude of chronic disease risk factors college students possess, MHBC research has expanded to the college student population. The same ideology of MHBC research presented to other age groups could be beneficial to this population in recognizing interrelationships and co-occurrences of health behaviors. Co-occurrences in health behaviors have been portrayed in both male and female college students, with 65% of female college students having more than 2 unhealthy behaviors (Quintiliani et al., 2010). In Germany co-occurrences of health risk behaviors occurred in over 85% of first year college students (Keller et al., 2008). Often, college women who have reported low levels of fruit and vegetable intake and physical activity (mainentance behaviors) have been shown to report higher consumption of
alcohol, an at-risk behavior (Quintiliani et al., 2010). Moreover, female college students whom eat healthier have been found to participate in more vigorous activity, and those strength training ate fewer fatty foods (Johnson, et al., 1998). Additionally, men show co-occurrences of health behaviors as those who partake in more vigorous, moderate, and flexibility exercise have been seen to eat healthier foods (Johnson et al., 1998). For both genders of college students relationships between levels of alcohol consumption and physical activity rates were seen (Nigg et al., 2009), as well as an association between alcohol consumption and eating unhealthy, calorie dense foods (Nelson et al., 2009). Students who drank alcohol showed greater rates of physical activity, and more active students drank alcohol more frequently (Nigg et al., 2009). Furthermore, it has been demonstrated that excessive alcohol consumption in college students interferes with other health behaviors and that regular physical activity or exercise may improve alternative health behaviors (Werch et al., 2007).

Recognizing relationships such as these can help in developing adequate interventions and programs to increase the health of our college youth. College should be a time of growth and development, mentally, physically, and emotionally, not a period of putting oneself at greater health risks. Greater attention needs to be brought to preventing these behaviors and bettering the wellbeing of college students. Understanding multiple health behavior clusters and where one is mentally in the change process, can help develop successful health behavior interventions in the college arena (Prochaska et al., 2008). This study examines the relationships between college students’ alcohol consumption, physical activity and eating patterns, and their relationship to the Transtheoretical Model (TTM) of change framework throughout the students’ freshman year of college.

**Transtheoretical Model of Behavior Change**

The Transtheoretical Model (TTM) was developed from components of numerous leading theories in behavior change and is a framework for the health behavior change process (Prochaska & Velicer, 1997). The TTM involves a progression through five stages of change in order to reach the ultimate goal of behavior or lifestyle change and can be used for both the acquisition and cessation of behaviors (Prochaska, DiClemente, & Norcross, 1992). There are multiple constructs in the model including processes of change, decisional balance between the pros and cons of the targeted behavior, and self-efficacy (Prochaska & DiClemente, 1984; Prochaska & Velicer, 1997). By employing the TTM practitioners can help patients progress
through the five stages of change to their goal of behavior modification (Prochaska & Velicer, 1997).

**Stages of change.** The TTM’s core construct is the stage of change, or the five stages of change an individual progresses through when attempting behavioral alteration (Glanz, Rimer, & Viswanath, 2008). According to the TTM, change does not just have a beginning and end point, but instead focus is on personal development throughout the whole change progression (Prochaska & Velicer, 1997). The first stage is *Precontemplation* (PC; Prochaska & Velicer, 1986). Individuals in PC are not thinking about changing their behavior within the next six months, in addition to often avoiding thinking about their high risk or unhealthy behavior(s) (Prochaska & Velicer, 1986). Most people in this stage are unaware of their problem(s), and they often enter therapy or group behavioral change sessions due to pressure from a friend or loved one (Prochaska et al., 1992). The next stage is *Contemplation* (C). In this stage, individuals plan on changing within the next six months (Prochaska & Velicer, 1986). Serious thought has been put into modifying or ceasing a behavior but no action has been made (Prochaska et al., 1992). People can become stagnant in this stage for some time, due to their views of the pros and cons of changing a behavior being equivalent (Prochaska & Velicer, 1986). *Preparation* (PR) involves the intention of changing a behavior within the foreseeable future, usually within the next month (Prochaska & Velicer, 1986). Generally, methods for the change have already mentally been developed by the individual (Prochaska & Velicer, 1986) and the individual may previously have taken small steps to ready themself for change (Prochaska et al., 1992). This stage is ultimately when the decision to change is made; individuals either move forward to action, or maintain reside where they are (Prochaska et al., 1992). The *Action* (A) stage is when behaviors, environments, or variables in one’s life are overtly modified in order to support behavior change (Prochaska & Velicer, 1986; Prochaska et al., 1992). These changes must have occurred within the past six months to be classified in the action stage (Prochaska et al., 1992). Following action is *Maintenance* (M). This stage involves sustaining the changes incorporated in the action stage. Preventing relapse is the objective of this period and as time goes on confidence of success increases (Prochaska & Velicer, 1986). For some attempting behavioral change maintenance may last for the remainder of one’s life (Prochaska et al., 1992). The duration of the maintenance stage is dependent upon the nature of behavior change and how successful one is in coping with temptations, or urges to engage in a specific behavior when in
difficult situations, and success in developing alternatives for the unwanted behavior (Prochaska & DiClemente, 1986).

Research shows distribution amongst the stages of change for people partaking in at risk behaviors is approximately 40% in Precontemplation, 40% in Contemplation, and 20% in Preparation stage (Prochaska & Velicer, 1997; Rossi, 1992; Velicer, Fava, & Prochaska, 1995). The majority of health behavior change programs are focused on the minority of patients in the Preparation or Action stages which would be technically ineffective with these populations (Prochaska, 1991). Therapy has been proven to be more successful if interventions are matched to the same stage of change the desired individual/population are currently in. Additionally, many times patients get stuck in a stage and have difficulty progressing forward (Prochaska & DiClemente, 1986). Moreover, the stages of change have a spiral relationship in that one may regress to a previous stage, then move forward, then back again (Prochaska et al., 1992). This spiral pattern occurs most often and proves that most people learn from their mistakes and setbacks (Prochaska, 1991).

In college students, temptations from peers and their environment greatly affect health behavior change processes and current stage of change. The temptations of easily accessible unhealthy foods can affect one’s maintenance of a healthy eating pattern, the prevalence of exercise amongst one’s peers can affects workout patterns, and the prevalence of alcohol in social gatherings can affect maintenance of healthy behaviors (Nelson et al., 2009). When examining health behavior changes, temptations are variables that should be controlled for and new healthier behaviors need to be conditioned in order to promote successful long-term change (Sun, Prochaska, Velicer, & Laforge, 2007). Understanding the dynamics of the stages of change college students are in with regards to their health behaviors can help universities better develop successful programs and improve the well-being of their students.

Processes of Change. Another construct of the TTM are the ten processes of change (POC) that aid in progression from one stage of change to the next have been defined for the majority of behaviors (Prochaska & Velicer, 1986). The POC utilize overt and covert actions that assist in altering relationships, thoughts, or behaviors associated with an unwanted behavior (Prochaska & Velicer, 1986). Most processes are directly integrated with progressing through specific stages, and can be viewed as the independent variables leading to change (Armitage, 2009). The POC (Prochaska & Velicer, 1986) are listed in Table 1. When each POC is used
strategically at the proper point in the change process, the individual is more likely to be successful in progressing through the stages of change (Prochaska & Velicer, 1997). Due to time constraints in the survey, the POC processes will not be examined in the current study, but still are recognized as a valid construct of the TTM.

**Decisional balance.** Decisional balance is the next construct of the TTM and focuses on evaluating the pros and cons of a behavioral change (Prochaska & Velicer, 1997). Depending upon the current SOC, the balance between the “believed” pros and cons shifts to where one may outweigh the other (Prochaska & DiClemente, 1986). In PC, the participant view the cons of changing as more important than the pros of changing. Usually in the C stage, the pros and cons equal each other (Prochaska, 2008); in PR, a crossover occurs where the pros now outweigh the cons (Prochaska, Wright, & Velicer, 2008). Ultimately, from PC to A, the pros successfully increase with each stage resulting in a greater gap between the pros and cons of changing (Prochaska, 2008). The same balancing relationship between prevalence of pros and cons has been found spanning more than fifty health behaviors and in order for permanent change to occur, the pros of the desired behavior need to outweigh the cons of the target behavior (Prochaska, 2008).

College is a time when students often develop unhealthy risky behaviors (Douglas et al., 1997; Nelson et al., 2009); until these young adults can visualize and believe the benefits (or pros) of a healthy lifestyle, change to a healthier lifestyle is less likely to occur. Following the theory behind decisional balance in the TTM, the positives of responsible moderate drinking will need to outweigh the positives associated with heavy drinking (and the cons of reducing heavy drinking), before students will contemplate and take action to decrease their binge drinking (Migneault, Pallonen, & Velicer, 1997). Moreover, students need to recognize the benefits of regular physical activity, outweigh the time and effort it takes, before exercise becomes a regular routine in their daily schedule. Lastly, the pros of a lower fat and overall healthier eating pattern will need to be outweigh the extra effort and lowered convenience (cons) this way of life may present. Universities must begin to understand students’ views of the pros and cons of the latter health behaviors in order to successfully intervene on the health patterns of our college youth.

**Self-efficacy and temptations.** The final construct in the TTM is the evaluation of self-efficacy in the context of tempting situations. Self-efficacy refers to the personal confidence the individual has concerning his or her success in implementing a behavior or lifestyle change (i.e.,
Self-efficacy increases with progress across the stages of change (Prochaska & DiClemente, 1986). Increased self-efficacy allows one to manage temptations or desires to partake in an undesired behavior (Prochaska & Velicer, 1986), and an indirect correlation is seen between self-efficacy and temptations from precontemplation to maintenance (Prochaska & DiClemente, 1986). For most behaviors it is not until the advancement from action to maintenance that the level of self-efficacy overrides that of temptations and one is able to better control behavioral cues (Prochaska & DiClemente, 1986). Higher levels of perceived self-efficacy in college students is a predictor of lower chances of drinking, and greater participation in health-promoting activities (i.e., healthy diets and physical activity; Von Ah et al., 2004), and lower levels of perceived ability have been associated with reduced rates of healthy behaviors (Boekeloo & Griffin, 2009; Joffe & Radius, 1993). Using this knowledge and working with students to increase their self-efficacy, may aid in reducing the poor patterns of alcohol consumption, physical activity levels, and eating patterns observed in college students.

The TTM is a valuable tool when implementing health promotion or behavior change programs. This model is focused on the specific type of behavior change and developing relevant interventions for target groups. Depending upon the individual’s stage of change, level of self-efficacy, and beliefs in the pros and cons of lifestyle change, differing strategies may be implemented in treatment. The TTM has been relevant in over forty-eight health related behaviors (Hall & Rossi, 2008) including alcohol consumption, physical activity, and eating behaviors, as well as effective in generalizing across a multitude of target populations (Prochaska et al., 1994).

Although college students are the target population of the current study, the TTM has been used in various other arenas. The formerly mentioned SENIOR project implemented stage-specific interventions for exercise and fruit and vegetable consumption and portrayed that readiness to change health behaviors is behavior specific in older adults, meaning health behaviors (and readiness to change those behaviors) are relatively independent of each other (Clark et al., 2005). Stage-based multiple behavior interventions have also been administered in primary care patients to quit smoking, eat healthier, receive regular mammograms, and prevent skin cancer (Prochaska et al., 2005). After two years, a stage based program showed significantly greater improvements in both dietary behaviors, use of sunscreen and avoiding sun
exposure, and reductions in smoking when compared to the control group, once again demonstrating the TTM validity in multiple health behavior research (Prochaska et al., 2005). In diabetic patients, a stage based intervention has a significantly greater effect than usual diabetic treatment on moving patients to the action/maintenance stage in self-monitoring blood glucose levels, healthier eating, and quitting smoking (Jones et al., 2003). In attempts to reduce weight in an obese population, individual behavior specific health improvement reports based on the TTM constructs (stages of change, self-efficacy, decisional balance, and processes of change) and subjects’ assessments were periodically distributed to participants over one year. Obese individuals participating in this multiple weight-related behaviors stage-based intervention showed greater progression to action/maintenance for healthy eating, exercising, emotional distress control, and weight than the control group (Johnson et al., 2008). Employing the TTM to create MHBC interventions framed on the TTM may be valuable in creating successful programs without overwhelming participants (Driskell et al., 2008) and creating synergistic health behavior change (Johnson et al., 2008). Using the TTM in the current study with college student health behaviors will provide valuable information on changes students experience in their readiness to change health behaviors during their first semester.

Using the TTM framework the proposed study examines the relationship between college students’ readiness to change their alcohol consumption, physical activity levels, and eating behaviors during their freshmen year of college. The model will be used to examine college’s effects on the constructs of the TTM in these three health behaviors throughout students’ first semester of college, as well as the corresponding interrelationships these behaviors may have on each other.

Alcohol Use and College Students

In 1949 Yale initiated the first major national college student alcohol study (Straus, 1953). At this time, an average of 74% of students reported using alcohol (across all schools) (Staus, 1953), and alcohol use since has increased to 84% of students (Wechsler et al., 1994). In the late 1940s over two-fifths of men, and the majority of women who consumed alcohol, did so no more than once per month, never were drunk, and consumed smaller rather than larger quantities of alcohol at each sitting (aka; did not heavily drink; Straus, 1953). Over the years the proportion of students drinking and quantity of alcohol consumed by students has increased (Hingson, Heeren, Winter, & Wechsler, 2005; Wechsler, Dowdall, Maenner, Gledhill-Hoyt, &
Lee, 1998). From 1998-2005 in college students ages 18-24 there was an increase from 41.7% to 44.7% of students who reported heavy episodic or binge drinking (Hingson, Zha, & Weitzman, 2009) and only a small percentage (16-19%) of students identified themselves as abstainers from alcohol (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; Wechsler et al., 1998).

Alcohol use in colleges is a national problem that is highlighted in Healthy People 2020 (U.S. Department of Health and Human Services, 2010), as well as the USDA’s 2010 Dietary Guidelines (USDA & U.S. Department of Health and Human Services, 2010). The new objectives for Healthy People 2020 released in January 2011, specifically target the college student population with objective SA-14.2 stating, “Reduce the proportion of students engaging in binge drinking during the past two weeks”. (U.S. Department of Health and Human Services, 2010). Learned alcohol use at a young age only foreshadows the substance abuse likely to continue into one’s adult years (The National Center on Addiction and Substance Abuse, 2011). If universities nationally begin to develop successful interventions aimed at alcohol use and other health behaviors in college youth, there is hope for mitigating college students’ poor health behaviors.

Many consequences result from alcohol abuse including problems with the law, lower academic performance, social relationship strains, unplanned sexual activity, injury, and secondary effects on those surrounding the problem drinkers (Wechsler et al., 1994). Around 92.7% of heavy drinking college students experience careless behavior consequences (missing class, perform actions they later regret, got into a fight, argued with friends, etc.), and an earlier onset of drinking being associated with more serious alcohol use consequences such as problems with the law (Vik et al., 2000). From 1999-2005, the proportion of college students ages 18-24 driving under the influence of alcohol increased by 7%, and the rate of unintentional non-traffic alcohol related injury deaths increased 25.6% with total deaths around 1,825 college students (Hingson et al., 2009). Injuries are often common consequences of alcohol use with about one in ten college students being hurt or injured because of their drinking and 12% having been hurt or assaulted by another drinking peer (Hingson et al., 2005). Alcohol use also affects students’ academics with missed class and lower ability to perform well due to hangovers (Wechsler et al., 1994).

Binge drinking is often portrayed alongside social aspects of the American college life in media and popular culture, yet this exposure to alcohol in the media is associated with alcohol
consumption in young people (Morgenstern, Isensee, Sargent, & Hanewinkel, 2011; Smith and Foxcroft, 2009). Binge drinking also is correlated with less studying and lower grades, yet this is often “offset” but more parties, larger friend groups, more sexual partners, and greater socialization (Weschler, Dowdall, Davenport, & Castillo, 1995). Wechsler & Austin (1998) describe the term binge drinking as a type of "heavy episodic drinking characteristic of college students” and give a numerical definition of five or more drinks for men and four or more drinks for women (i.e., the 5/4 measure) on one occasion during the previous two weeks. A standard drink is one 12 ounce beer, one five ounce glass of wine, or one 1.5 ounces of 80 proof spirits (NIAAA, 2005). The binge drinking pattern brings one’s blood alcohol concentration (BAC) to 0.08 or above resulting in a greater danger to oneself and society (Friedman, Robinson, & Yelland, 2011; Moskowitz & Fiorentino, 2000). Frequent binge drinkers are those partaking in this three or more times in the past three weeks, and occasional binge drinkers partake less that once every two weeks (Wechsler & Nelson, 2001).

Students whom binge drink are more likely to be harmed by alcohol and its effects than those whom do not (Wechsler et al., 1994; Wechsler et al., 1998; Wechsler et al., 2000) with 47% of frequent binge drinkers experiencing five or more alcohol-related problems compared to only 3% of non-bingers (Wechsler & Austin, 1998). Frequent binge drinkers are more likely to engage in unplanned sexual activity, experience hangovers, miss classes, perform actions they regret, and forget where they were or what they did than non-binge drinkers (Wechsler et al., 1994). Heavy alcohol consumption also leads to risky sexual behaviors with over 2,700 vaginal or anal sexual events being reported from only 177 heavy drinking college students and less condom use during heavy drinking episodes and sex with steady partners (Scott-Sheldon, Carey M., & Carey K., 2010). Underage drinkers are more likely to have negative consequences including doing things they regret, forgetting where they were, causing property damage, get in trouble with the police, and acquire injuries due to alcohol use (Wechsler et al., 2002). Interestingly, these same students are less likely to drive under the influence, miss a class, and engage in unprotected sexual activity than those ages 21-23 while under the influence of alcohol (Wechsler et al., 2002). Despite the plethora of consequences students experience, less than one percent of frequent binge drinkers defined themselves as problem drinkers, and about one fifth believe they have a drinking problem (Wechsler et al., 1994).
Alcohol not only affects those consuming it, but it also affects surrounding peers and colleagues. College freshmen males’ GPAs are reduced by 0.18 points their first year of college by having a roommate who frequently drank in high school and by 0.43 points by their second year of college (Kremer & Levy, 2003). Additionally, non-binge drinkers at high binge drinking colleges are two times as likely to be harassed by a student using alcohol, three times as likely to have property damage, and three times as likely to have their studying or sleep disturbed than non-binge drinkers at low-binge drinking prevalence colleges (Wechsler & Nelson, 2001). From 2001 to 2005 around 97,000 college students were victims of alcohol-related sexual assault or date rape annually (Hingson et al., 2009).

The college environment is where most young adults acquire lifestyle preferences both from fellow peers and personal experience (Kremer & Levy, 2003). Unfortunately, college is also a locus of substance abuse with about 40% of students binge drinking in the past two weeks (Wechsler, Lee, Kuo, & Lee, 2000) and 45.4% of students drinking alcohol 2-4 times per month (Goldstein, Flett, & Wekerle, 2010). Moreover, the percentage of first-year students consuming alcohol has been shown to increase throughout the first year of college (Kasperek, Corwin, Valois, Sargent, & Morris, 2008). In first year college students, most alcohol consumption occurs at the beginning of each semester and on weekends with less drinking during exam periods (Tremblay et al., 2010). The highest drinking days in the first year of college seems to occur on Halloween, New Year’s Eve, and St. Patrick’s Day (Tremblay et al., 2010) following the pattern that greater levels of alcohol is consumed resulting in higher levels of intoxication during celebratory drinking (Glindemann, Wiegand, & Geller, 2007). Despite the drinking age being 21 years old, drinking patterns in college students under 21 do not differ from those college students ages 21-23 (Wechsler et al., 1994) with 43.6% of underage students being classified as binge drinkers (Wechsler, Lee, Nelson, & Kuo, 2002). Fifty percent of underage students report that alcohol is “very easy” to obtain with binge drinkers reporting an increased perceived availability of 56.9% (Wechsler et al., 2002). Underage students are more likely to “drink to get drunk,” get drunk three or more times in a month, and consume more drinks on an average drinking occasion than of drinking age students (Wechsler, 2002).

Furthermore, the college environment seems to cause an increase in drinking rates with a greater percentage of 18-24 year old college students drinking five or more drinks on a single occasion in the past month when compared to the same age non-college group (Hingson et al.,
Moreover, while in high school, those whom will later be attending college have lower rates of drinking than those who will not become college students; however, after college graduation and into the following year, college students’ heavy drinking increases more and surpasses that of their non-college student peers (O’Malley & Johnston, 2002). These effects of the college environment can be attributed to the fact that many college students often do not live with their parents as college students whom still live at home tend to drink less than non-college high school graduates living with their parents (O’Malley & Johnston, 2002). Heavy alcohol use rates are higher in the Northeast and North Central regions and lower in the South and West colleges (O’Malley & Johnston, 2002) and the lowest rates of binge drinking tend to be in students living in substance free dorms or off campus with their parents (Wechsler et al., 2002).

Drinking is not always a social occasion in college students. Some students tend to drink alone, which has been linked to greater alcohol issues later in life (Christiansen, Vik, & Jarchow, 2002). Although almost two-thirds of college students classify themselves as social-heavy drinkers, about 15% do report heavy drinking when alone (Christiansen et al., 2002). These students report more negative drinking consequences, as well as higher depression scores, more alcohol expectancies, less self-efficacy and motivation to reduce drinking, and greater rates of regular drinking than social-heavy drinkers (Christiansen et al., 2002).

Greek system involvement is associated with greater alcohol use and binge drinking (Cashin, Presley, & Meilman, 1998; Scott-Sheldon, Carey K., & Carey M., 2008) especially during the first two years of college (Capone, Wood, Borsari, & Laird, 2007). Joining a fraternity often increases the proportions of alcohol use with 45% of students in a fraternity binge drinking more than once a week over the past year and 73% reporting drinking more than once a week (Kremer & Levy, 2003). A similar pattern is seen in sororities with a significantly greater heavy drinking seen in students belonging to a sorority when compared to those not involved with the sorority (Cashin et al., 1998). Residing in a fraternity or sorority house only increases these percentages with 81.1% of residents reporting binge drinking (Wechsler et al., 1998). Only 25% of these students’ non-fraternity counterparts reported binge drinking more than once a week over the past year, and 37% of non-Greek students reported drinking more than once a week over the past year (Kremer & Levy, 2003). Greek members also view alcohol as a means to friendships, sex, and social activities to a greater extent than non-Greek members (Cashin et al., 1998). Although Greek life plays an important role in alcohol use on college
campuses, this is not a topic of the current study due to time constraints and the primary focus being on the relationship amongst health behaviors in students and not social effects.

There are gender differences in alcohol drinking patterns with males drinking more quantities and frequently, (Kremer & Levy, 2003; O’Malley & Johnston, 2002) in addition to having different drinking motives than females (Goldstein et al., 2010; O’Malley et al., 2002). Males have higher rates of binge drinking with 50-51.6% of males and 23.4-39% of females binging at least once a month (Goldstein et al., 2010; Wechsler et al., 1994). In addition, 39% of women and 50% of men binged in the past two weeks (Wechsler et al., 1995). Interestingly, both males and female drinking students are more likely to binge drink, than not (Wechsler et al., 1994). Of the drinking students, only 35% of males and 45% of women are non-binge drinkers (Wechsler et al., 1994). Heavy drinking males (96.9%) are more likely to experience careless behavior consequences from their drinking than female heavy drinkers (89.1%), in addition to greater rates of risk behaviors such as unprotected sex, unplanned sex, and problems with the police (73% of heavy drinking men vs. 49.2% of heavy drinking females; Vik, Carrello, Tate, & Field, 2000).

As far as drinking motives, women tend to drink moreso for the desire of positive experiences, reduced social anxiety, mating/interactions with the opposite sex, and for mood management/using alcohol as a “pick me up” (Smith & Berger, 2010). Similarly, males also place emphasis on the effects of drinking on reducing social anxiety (DeJong, DeRicco, & Schneider, 2010) yet rate meeting members of the opposite sex as more important than females (Pedersen, LaBrie, & Kilmer, 2009). Both males and females often report drinking in positive situations, but women are more likely than men to report drinking to cope with adverse emotions in negative situations (Norberg, Norton, Olivier, & Zvolensky, 2010). In addition, higher stress levels are often seen in female college students and they are more likely to drink to cope with this stress when compared to men (Rice & Van Arsdale, 2010).

Pre-gaming and drinking games prior to a planned night’s activities are also newer trends in the college social environment with anywhere from 30-65% of college students prepartying prior to going out and encompass fast paced drinking during short periods of time (Borsari et al., 2007; DeJong et al., 2010). These drinking practices increase students’ intoxication level (Blood Alcohol Level: BAL) for the night, in addition to increasing drinking consequences in both males and females (LaBrie & Pedersen, 2008). Because of the fast-paced nature of
prepartying, students may reach dangerous levels of intoxication prior to even going out or feeling the effects of the alcohol until in public resulting in even greater risks when drinking more at the intended destination (Pedersen et al., 2009). Prepartying most often occurs with friends while getting ready to go out, before going to a bar or party, while playing drinking games in a dorm before going out, and before going to a concert or sporting event (Pedersen et al., 2009). There are a multitude of motives for prepartying including saving money, being able to drink if underage, arriving to a social function already intoxicated, and making the night more interesting (Pedersen et al., 2009). Men often have additional/differing reasons than females for prepartying such as higher ratings of meeting females, greater sex opportunities, enjoying concerts and sporting events more, and conforming to social pressures (Pedersen et al., 2009).

Current norms pertaining to college and drinking, as well as students’ perceptions of alcohol affect individuals’ drinking patterns (Osberg, Insana, Eggert, & Billingsley, 2011; Perkins & Wechsler, 1996). Students who are more permissive with their views of alcohol (and most likely who were raised in a permissive environment) have greater rates of personal alcohol abuse than those with more stringent perceptions (Perkins & Wechsler, 1996). Additionally, a student’s perception of the campus norm regarding alcohol contributes to his/her actions with regards to alcohol. Those perceiving the campus environment to be permissive of alcohol usage are more likely to abuse alcohol, even when controlling for the student’s own attitude toward alcohol (Perkins & Wechsler, 1996). Similarly, in pertaining to prepartying and drinking games, perceptions of drinking game and prepartying frequency and quantity were associated with mirror effects in actual behaviors in both male and female students (Pedersen & LaBrie, 2008).

The College Life Alcohol Salience Scale (CLASS) recently was developed to examine the extent students believe that alcohol is pertinent to their college experience (Osberg et al., 2010). These beliefs are often predictive of college freshmen’s alcohol drinking and associated consequences at two time points and can be key in targeting alcohol prevention interventions for freshmen college students (Osberg et al., 2011). Perceptions of one’s friends’ acceptance of alcohol consumption and alcohol related behaviors have a predictive nature of reflecting one’s personal belief about alcohol’s role in the college experience (Osberg et al., 2011). Further understanding these perceived norms can help reduce the alcohol problems observed in colleges today.

The excessive binge drinking demonstrated in college student results in immediate consequences in addition to potential unforeseen consequences later in life. Students may
become dependent on alcohol or face more serious health issues. For example, they might experience a reduction in brain cell size, liver disease, depression, coordination problems, weakened heart, pancreatitis, kidney problems, and even death (NIAA, 2011). Understanding college’s impacts on students’ readiness to change alcohol consumption, self-efficacy, and perceptions of the pros and cons of their drinking behavior can help mitigate this growing problem on our county’s college campuses. Employing the TTM framework to examine freshmen college students’ alcohol consumption, eating habits, and physical activity patterns will provide further understanding and help our nation work towards the objectives of improving the health of young adults.

**Alcohol use and the Transtheoretical Model.** The TTM was originally developed and tested on smokers and since has been applied to alcohol and other substance abusers (Hall & Rossi, 2008; Migneault, 1995; Migneault, Adams, & Read, 2005). Numerous studies support the efficacy of the TTM in relation to alcohol use and the standard themes in relationships of the TTM constructs are demonstrated. The pros and cons of drinking are associated with the stages of change and these factors change over time as one progresses towards altering their alcohol abuse behavior (Migneault et al., 2005). Additionally, more alcohol use and earlier stages of change are associated with greater reports of temptation to drink and lower self-efficacy (Migneault et al., 2005). These relationships have been studied in the adult population and to a lesser extent in college students. Further examining and understanding students’ drinking patterns in relation to their readiness to change, self-efficacy, and decisional balance will produce valid insight into promoting safer and less excessive drinking habits in our nation’s college environment.

SOC in college students has been correlated with the typical, number of drinks per week, number of binge drinking occasions, and alcohol related problems (Shealy, Murphy, Borsari, & Correia, 2007), with those having greater than average past drinking portraying lower readiness to change (Kaysen, Lee, LaBrie, & Tollison, 2009). Anywhere from 58% to two-thirds of heavy college student drinkers are in the PC stage, even despite past consequences from their alcohol abuse, and one third report evidence of tolerance to alcohol (Harris, Walters, & Leahy, 2008; Vik, Culbertson, & Sellers, 2000). Around 17.9% of heavy drinkers are contemplators, or those whom acknowledged a need to reduce their drinking (Harris et al., 2008). These contemplators drink more than precontemplators (24%) (Harris et al., 2008) and those in the action stage
The contemplators report greater alcohol related consequences than precontemplators, but less than action students, leading to the idea that the greater problems (or cons) associated with alcohol lead to stage progression and initiation of action (Shealy et al., 2007; Vik et al., 2000). Despite experiencing alcohol related problems, 83% of heavy student drinkers have not committed to change, supporting the idea that multiple variables/concepts come into play with behavior change and negative consequences may not be enough to initiate action to change behavior in college students (Vik et al., 2000). In first year college students only one in five binge drinkers report having taken any action to change their drinking (Vik et al., 2000).

The decisional balance construct of the TTM focuses on perceptions and balance of the pros and cons of a behavior change (Prochaska & Velicer, 1986). Typical American college students recognize two main cons of drinking: those associated with concrete/physical harm and those associated with emotional consequences (Migneault, Velicer, Prochaska, & Stevenson, 1999). As supported by the TTM, those perceiving greater cons of drinking are more likely to drink less, and those reporting greater pros from drinking have greater drinking rates (Migneault et al., 1999). Students reporting little alcohol use and alcohol related problems are more likely to portray less motivation to change their current alcohol behaviors, most likely due to the lack of experienced cons of drinking (Shealy et al., 2007). More interpersonal and academic problems associated with alcohol use in first year college students is also correlated with a higher readiness to change binge drinking patterns (McGeea et al., 2010). Moreover, higher levels of depression and anxiety (greater cons) in heavy college drinkers are been correlated with a greater readiness to change alcohol consumption patterns (Smith & Tran, 2007). As students progress through the stages of change, their pros of drinking decrease and their perceived cons of drinking increase, suggesting that TTM based stage matched interventions are applicable to college students and should focus on reducing the pros of drinking (Migneault et al., 1999; Ward & Scielke, 2011).

Most college students believe that their alcohol problems will resolve themselves through “natural recovery,” the process of resolving alcohol problems without formal treatment, yet self-efficacy is key in order for this to occur (Vik, Cellucci, & Ivers, 2003). Greater levels of self-efficacy, or confidence in success, has been associated with decreases in temptation and greater overall success alcohol abstinence (Carbonari & DiClemente, 2000). Unfortunately, “natural recovery” does not happen for most, and only about one-fifth (22%) of college students
with a history of drinking in high school have been shown to reduce their drinking while in college without formal treatment (Vik et al., 2003). Current bingers unable to reduce their drinking, however, show lower self-efficacy to resist drinking under social pressure and more ambivalence about change than natural reducers (Vik et al., 2003). In other words, current bingers exemplify a lower ability and confidence to reduce temptation than those students reducing their alcohol consumption without formal treatment.

Alcohol abuse in college is an emerging issue that needs to be addressed. These changes in alcohol use seem to occur upon entering the college atmosphere and students’ readiness and confidence to change these behaviors changes within the first semester of college. Behaviors developed during this period of life often mimic those later in life and can result in serious health consequences including death. The TTM has been employed sparingly in studying college students’ drinking behaviors and further examining the TTM framework in relation to students’ alcohol consumption patterns in their first semester can help develop successful future interventions to reduce this widespread alcohol abuse. Moreover, examining students’ alcohol behaviors in relation to their eating habits and physical activity patterns can produce pertinent insight into the health behavior changes experienced upon entering.

**Physical Activity and College Students**

Currently, the US Department of Health and Human Services recommends “at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity” for optimal health benefits (US Department of Health and Human Services, 2008). Additionally, the recent release of the *Health People 2020* objectives state objectives to “reduce the number of adults whom engage in no leisure-time physical activity” and increase the amount of physical activity the average American partakes in on most days of the week (US Department of Health and Human Services, 2011). The Centers for Disease and Control and Prevention (CDC) defines physical activity as, “any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level” (CDC, 2011).

The focus on physical activity participation has its roots in the vast benefits one can experience from these activities. Regular physical activity and/or exercise is known to reduce risk of premature death and chronic disease, prevent weight gain, benefit body composition and blood lipid levels (Sacheck, Kuder, & Economos, 2010) improve cardiorespiratory and muscular
fitness, improve bone health, reduce depression, and improve cognitive function (Hallal, Victora, Azevedo, & Wells, 2006; US Department of Health and Human Services, 2011; US Department of Health and Human Services, 2008; Warburton, Nicol, & Bredin, 2006). Specifically in college students physical activity has also been associated with improved blood lipid levels (Sacheck, Kuder, & Economos, 2010). Moreover, evidence shows that a sedentary lifestyle can lead to increase risk of premature death, decreased functional ability, obesity (leading to many secondary diseases), and a decrease in health in each of the forementioned areas (US Department of Health and Human Services, 2008).

Despite this knowledge, the US Surgeon General reports that the majority of American (more than 60%) adults do not participate in regular physical activity and 20% participate in no activity at all. This trend in inactivity is not only seen in adults, but also in adolescents and young adults, including college students. The largest declines in physical activity is demonstrated from the period of adolescence to young adulthood, and then again to a greater extent during the college experience (Bray & Born, 2004; Lake, Townshend, Alvanides, Stamps, & Adamson, 2009; Nelson, Gortmaker, Subramanian, & Wechsler, 2007; Racette et al., 2005; Racette et al., 2008) Juniors and senior college students participate in approximately three fewer exercise bouts per week than freshmen and sophomores (Reed & Phillips, 2005). Physical education class in high school may not make a difference in students’ continuing physical education patterns, as well. College students whom were athletes in high school and did not take part in physical education class report engaging in more cardiovascular exercise than students whom were non athletes and required to take physical education in high school (Everhart et al., 2005). With this in mind, one understands why the transition to college is a pertinent time for young adults to establish proper physical activity patterns (Stephens, Jacobs, & White, 1985).

From 1996-2008 average physical fitness in college students declined while body fatness increases throughout students’ college careers (Pribis, Burtnack, McKenzie, & Thayer, 2010) and the proportion of overweight/obese students increases throughout the four years in college (Racette et al., 2005; Racette et al., 2008). Lack of physical activity during these young years may lead to greater health issues and poor health behaviors in the adult years (Von Ah et al., 2004). Understanding the relationship physical activity and other health behaviors have in common is pertinent in improving the amount of exercise our nation’s young adults receive.
Moreover, examining the effects the college environment has on physical activity patterns and readiness to change their behaviors is a crucial step in this process.

The most recent ACHA-NCHA in fall 2010 examined 106 college campuses and found that only 19.2% (17.9% females, 21.4% males) of college students report moderate-intensity cardio/aerobic exercise for at least 30 min on 5-7 days of the week and 58% report only 1-4 days of the week, with 22.5% reporting none on any day of the week (American College Health Association, 2011). Overall, only 46.7% of the students from 42 U.S. college campuses met the physical activity guidelines in a fall 2010 survey (American College Health Association, 2011), yet a similar pattern is seen in many previous years (see Table 2). College students are more active on weekdays than on weekends, including more walking during the week (Sisson, McClain, & Tudor-Locke, 2008) and which may be advantageous information when implementing physical activity programs (Behrens & Dinger, 2003; Dinger & Behrens, 2006). Exercise specific patterns show that males are more likely than females to participate in muscle strengthening exercises and vigorous physical activity (Lowry et al., 2000) and females are more likely than males to perform moderate or vigorous cardiovascular or aerobic exercise (American College Health Association, 2011). Table 2 presents data on a range of studies examining physical activity patterns in the college population.

Sedentary activity may also replace time that college students would otherwise be devoting to physical activities, and includes driving, reading, music, art, talking on the phone, computer time, video games, or in other words “inactive behaviors.” Studying is a necessary component of the college lifestyle with 62% of students reporting doing 1-2 hours of homework during the weekdays and a total of almost 30 hours of sedentary behaviors throughout the week (Lake et al., 2009). Additionally, with the constant increase in recreational technology (i.e., cell phones, television, computers, etc) more time is spent at sedentary behaviors and less at physical activities. During the week, students watch TV for an average of 3.18 hours daily (Clement, Schmidt, Berriaix, Covington, & Can, 2004) and on the weekends 51% of students spend 3-4 hours watching TV, videos, DVDs, or listening to music (Lake et al., 2009). Males show patterns of greater sedentary activity (television/video watching, computer time, etc.) than females, yet at the same time men report greater levels of exercise (Dinger & Behrens, 2006; Lake et al., 2009). Negative correlations between sedentary activities and exercise are demonstrated for both male and female college students (Lake et al., 2009).
television watching is negatively associated with most physical activity patterns, however, studying is positively correlated with the duration of exercise. For males, computer use is negatively correlated with physical activity behaviors and may be seen as a competing factor for physical activity in college males (Lake et al., 2009). Understanding these gender specific behavior patterns that interfere/compete with physical activity, can help administrators tailor sex specific physical activity programs aimed at increasing the number of active students on our college campuses. Not undermining the importance of this area of research, and solely due to the scope of the current study, specific sedentary behaviors will not be examined, and instead the focus will be on patterns in physical activity.

Students exercise for a variety of reasons and both intrinsic and extrinsic motives are pertinent factors in college students’ decision to participate in physical activity (Wang, Liu, Bian, & Yan, 2011). Sport participation has more intrinsic motives such as enjoyment and challenge, while exercise motivations are more extrinsic focusing on appearances, strength, endurance, and stress management (Kilpatrick, Hebert, & Bartholomew, 2005). Specifically with weight training, intrinsic beliefs regarding its importance, usefulness, and pure interest in the exercise predict students’ intention for further participation (Gao, 2008). Both male and females exemplify the same level of feelings of obligation to exercise and higher feelings of obligation lead to greater self-reported physical activity (Chu, Bushman, & Woodard, 2008). Each of these play a role in the varying degrees of physical activity demonstrated in college students.

Once more, gender differences are relevant in regards to college students’ physical activity. Males are more motivated by activities incorporating performance factors (Chu et al., 2008; Greene et al., 2011; Kilpatrick et al., 2005), whereas females view weight management and physique as higher motivators (Kilpatrick et al., 2005; Lowry et al., 2000). Examining students’ exercise choices support this evidence in that positive correlations are seen between men’s obligation to exercise and resistance training and women’s obligation to exercise and cardiorespiratory activity (Chu et al., 2008). Females are more likely than males to participate in low-intensity physical activity, and males are more likely to partake in strength training (Kasparek et al., 2008). In order to develop successful interventions increasing the activity of college students, these motivators and interests must be taken into consideration for successful behavioral changes and adherence. Although not examined in the study at hand, future interventions should acknowledge these gender differences in college students.
The campus built environment (i.e., human built areas such as buildings, roads, sidewalks, parks) and surrounding community also affect the frequency and duration of college students’ physical activities. About two-thirds of students engage in physical activity less than two-thirds of a mile from where they live, and a positive correlation exists between the distance between a student’s residence and location of exercise and the duration and intensity of the activity (Reed & Phillips, 2005). In males, frequency of physical activity has a negative correlation with proximity of the activity’s location and females often initiate physical activity closer to home. Freshman and sophomore college students engage in physical activity closer to their residences and participate in three more bouts of exercise per week than juniors and seniors (Reed & Phillips, 2005).

Car access on campus, public transportation, and support for walking (sidewalks, daily traffic, curb lamps, lighting, etc.) all impact daily physical activity and can explain variances we see amongst different college’s physical activity participation (Sisson et al., 2008). Students at colleges with greater perceived walk ability accumulate significantly more time (70 min/day vs. 37 min/day) walking than those from a less “walker friendly” campus (Sisson et al., 2008). Although campus built environment is not examined in the current study it is a factor affecting college students’ physical activity patterns. College administrators and health promoters looking to increase the activity of their students should bring attention to their campuses built environment and surrounding geographic terrain for natural methods to increase the activity of their students.

Physical activity is a pertinent component of overall health, especially in college students. These individuals are at an age where health behaviors are developed for the adult life, and developing healthy physical activity patterns should be an important part of college life. Unfortunately, past research shows the opposite, with physical activity patterns decreasing upon entering college. Additionally, gender differences in physical activity patterns exist between males and females and should be addressed in programs attempting to increase students’ activity. Understanding students’ readiness to change this behavior, as well as the change college causes in relation to this is an important part of developing these successful interventions.

**Physical activity and the Transtheoretical Model.** The TTM describes individual’s readiness to change various health behaviors and is applicable to adults’ physical activity and exercise patterns (Marshall & Biddle, 2001; Nigg et al., 2011; Prochaska & Marcus, 1994;
Prochaska et al., 1994; Sarkin, Johnson, Prochaska, & Prochaska, 2001; Spencer, Adams, Malone, Roy, & Yost, 2006). Tailoring interventions to individuals’ specific stage of change has helped people progress to action/maintenance in exercise behaviors (Johnson et al., 2008). The application of the framework to college students’ physical activity behaviors, however, has not been thoroughly examined. College students in different stages of change differ in the various TTM constructs with regards to physical activity (Cardinal, Tuominen, & Rintala, 2004). Those in PC report the lowest level of self-efficacy and pros and those in M report the highest (Cardinal, Keis, & Ferrand, 2006).

Furthermore, gender differences exist as those in the earlier stages of change (i.e., PC, C, and PR) for general physical activity are more likely to be women than men (Cardinal et al., 2009; Suminski & Petosa, 2002), and males often report more pros and have greater self-efficacy than women for muscular fitness promoting behavior (Cardinal et al., 2006). Understanding how students’ view their readiness to change their physical activity patterns, their beliefs regarding the pros and cons of physical activity, as well as their self-efficacy are all factors that may help educators improve the health of college youth.

Supporting the use of the TTM in college students, research demonstrates an increase in weekly exercise level as students progress through the stages of change (Cardinal et al., 2009; Daley & Duda, 2006). The distribution of students in the various stages of change is 2-6.8% in PC, 4.9-22% in C, 17-26.2% in PR, 22-23.8% in A, and 33.5-38.3% in M (Daley & Duda, 2006; Wadsworth & Hallam, 2007; Zizzi, Keeler, & Watson, 2006). Students in the higher stages of change for physical activity exemplify greater physical activity levels, as well as higher overall health status (Clement et al., 2004). As previously discussed, students physical activity levels decline as they progress through college. The same pattern is observed for the SOC. As students progress from freshmen to sophomore year of college there a significant reduction in the number of students in maintenance for aerobic exercise (Racette et al., 2005).

Mixed findings have been reported with regards to self-efficacy levels in college students while progressing through the SOC. While examining the TTM constructs and physical activity in American and South Korean college students, Cardinal et al. (2009) demonstrated an increase in self-efficacy in the later SOC, supporting previous TTM research. Additionally, students’ beliefs about their capabilities (or their self-efficacy) has proven to be a significant predictor of their performance and efforts exerted (Gao, 2008). Levy and Cardinal (2006), however, found
contradicting evidence supporting that increases in self-efficacy did not accompany increases in exercise stages. Decisional balance research in college students provides mixed findings as well. Levy and Cardinal (2006) found that there are no significant effects for cons of exercise behavior, whereas Cardinal et al. (2009) observe an increase in pros of physical activity in the later SOC.

The effects of the first semester of college on a students’ readiness to change their physical activity patterns when incorporating their alcohol consumption and eating habits has not been examined. Employing multiple health behavior research in investigating the interrelationships amongst these three behaviors, how the college environment affects them, and using the framework of the TTM will allow a clearer picture of effectively improving the health behaviors of college students. Employing the TTM enables an understanding of college students’ readiness to change their health behaviors allowing the tailoring of stage specific interventions. Students with different mental preparedness respond differently to various interventions, and programs should be created accordingly, focusing on stage specific attitudes and beliefs.

**Dietary Patterns and College Students**

As of 2009, the CDC estimates 27.6% of American adults are obese, a condition known to lead to many other serious diseases/disorders including psychological issues with poor self-confidence (Centers for Disease Control and Prevention, 2010). The primary cause of this phenomenon is simply energy imbalance between calories consumed and calories expended (World Health Organization, 2011). While this is the primary cause, it may not be the only factor contributing to this weight gain with lifestyle factors (Mozaffarian et al., 2011) and genetics (Elks et al., 2010; Frayling et al., 2007; Loos et al., 2008; Thorleifsson et al., 2009; Willer et al., 2009) playing a role, as well. Nevertheless, food consumption impacts weight changes, as well as overall health (Mozaffarian et al., 2011; US Department of Health and Human Services, 2011). A well-balanced diet has shown to reduce risk for vitamin and mineral deficiencies, heart disease, diabetes, hypertension, overweight and obesity, and other chronic conditions (US Department of Health and Human Services, 2011). Diets high in fruits and vegetables specifically, in addition to low fat diets, have demonstrated a decreased risk of many chronic diseases, including coronary heart disease, and helpful to individuals trying to lose weight (CDC, 2011; Joshipura et al., 2001; Terry, Terry, & Wolk, 2001; USDA, 2010).
At present, Americans consume less than 50% of the daily recommendation of vegetables and less than 60% of the daily recommended fruits (USDA, 2010). A plethora of government agencies are developing programs and initiatives to improve the diets of the American people to reduce the increase in obesity and diminishing health. *Healthy People 2020* specifically addresses Americans’ eating patterns in objectives NWS 14, 15, and 17 by stating goals to increase the quantity and variety of fruits and vegetables in one’s diet, in addition to reducing the percentage of daily calories from solid fats and added sugars (US Department of Health and Human Services, 2011). The USDA recently released the 2010 Dietary Guidelines for Americans and specifically recommending an average of 2 cups of fruits and 2 ½ cups of vegetables per day, in addition to a diet with fat totaling no more than 20-35% of total calories for optimal health (USDA, 2010).

College is a point in time to adopt these healthful eating patterns and unfortunately is often a time when eating habits changes are not always for the better (Racette et al., 2008). Often college students exemplify unhealthy eating practices including skipping meals (Huang, Song, Schemmel, & Hoerr, 1994), excessive dieting (Lowry et al., 2000), frequent snacking, and high fat/low vitamin and mineral diets (Johnston, Solomon, & Corte, 1998). Eventually, these common unhealthy eating patterns may lead to weight gain (Racette et al., 2008) and/or nutrient deficient diets (Zive, Nicklas, Busch, Myers, & Berenson, 1996). The Fall 2010 American College Health Association NCHA survey reveals that only 4.8% of college students meet the recommended five or more fruits or vegetables per day with 68.2% of students consuming 2 or less per day (American College Health Association, 2011). Table 3 lists similar findings for fruit and vegetable consumption rates in other studies. These rates of fruit and vegetable consumption are only seen to decrease throughout the college years (Kasparek et al., 2008; Larson, Neumark-Sztainer, Hannan, & Story, 2007), a time of change and adaptation for these students (Dyson & Renk, 2006; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008).

The availability of fruits and/or vegetables in students’ living environments are positively associated with consumption; in other words, if the food is readily present and available it is more likely to be consumed (Chung & Hoerr, 2005; Neumark-Sztainer, Wall, Perry, & Story, 2003). Further understanding these patterns and changes that occur in eating patterns upon entering college can help administrators develop successful interventions that improve the diets of our nation’s college student, and hopefully produce long-term changes for the best.
High fat consumption is another dietary concern in college students and intake of total fat, in addition to saturated fat, is often higher than recommended levels for optimal health (Brevard & Ricketts, 1996; Hampl & Betts, 1995; Hendricks & Herbold, 1998). According to Brevard and Ricketts (1996) on average college students consume 34-46% of their total calories from fat, a higher percentage than the USDA recommended 20-35% (USDA, 2010). Ground beef, a food product high in saturated fat, is reported as the primary source of dietary fat for both male and female students (Hampl & Betts, 1995). Moreover, cakes, pies, doughnuts, cookies, and ice cream are consumed an average of 1.1 times per day and 60% of students consume these items 1-2 times per day (Clement et al., 2004). Fried foods are common occurrences in dining halls and more than 50% of freshmen report eating fried food at least three times in the past week (Racette et al., 2005). Students with a high fast food intake and/or fried food intake also consume less fruits and vegetables, leading to the belief that these unhealthy options often replace the nutrient dense fruits and vegetables in college students’ diets (Racette et al., 2008). Students with high-fat diets are at greater risk for lower overall health status (Clement et al., 2004) and often show weight gain through their four years in college (Levitsky, Halbmaier, & Mrdjenovic, 2004; Pliner & Saunders, 2008; Racette et al., 2008).

Dietary patterns in college student differ by gender and males often consume less fruits and vegetables than females (ACHA, 2011; Chung & Hoerr, 2005; Erinosho, Thompson, Moser, & Yaroch, 2011; Greene et al., 2011), whereas females are less likely to eat high fat foods and diets than males (Chunch & Hoerr, 2005; Huang et al., 1994; Lowry et al., 2000). Over a quarter of males report consuming fast food several times per week, whereas around 12% of females do (Laska, Pasch, Lust, Story, & Ehlinger, 2009). Candy bars, pizza, chips, and french fries are all eaten more often by men than women (Huang et al., 1994) and males report lower intention to consume healthy diets (Deshpande, Basil, & Basil, 2009). As a result of these poor diets, all essential vitamins and minerals are often lacking from students’ daily intakes (Hendricks & Herbold, 1998). Females more commonly than males report nutrient intakes less than 2/3 of the recommended dietary allowance (RDA), yet also demonstrate more nutrient rich diets (in relation to nutrient/kcals) than males (Zive et al., 1996).

There are multiple potential factors leading to these dietary patterns observed in college students including availability of food on campus and dorm rooms, lack of time, prioritization, stress, and alcohol consumption (Nelson et al., 2009). Although these are not studied in the
current study due to the lack of data, gaining a further understanding of these factors, in addition to other behaviors influencing dietary pattern in college students, may help administrators curb the unhealthy diet changes seen in college students.

**Diet and the Transtheoretical Model.** The TTM has been shown to be valid for various eating behaviors in a range of populations (Di Noia & Prochaska, 2010). Applying the TTM to assessing fruit and vegetable intake, shows that persons in the highest stage of change (M) consume the recommended five or more servings per day, whereas those in A eat one more serving (3.68 servings/day) than those in PR (2.68 servings/day) (Van Duyn et al., 1998). Moreover, individual interventions tailored to individual’s specific stage of change in fruit and vegetable intake and “healthy eating” have shown to help participants progress to the A and M in these behaviors (Johnson et al., 2008). Prochaska et al. (1994) demonstrated the validity of the decisional balance aspect of the model with respect to high-fat diets and the SOC. In the earlier SOC, the cons of change were shown to outweigh the pros, yet as one progressed to PR and A, the pros of change began to outweigh the cons of reducing fat in one’s diet (Prochaska et al., 1994).

Studies with college students, dietary habits, and the TTM show more than 55% of students are in the PC stage for adopting healthier eating patterns both at the beginning of freshman year and the end of sophomore year (Racette et al., 2005) and only 5% of all ages of college students are in both the A and M stages combined together (Cummins, Johnson, Paiva, Dyment, & Mauriello, 2006). Average fruit and vegetable intakes for college students in PC, C, and PR are lower than the recommended daily servings, and are significantly lower than those in A/M, data supported by the TTM (Chung, Hoerr, Levine, & Coleman, 2006). For fruit and vegetable consumption specifically stages distributions are often PC (0-40.4%), C (5.6-37.3%), PR (7.0-40.8%), A (1.2-7.0%), and M (5.1-50%) (de Oliveira, Anderson, Auld, & Kendall, 2005; Richards, Kattlemann, & Ren, 2006; Soweid, Kak, Major, Karam, & Rouhana, 2003). There is a negative correlation between high calorie/high fat foods and the stage of change students are in (Clement et al., 2004; Lamb & Joshi, 1996), and a positive correlation between fruit and vegetable consumption and stage of change (Clement at al., 2004). As with other populations, stage matched interventions have proven to be successful in increasing the fruit and vegetable consumption in college age students (Cummins et al., 2006; Johnson et al., 2008; Soweid et al., 2003), as well as reducing fat intake and increasing readiness to change (Finchenor & Byrd-
Gender differences also exist in the stage distributions for fruit and vegetable consumption in college age individuals. For fruit stage of change, more males are in PC, while more females are in the A/M stage, and when solely examining solely vegetable stage of change more males are in PC than females (Horacek, 2002). In relation to dietary fat consumption, females are more likely than males to be in the later stages, and thus females are more willing to give up fat in their diets (Lamb & Joshi, 1996).

Balancing the pros and cons of behavioral change has also been examined in college students readiness to change their eating patterns. Between the C/PR and A/M stages, the pro scores of fruit/vegetable consumption can predict males’ stage categorization supporting the application of the decisional balance construct to college students (Horacek et al., 2002). Moreover, the pros and cons of fruit and vegetable consumption have shown to be predictive of SOC in both males and females and may be a pertinent focus for successful interventions (Cummins et al., 2006).

The self-efficacy component of the TTM has also been examined in relation to fruit and vegetable intakes in college students. Self-efficacy is a positive predictor of fruit and vegetable intake, as well as nutrition protective behavior (Franko et al., 2008; Horacek et al., 2002; Von Ah et al, 2004), and those with past successful attempts at increasing fruit and vegetable intake have higher self-efficacy than those without successful attempts (Chung & Hoerr, 2005). Once again, those in the later SOC show greater self-efficacy than those in the early stages (Cummins et al., 2006) and employing motivational methods to increase self-efficacy has been productive in increasing college students’ fruit and vegetable consumption (Franko et al., 2008; Richards et al., 2006). Interventions should attempt to maximize self-efficacy in students for extended periods in to help them maximize their full health potential.

Researchers have yet to examine the changes in students’ readiness to change their alcohol consumption, eating habits, and physical activity patterns across the first semester of freshman year. Additionally, understanding the relationships amongst these three behaviors on each other can help develop subsequent multiple health behavior change interventions curbing the demise in health behaviors upon entering college. Applying various matched components of the TTM to interventions targeting college students’ health behaviors can potentially mitigate the poor lifestyle changes observed in college students today.
Alcohol Consumption, Diet, and Physical Activity and Multiple Health behavior Change Research

As presented, the three behaviors in focus have been studied widely as individual behaviors in the college student population. In addition, studies have examined relationships between two of these variables, but none have looked at all three behaviors together, especially in relation to students’ readiness to change and the TTM constructs. Cluster analysis on college student health behaviors shows that certain health behaviors coincide with others (Laska et al., 2009), yet students’ readiness to change has not yet been examined in relation to the three behaviors in question.

Alcohol consumption, physical activity have been examined in a multitude of studies (see Multiple Health Behavior Research in a College Student Population for further references) looking at the relationship amongst the two of the three behaviors, yet not with all three in relation to students’ readiness to change. Musselman & Rutledge (2010) report a positive association between alcohol consumption and physical activity in college students, and same relationship is portrayed in numerous other studies showing that more active nonathletes drink more alcohol than less active students (Dunn & Wang, 2003; Moore & Werch, 2008). What’s more, intercollegiate athletes (more physically active students by nature) are more likely to drink than nonathletes (Leichliter, Meilman, Presley, & Cashin, 1998; Martens, Dams-o’Connor, & Beck, 2006). In contrast, some view exercise as an alternative substance free activity that can replace and/or help reduce alcohol consumption in college students (Correia, Benson, & Carey, 2005; Weinstock, 2010; Murphy, Pagano, & Marlatt, 1986), yet this idea is still questioned by researchers (Barry & Piazza, 2010). The current study will test for a positive or negative relationship between readiness to change physical activity and readiness to change alcohol consumption in college students, in addition to examining the changes that occur in these behaviors over the first semester of college.

Dietary habits and alcohol consumption are related in college students. Students consuming low-fat diets also consume more alcohol than other students (Hampl & Betts, 1995). Qualitative research presents students’ reports that alcohol greatly affects their dietary habits (Nelson et al., 2009). Alcohol-related eating, including both eating prior to drinking to minimize the alcohol’s effects and eating late at night due to “munchies,” affects’ students diets and often leads to greater consumption of take-out and higher fat foods (Nelson et al., 2009). Physical
activity patterns have also been linked to dietary habits in college students. Students reporting greater levels of sedentary behaviors (watching TV/DVDs, listening to music, driving, etc) have also reported a greater percentage of energy from fat and greater total energy intake (Lake et al., 2009). One study examined the stages of change in relation to diet and physical activity and portrayed similar findings with a negative correlation between high calorie/high fat food intake and physical activity stage of change score (Clement et al., 2004). Moreover, fruit and vegetable consumption was positively correlated with the physical activity stage score (Clement et al., 2004) and regular physical activity has shown to be associated with fruit intake (Chung & Hoerr, 2005). Those attempting weight control, recognize the importance of both diet and physical activity with 54% of females and 41% of males using both methods to lose weight (Lowry et al., 2000).

The combination of high alcohol consumption, poor diet, and lack of regular physical activity has great implications for long-term health. TTM tailored multiple health behavior change intervention have proven to be more effective than individual behavior interventions, especially in relation to diet and exercise (Johnson et al., 2008). Gaining a clear understanding of the relationships between these three behaviors and how college affects students’ readiness to change each behavior is pertinent in developing successful interventions for this age group. The multiple questions asked while examining these behaviors in college students are listed below.

**Research Question 1:** Do college students’ readiness to change their alcohol consumption, physical activity, and diet change throughout their first semester of college, and do complementary changes exist in students’ decisional balance for these behaviors? Do freshmen college students’ quantity of alcohol and fruits and vegetables consumed change over their first semester of college?

Each behavior will be examined individually in relation to the TTM stage of change at both Time 1 and Time 2. Dietary patterns will include stages of change for both fruit and vegetable consumption, as well as high fat food intake. It is expected over the course of freshman students’ first semester of college their readiness to change alcohol consumption will decrease and their readiness to participate in more physical activity will decrease. Additionally, it is expected freshmen college students’ readiness to eat more fruits and vegetables and less fatty foods will decrease.
Decisional balance will be measured for each behavior at both Time 1 and Time 2, and it is expected the cons of changing behaviors will decrease over the first semester of college.

**Research Question 2: Are the stages of change for each health behavior related; are they dependent on each other? Are there interrelationships between these three health behaviors with respect to students’ stage of change status at both Time 1 and Time 2?**

It is expected there will be significant associations between alcohol consumption, physical activity, and dietary stages of change over the course of a semester in freshman college students.

**Research Question 3: Does the change in stage of change form Time 1 to Time 2 for each health behavior in question differ between males and females?**

It is expected there will be significant differences between males and females in magnitude of behavioral stage of change changes throughout freshman students’ first semester of college.

**Methods**

Data was collected from 321 first-year undergraduate students enrolled in an introductory psychology course at a mid-sized Midwestern university campus. Prior to collecting data, the primary investigator received approval from the institutional review and students completed an informed consent form (Appendix A). Data collection was part of a larger longitudinal study and students completed a survey inquiring about more than 20 health behaviors at two time points fifteen weeks apart during their first semester of college. Surveys were administered in a large lecture hall on campus both during the first day of fall semester (Time 1) and during the week before finals the same semester (Time 2). Seven versions of the survey were available to help counterbalance any progressive error, and it took participants anywhere from 30-60 minutes to complete the questionnaire. After completing the questionnaire participants were verbally debriefed for any further questions and future reference.

**Measures**

The questionnaire used included questions regarding the behaviors of interest, alcohol consumption, physical activity, and dietary patterns, in addition to a variety of other health behaviors. Only gender and questions pertaining to the three latter behaviors will be used in this study and all are listed in Appendix D.
To assess alcohol stages of change (Laforge, Maddock, Rossi, 1998), the questions, “In the last month, have you had 5 or more (for males) or 4 or more (for females) drinks in a row” and “Did you drink until you got drunk or intoxicated at least once in the last month” are used. Six one-sentence answer options were given assessing the current alcohol stage of change. Average frequency of alcohol use at in the past month was also examined at both Time 1 and Time 2 by asking “Think back over the last month. How many times have you consumed 5 or more drinks in one day?” A drink was clearly defined for the participants as “one bottle of beer, one ounce of liquor, or a four-ounce glass of wine.”

To assess alcohol decisional balance, the decisional balance scale (Laforge, Maddock, & Rossi, 1999) was used measuring the students’ pros and cons of drinking alcohol. Five measures for both the pros and cons were used and students were asked how important various aspects of drinking were in their decision to drink (i.e., Drinking helps me keep my mind off problems) by choosing from a scale of five options (Not at all important, Not important, Somewhat important, Very important, or Extremely important).

In order to measure physical activity stages of change, regular exercise was first defined as “any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 or more times per week for 20 or more minutes per session at a level that increases your breathing rate and causes you to break a sweat.” The question asked to measure stages of change was “Do you regular exercise according to the definition above” and 5 answer options were given (Marcus, Selby, Niaura, & Rossi, 1992).

Dietary stage of change was measured by looking at both high fat food and fruit and vegetable stage of change. High fat food was assessed with the question “Do you consistently avoid eating high fat foods?” and six one-sentence answer options (Greene & Rossi, 1998). General fruit and vegetable consumption was measured at both Time 1 and Time 2 by asking “How many servings of fruits and vegetables do you usually eat each day?” Fruit/vegetable stages of change was measured with the two questions (1) Have you been eating 5 or more servings of fruits and vegetables a day for more than 6 months and (2) Do you intend to start eating 5 or more servings of fruits and vegetables a day in the next 6 months (Laforge, Greene, & Prochaska, 1994).
Proposed Analysis

The purpose of this study is to examine the changes and interrelationships students experience in their readiness to change their alcohol consumption, physical activity, and diet during two time points their first semester of college. Differences between males and females change in readiness to change these behaviors across the semester will be examined to identify if any gender differences exist. The researcher hypothesizes that there are relationships existing amongst readiness to change these behaviors, supporting the use of simultaneous multiple health behavior interventions in the college student population. Below are the research questions being examined and the proposed methods of analysis for each.

Research Question 1: Do college students readiness to change their alcohol consumption, physical activity, and diet change throughout the first semester of college? Do freshmen college students’ quantity of alcohol and fruits and vegetables consumed change over their first semester of college?

This research question will be answered by examining if the Time 1 stage of change for each health behavior individually is different from that at Time 2. The variables will be the stage of change at both Time 1 and Time 2 for each health behavior. The program SPSS (Statistical Package for the Social Sciences) will be used to run a Chi-square analysis for overall sample population, to see if the stage of change differs from Time 1 to Time 1 within each health behavior. Some students may experience changes over their first semester, while others behaviors may remain static. Moreover, students may progress in their readiness to change one health behavior, while digressing in another.

Research Question 2: Are the stages of changes for each health behavior related; are they dependent on each other? Are there interrelationships between these three behaviors with respect to their stage of change status at both Time 1 and Time 2? Do the stages of change for all three health behaviors change across time together?

This research question will be answered by examining if there is a relationship between the stages of change for alcohol consumption, physical activity, and diet in freshman college students. Because the variables are categorical a Chi-square test of independence will be used to examine if each variable (the stage of change for each health behavior) is dependent on the others. This analysis will test:

Does alcohol stage of change affect physical activity stage of change? (and vice versa)
Does alcohol stage of change affect eating stage of change? (and vice versa)

Does physical activity stage of change affect diet stage of change? (and vice versa)

Knowledge on the interrelationships that may or may not exist is significant in the development of successful multiple health behavior interventions.

**Research Question 3: Does the change in stage of change from Time 1 to Time 2 for each health behavior in questions differ between males and females?**

To answer this question the variables are the change in stage of change from Time 1 to Time 2 for each health behavior. New variables will be created using the difference between Time 2 and Time 1 for each health behavior in both males and females. For example, with alcohol consumption, the formula Alcohol Stage of Change \(_{time\ 2} – \) Alcohol Stage of Change \(_{time\ 1}\) = Alcohol Stage of Change \(_{change}\) will be used for both males and females creating a new change variable. The program SPSS will be used to run a Chi-square analysis comparing these two change variables across gender for each health behavior in question. The magnitude of stage of change for both genders will be examined to see if the direction of change is stable across all behaviors and both genders.
References


behaviors through the transition out of high school. *American Journal of Preventive Medicine, 17*(1), 1-7.


Federation of American Societies for Experimental Biology, 23(Meeting Abstract Supplement), 735.8.


Chapter Two  
A Time to Increase Knowledge and Attenuate Health? A Study into College’s Influence on  
Students’ Physical Activity, Diet, and Alcohol Consumption

**Introduction**

The college transition is a significant time period in a student’s life, and during this time health behaviors often change due to decreased parental influence (Hogan & Aston, 1986), social influence, changes in physical environment, changes in social norms, varying academic standards, and associated stressors (Gruber, 2008; Nelson, Kocos, Lytle, & Perry, 2009; Quintiliani, Allen, Marino, Kelly-Weeder, & Li, 2010; Von Ah, Ebert, Ngamvitrtjoj, Park, & Kang, 2004). Many health behavior habits for one’s adult life are established during the college experience and are pertinent in leading a healthy lifestyle (Von Ah et al., 2004). These health behavior changes are not always for the better including weight gain, with over 35% of students being overweight (ACHA, 2010), low fruit/vegetable and high-fat food diets (Douglas et al., 1997), low physical activity levels (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008), and an increase in alcohol consumption (Kasparek, Corwin, Valois, Sargent, & Morris, 2008). Males show greater rates of health risk behaviors than females including more alcohol consumption (Cullen et al., 1999; Johnson, Nichols, Sallis, Calfras, & Hovell, 1998; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Spencer, 2002), more weight gain (Economos, Hildebrandt, & Hyatt, 2008; Racette et al., 2008), less fruit and vegetable intake (Economos et al., 2008), and more fast food intake (Driskell & Morse, 2009). Each of these poor college student health behaviors can lead to more serious health issues such as heart disease (Spencer, 2002), obesity, or addiction problems later in life for these young adults (Douglas et al., 1997). The greatest rates of mortality and morbidity in the United States are due to cancer and heart disease, which are most often as a result of multiple risky health behaviors such as alcohol abuse, lack of physical activity, and inadequate diets (Prochaska, Spring, & Nigg, 2008).

Multiple health behavior change research is a field focusing on studying numerous health behaviors and interrelationships amongst them and may lead to more successful health behavior interventions. Co-occurrences in health behaviors have been portrayed in both male and female college students, with 65% of female college students having more than 2 unhealthy behaviors (Quintiliani et al., 2010). Past research shows that one risky behavior may be directly linked to another behavior with underlying mental processes, attitudes, or issues potentially producing
both behaviors (Nigg, Lee, Hubbard, & Min-Sun, 2009; Prochaska, Nigg, Spring, Velicer, & Prochaska, 2010). Further understanding these relationships in college students’ readiness to change their alcohol consumption, physical activity, fruit and vegetable consumption, and high fat food avoidance may help produce more successful interventions in the future.

**Transtheoretical Model (TTM)**

The four behaviors in question were examined using the Transtheoretical Model framework. The Transtheoretical Model (TTM) was developed from components of numerous leading theories in behavior change and is a framework for the health behavior change process (Prochaska & Velicer, 1997). The TTM involves a progression through five stages of change (precontemplation, contemplation, preparation, action, and maintenance) in order to reach the ultimate goal of behavior or lifestyle change and can be used for both the acquisition and cessation of behaviors (Prochaska, DiClemente, & Norcross, 1992). There are multiple constructs in the model including processes of change, decisional balance between the pros and cons of the targeted behavior, and self-efficacy (Prochaska & DiClemente, 1984; Prochaska & Velicer, 1997).

The central construct of the model is the stages of change (Glanz, Rimer, & Viswanath, 2008), which allow researchers and practitioners to gauge where someone is in the change process. The first stage is *Precontemplation*. Individuals in PC are not thinking about changing their behavior within the next six months in addition to often avoiding thinking about their high risk or unhealthy behavior(s) (Prochaska & Velicer, 1997). The next stage is *Contemplation* (C) in which individuals plan on changing within the next six months (Prochaska & Velicer, 1997). At this time, serious thought has been put into modifying or ceasing a behavior but no action has been made (Prochaska et al., 1992). *Preparation* (PR) involves the intention of changing a behavior within the foreseeable future, usually within the next month (Prochaska & Velicer, 1997). Generally, methods for the change have already mentally been developed by the individual (Prochaska & Velicer, 1997), and the individual may previously have taken small steps to ready him- or herself for change (Prochaska et al., 1992). This stage is ultimately when the decision to change is made; individuals either move forward to action, or stay where they are (Prochaska et al., 1992). The *Action* (A) stage is when behaviors, environments, or variables in one’s life are overtly modified in order to support behavior change (Prochaska & Velicer, 1997; Prochaska et al., 1992). These changes must have occurred within the past six months to be
classified in the action stage (Prochaska et al., 1992). Following action is *Maintenance* (M). This stage involves sustaining the changes incorporated in the action stage. Preventing relapse is the objective of this period and as time goes on confidence of success increases (Prochaska & Velicer, 1997). During the process of behavior change, one may progress and regress through these stages in a spiral like pattern until M is reached (Prochaska et al., 1992).

The TTM has been applied to over forty-eight health related behaviors (Hall & Rossi, 2008) and is effective in generalizing across a multitude of target populations (Prochaska et al., 1994). Specifically in the college student population, the TTM has shown to be valid with alcohol consumption (e.g., Harris, Walters, & Leahy, 2008; Kaysen, Lee, LaBrie, & Tollison, 2009; Shealy, Murphy, Borsari, & Correia, 2007; Vik, Culbertson, & Sellers, 2000), physical activity (e.g., Cardinal, Tuominen, & Rintala, 2004; Cardinal, Keis, & Ferrand, 2006; Cardinal et al., 2009; Clement, Schmidt, Berriaix, Covington, & Can, 2004; Daley & Duda, 2006; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Wadsworth & Hallam, 2007; Zizzi, Keeler, & Watson, 2006), and dietary patterns (e.g., Chung, Hoerr, Levine, & Coleman, 2006; Clement et al., 2004; Cummins, Johnson, Paiva, Dyment, & Mauriello, 2006; de Oliveira, Anderson, Auld, & Kendall, 2005; Finchenor & Byrd-Bredbenner, 2000; Franko et al., 2008; Horacek, 2002; Lamb & Joshi, 1996; Racette et al., 2005; Richards, Kattlemann, & Ren, 2006; Soweid, Kak, Major, Karam, & Rouhana, 2003). TTM tailored multiple health behavior change intervention also have been proven to be more effective than individual behavior interventions, especially in relation to diet and exercise (Johnson et al., 2008). Even so, students’ readiness to change, however, has not yet been examined in relation to alcohol consumption, physical activity, and dietary behaviors together in college students. The current study examined the stages of change in college students' health behaviors at two time points across the first semester of college.

**Multiple Health Behavior Change Research in College Students**

Previously, cluster analysis on college student health behaviors shows that certain health behaviors coincide with others (Laska, Pasch, Lust, Story, & Ehlinger, 2009). For example, Musselman and Rutledge (2010) report a positive association between alcohol consumption and physical activity in college students. However, other researchers view exercise as an alternative substance free activity that can replace and/or help reduce alcohol consumption in college students (Correia, Benson, & Carey, 2005; Murphy, Pagano, & Marlatt, 1986; Weinstock, 2010). Additionally, students consuming low-fat diets also consume more alcohol than students not on a
low-fat diet (Hampl & Betts, 1995), and physical activity patterns have also been linked to college student dietary habits (Clement et al., 2004; Chung & Hoerr, 2005; Lake, Townsend, Alvanides, Stamps, & Adamson, 2009). Gaining a clear understanding of the relationships between these three health behaviors and how college affects students’ readiness to change each behavior is pertinent in developing successful interventions for this age group.

Summary and Research Questions

This study examined if the first semester of college had an effect on freshmen students' health behaviors. Changes in readiness to change alcohol consumption, physical activity, and diet were examined, in addition to the interrelationships and general patterns amongst these behaviors. Differences in behavior patterns by gender also was examined to see if health behavior interventions for college students should be specifically tailored to gender.

Methods

Participants

Data was collected from 321 first year undergraduate students enrolled in an introductory psychology course at a mid-sized Midwestern university campus. Over 78% of the sample \( (n = 256) \) completed the questionnaire at both Time 1 and Time 2. Of the initial sample, 227 participants (70.70%) were female and 94 (29.30%) were male. The participants had an average age of 18.06 \( (SD = .44) \). The average height of participants was 66.83 inches \( (SD = 3.71) \) and weight of 141.76 \( (SD = 28.59) \). This was a fairly uniformed ethnic sample consisting of Caucasian (91.00%), Asian/Asian American (5.30%), Hispanic/Latino (2.80%), Black/African American (1.20%), American Indian/Alaska Native (0.90%), and Other (0.90%).

Procedures

Prior to collecting data, the primary investigator received approval from the institutional review board. Data collection was part of a larger longitudinal study, and during their first semester of college, students completed a survey inquiring about more than 20 health behaviors at two time points fifteen weeks apart. Surveys were administered in a large lecture hall on campus both during the first day of fall semester (Time 1) and during the week before finals the same semester (Time 2). At both time points students were read an explanation of the study and completed an informed consent form, prior to completing the questionnaire. Seven versions of the survey were available to help counterbalance any progressive error. Participants took
between 30-60 minutes to complete the questionnaire. After completing the questionnaire participants were verbally debriefed for any further questions.

Measures

The questionnaire included basic demographic questions (i.e., gender, race, and age) to gain an understanding of the sample population. Questions assessing frequency of alcohol and fruit and vegetable consumption behavior patterns were also asked, in addition to specific stage of change questions for binge drinking, intention to exercise, fruit and vegetable consumption, and high fat food avoidance at both time points.

Alcohol stage of change (Laforge, Maddock, & Rossi, 1998). To measure the students' binge drinking stage of change the question, “In the last month, have you had 5 or more (for males) or 4 or more (for females) drinks in a row” was used. It had six one-sentence answer options that placed students in categories from precontemplation to non-bingers. For instance the answer corresponding to Precontemplation was, "Yes, and I do not intend to stop drinking 5 or more (4 or more) drinks in a row." A drink was defined for the participants as “one bottle of beer, one ounce of liquor, or a four-ounce glass of wine.”

Exercise stage of change (Marcus, Selby, Niaura, & Rossi, 1992). In order to measure physical activity stages of change, regular exercise was first defined as “any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 or more times per week for 20 or more minutes per session at a level that increases your breathing rate and causes you to break a sweat.” This definition was consistent with the American College of Sports Medicine (ACSM) and the American Heart Association’s (AHA) description of vigorous physical activity (Haskell et al., 2007) at the time of data collection. The participants were asked “Do you regular exercise according to the definition above” and 5 answer options were presented representing the five stages of change. For example, the answer corresponding to Contemplation was, "No, but I intend to in the next 6 months."

Fruit and vegetable stage of change (Laforge, Greene, & Prochaska, 1994). Fruit/vegetable stages of change was measured with the two questions (1) Have you been eating 5 or more servings of fruits and vegetables a day for more than 6 months and (2) Do you intend to start eating 5 or more servings of fruits and vegetables a day in the next 6 months, with answers corresponding to the stages of change.
High fat food avoidance stage of change (Greene & Rossi, 1998). Readiness to change high fat food avoidance was assessed with the question “Do you consistently avoid eating high fat foods?” and five one-sentence answer options parallel to the TTM stages of change. For example, the answer correlating with Precontemplation was, "No, and I do not intend to in the next 6 months."

Results

Descriptives of alcohol and fruit and vegetable consumption patterns. Initial frequencies were run at both time 1 and time 2 on alcohol and fruit and vegetable consumption in the freshmen college students. At time 1 on the first day of classes, freshmen year, 87.9% of the sample had drunk an alcoholic beverage at some point in their life. In a typical week, students reported drinking on fewer, rather than more, days of the week (0-1 day = 56.3%, 2-3 days = 37.1%, and 4 or more days = 5.2%). On a typical drinking day, students consumed an average of 4.64 drinks (SD = 3.38). In addition, the students had an average of 7.56 drinks (SD = 5.60) on their highest drinking occasion in the last 30 days. The majority of the students (62.0%) reported they had drank until intoxicated in the past and plan to again. In addition, almost half of the students (49.5%) in the Precontemplation SOC for intention to stop drinking until intoxicated. Additionally, at time 1 the majority of participants had binge drank at least once in the past month (never = 39.9%, once = 10.6%, 2-3 times = 21.2%, 4-6 times = 15.3%, 7 or more times = 12.1%). With regards to fruit and vegetable consumption the majority of students (57.8%) consumed only 1-2 servings of fruits and vegetables per day.

At time 2 the week before first semester finals, 91.7% of the sample reported ever previously drinking an alcoholic beverage. Students often drank at least one alcoholic drink on multiple days in a typical week (0-1 day = 38.2%, 2-3 days = 50.8%, and 4 or more days = 9.4%). On a typical drinking day, students reported consuming an average of 3.96 drinks (SD = 2.92), and an average of 6.27 drinks (SD = 5.35) on their highest drinking occasion in the last 30 days. Almost three-fourths of the students (72.0%) reported they had drank until intoxicated in the past and plan to again, significantly more than at time 1. Additionally, the proportion of students in Precontemplation intentions to stop drinking until intoxicated increased to 63%. Similarly to time 1, at time 2 the majority of participants had binge drank at least once in the past month (never = 28.7%, once = 9.1%, 2-3 times = 18.5%, 4-6 times = 18.9%, 7 or more times = 24.0%). Lastly, the majority of students (56.3%) still only consumed 1-2 servings of fruits and
vegetables per day at time 2. Frequencies were run at both time 1 and time 2 for the stage distributions in each health behavior (see figures 1-4).

**Health behavior change using stage of change measures.** To assess the movement of the stages across time, chi-square tests were used for each individual health behavior at time 1 and time 2. From time 1 to time 2, participants showed significant changes in readiness to change their binge drinking, \( \chi^2 (25, n = 251) = 220.50, p < 0.001 \), exercise patterns, \( \chi^2 (16, n = 256) = 136.79, p < 0.001 \), and high-fat food avoidance, \( \chi^2 (16, n = 255) = 140.36, p < 0.001 \). However, for binge drinking, exercise, and high-fat avoidance, 60.5%, 57.1%, and 44.4% of students stayed in the same stage of change for both time 1 and time 2. For binge drinking, almost a third of students (29.6%) regressed and 10.0% progressed in their readiness to change from time 1 to time 2. With respect to intention to exercise, 27.1% regressed and 16.1% progressed in stage of change across the first semester of college. The least amount of students (20.9%) regressed, and the most progressed (35%) across the two time points in readiness to avoid high fat foods. No significant \((p > .05)\) changes were observed from time 1 to time 2 in students’ changes in readiness to change their fruit and vegetable consumption, yet there were differences in servings consumed per day. At time 2, 10.1% of students consumed five or more servings of fruits and vegetables per day compared to 3.0% at time 1. Moreover, over the first semester of college significantly more students had increased the number of fruit/vegetable servings consumed per day \((20.8\%)\), as opposed to decreased \((17.7\%)\), \( \chi^2 (16, n = 256) = 105.13, p < 0.001 \). These results are shown in Table 4.

**Health behavior change interrelationships.** To examine the interrelationships amongst binge-drinking, exercise, fruit and vegetable consumption, and high fat food avoidance stages of change, chi-square tests were used for behavior pairs at both time 1 and time 2. Stage of change for exercise and high fat food avoidance was the only behavior pair to present significant \((p = .006)\) relationships at both time 1, \( \chi^2 (16, n = 320) = 33.95, p = 0.006 \), and time 2, \( \chi^2 (16, n = 255) = 50.59, p < 0.001 \). At time 1, 27.3\% \((n = 87)\) of participants were in the same stage of change for both of the latter behaviors, 59.77\% of whom were in Maintenance. At time 2, this number increased to 34.80\% of participants being in the same stage of change for both intention to exercise and high fat food avoidance, yet the percentage of this in Maintenance for both behaviors dropped to 48.31\%. In addition at time 1, 16.3\% of students were in Precontemplation for limiting fat intake, yet at the opposite end of the spectrum in Maintenance for intention to
exercise. At time 2, however, 39.2% of students were in an action stage of change (Action or Maintenance) for both health behaviors.

At time 2, readiness to change binge drinking and high fat food avoidance also were significantly related, \( \chi^2(20, n = 253) = 45.35, p = 0.001 \). At this time, 16.2% of students were in the same stage of change for both behaviors, 92.68% of whom were in Precontemplation. Interestingly at time 2, 30% of students were also in an action stage of change (Action or Maintenance) for avoiding high fat foods, yet in Precontemplation for binge-drinking at the same time. Further results of the multiple health behavior relationships at time 1 are presented in Table 5.

To examine if the stage of change for all three health behaviors changed across time together, a correlation was performed using the changes in stage of change variables for each behavior (T2 SOC-T1 SOC). The only significant correlation was between intention to exercise and binge drinking stages of change, \( r(249) = -0.156, p = .013 \). That is, as one progresses in their readiness to change their alcohol consumption, they regress in their readiness to change their exercise patterns and vice versa (↑Alcohol SOC = ↓ Exercise SOC). The correlation table is presented in Table 6.

A chi-square examined all behaviors’ change variables together, yet this resulted in no significant findings. As a result, chi-squares were run between each pair of change variables for the multiple health behaviors; a total of six chi-squares. The only significant relationships were between the change in stage of change for binge-drinking and high fat avoidance together, \( \chi^2(80, n = 250) = 110.11, p = 0.01 \), and intention to exercise and fruit and vegetable consumption, \( \chi^2(28, n = 256) = 41.72, p < 0.05 \). Over a third of participants (34%) moved the same number of stages from time 1 to time 2 in binge drinking and high fat food avoidance, 90.59% of whom maintained their stage of change in both behaviors from time 1 to time 2. Additionally, 10% of students maintained their stage of change in binge drinking, yet they also progressed one stage in high-fat food avoidance from time 1 to time 2. From time 1 to time 2, 54.3% \( (n = 139) \) of students did not change in readiness to change both their exercise and fruit and vegetable intake. One-tenth of students did not change in readiness to change their fruit and vegetable consumption, yet regressed one stage in exercise. Similarly, 13.3% maintained their readiness to change their fruit and vegetable consumption, yet progressed one stage in intention to exercise.
The percentage of students moving the same number of stages for each health behavior from time 1 to time 2 are presented in Table 7.

**Gender comparison.** To explore the differences in change in stage of change from time 1 to time 2 between males and females, chi-squares were run between each behavior’s change variable and gender. Results from this analysis are shown in Table 8. The only significant difference between males and females was in their change in readiness to change high fat food avoidance, \( \chi^2(8, n = 255) = 28.95, p < 0.001 \). Females were more likely than males to progress in readiness to avoid high fat foods across the first semester of college, and a higher percentage of males (56.2%) than females (39.6%) maintained their stage of change from time 1 to time 2.

**Discussion**

Across the first semester of college, freshmen are less likely to be ready to change some behaviors (e.g., alcohol consumption and exercise) and more likely to progress to adopting some healthy behaviors (e.g., high fat food avoidance). This result is similar to past research on entrance into college’s impact on students' health behaviors (Douglas et al., 1997; Nelson et al., 2009; Patrick, Covin, Fulop, Calfas, & Lovato, 1997; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Spencer, 2002) and readiness to change these health patterns (Racette et al., 2005). In the current sample, the only behavior not showing significant changes in readiness to change across the semester was fruit and vegetable intake. However, the data shows most students were in Preparation to increase their fruit and vegetable intake at both time points.

Even when students increase their readiness to change over time, the students' health behaviors did not always improve to meet the recommended guidelines at the time. Given that the average age of participants was 18 years of age, legally, none of the students should have been drinking alcohol. The majority of students, however, had consumed alcohol at some point in their life, and they reported consuming alcohol during the study. Moreover, the current average number of drinks per drinking occasion surpassed four, whereas the United States Department of Agriculture's *Dietary Guidelines* define moderate drinking as up to one drink per day for females and two drinks per day for males (USDA, 2010). At the end of the first semester of college this number of drinks per drinking occasion did not significantly decrease, and significantly more student had regressed (29.6%) in their readiness to change their binge drinking patterns, than progressed (10%). At time 2, the majority of students were in PC, similar to findings from past research (Harris, Walters, & Leahy, 2008; Vik, Culbertson, & Sellers,
heavy episodic drinking and alcohol abuse is often associated with many negative consequences including problems with the law, lower academic performance, social relationship strains, unplanned sexual activity, injury, and secondary effects on those surrounding the problem drinkers (Wechsler et al., 1994). The regression seen in readiness to change binge drinking patterns in this study suggests that current alcohol consumption intervention programs in place at the university may not be as effective as previously thought. Moreover, these findings support the hypothesis that changes in students readiness to change their alcohol consumption patterns does change over the course of the first semester of college.

The majority of students at both time points did not meet the recommended intake of five servings of fruit and vegetables per day, putting them at risk for various vitamin and mineral deficiencies, chronic diseases, and more difficult weight maintenance (USDA, 2010). Nutrient deficiencies may also lead to greater health problems later in life and have been shown to affect academic performance (Ross, 2010). In addition to low fruit and vegetable intake, at time 1 and time 2, only 44.2% and 52% of students avoided intake of high fat foods. Throughout their first semester, however, more students had progressed to the action and maintenance stages of change and less were in the precontemplation for fat avoidance. If unmonitored, constant high fat food intake can lead to weight gain (Levitsky, Halbmaier, & Mrdjenovic, 2004; Pliner & Saunders, 2008; Racette et al., 2008) chronic health issues, and lower overall health status (Clement et al., 2004). In contrast to past research (Racette et al., 2005) significant changes in stage of change for fruit and vegetable consumption across the first semester of college were not demonstrated. An overwhelming 94.1% of students were in Preparation and less than 1% were in Maintenance at both time points. Racette et al. (2005) showed the majority of students (55%) were in Precontemplation at both the beginning of freshmen year and the end of sophomore year. However, the current results may differ due to university specific culture and/or the time points of data collection.

On a more positive note, at both the beginning and end of their first semester of college about two-thirds of students reported the recommended level (were in the Action or Maintenance stage of change) of 20 minutes of physical activity most days of the week. In the current study at both time points, a higher percentage of students were in both Action and/or Maintenance, than other studies examining stages of change in exercise in college students (Daley & Duda, 2006; Wadsworth & Hallam, 2007; Zizzi, Keeler, & Watson, 2006). Even so, as supported by past
research (Racette et al., 2005), more students regressed than progressed in readiness to change during this time suggesting that the college environment does negatively affect students' physical activity patterns. Efforts should be made to research variables leading to these changes in behavior, and implement programs to mitigate this regression.

A limited number of significant relationships were found between the studied health behaviors in these freshmen college students at both time points of data collection. Readiness to increase physical activity and avoid high fat foods were found to be interrelated at both time points, leading to the conclusion that interventions aimed at one behavior may have an potentially inadvertent positive effect on the other behavior. Past research with college students supports this finding showing that whom eat healthier have been found to participate in more vigorous activity, and those strength training ate fewer fatty foods (Johnson et al., 1998). Clement et al. (2004) also found a relationship between these two variables, with a negative correlation between high calorie/high fat food intake and physical activity stage of change score. Lastly, Lake et al. (2009) also show that students with greater levels of sedentary activity, report a greater percentage of energy from fat and total energy intake.

Similar to this previous relationship, at time 2 only, binge drinking and high fat food avoidance stages of change were significantly interrelated suggesting that one behavior may affect the other and multiple health behavior change interventions can be an efficient method of health promotion for this population. Past research (Nelson et al., 2009) supports this finding stating that alcohol-related eating drastically affects students' diets and often leads to greater consumption of take-out and higher fat foods.

Change in stage of change in the multiple behaviors, also produced significant results. A negative correlation was found between change in binge drinking and exercise stage of change, meaning that as one regressed in readiness to change one behavior, they progressed in the other. Both Laska et al. (2009) and Nigg et al. (2009) presented similar results stating that students whom drank alcohol had greater rates of physical activity. This finding may suggest compensation effects and a more complicated relationship between these two behaviors, as supported by past research in college student health behavior relationships (Laska, Pasch, Lust, Story, & Ehlinger, 2009; Nigg et al., 2009). Future research is warranted to further explore this relationship.
In addition to this correlation, there were significant relationships between change in stage of change of binge drinking and high fat food avoidance, as well as change in stage of change of intention to exercise and consume fruits and vegetables. These findings are supported by past research by both Johnson et al. (1998), whom showed relationship between students exercise patterns and healthier eating, and Nigg et al. (2009) whom demonstrated an association between alcohol consumption and eating unhealthy, calorie dense foods. In contrast, and not supported by current findings, Clement et al. (2204) demonstrated a negative correlation between high calorie/high fat food intake and physical activity stage of change score.

Contrary to gender difference expectations and previous gender difference findings (Cardinal et al., 2009; Horacek, 2002; Suminski & Petosa, 2002), high fat food avoidance portrayed the only significant difference in change in stage of change between male and females. Lamb and Joshi (1996) had similar findings showing that females are more likely than males to be in the later stages of change for dietary fat consumption. Given this, TTM based health promotion programs aimed at college student binge drinking, physical activity, and fruit and vegetable consumption may need not be gender specific, allowing for more efficient (both financially and timely) interventions.

Although some changes were seen in health behavior stage of change, the vast majority of students remained stable in readiness to change their health behaviors from time 1 to time 2. Additionally, with regards to the multiple health behavior relationships fewer significant interrelationships were found in contrast to past research. Upon running the stage of change analysis for all behaviors together across the first semester in college, no significant relationships were found. This lack of significance, potentially provides disconfirming evidence for the hypothesis that a multiple health behavior change cluster exists between these behaviors stage of change in this sample population. This is the first study of its kind examining the four health behaviors in question using Stages of Change, which may be a reason for the lack of behavior interrelationships. The conclusion may be that there are indeed interrelationships in the behavioral patterns, but not in readiness to change these patterns. Moreover, the current results may be specific to the university studied, and results may be different at a larger or more urban or more diverse university.
Limitations

Although this study has numerous interesting findings, there were limitations to it. First, two data points throughout students first semester of college were used to collect data. Although both the beginning and end of the semester behavior patterns were collected, both time points were key points during the semester (the first day of classes and before finals week). During these times, students do not have as standard and predictable schedules and priorities, as they may throughout the middle of the semester, which may result in altered behavior. Past research (Del Boca, Darkes, Greenbaum, & Goldman, 2004; Lee, Maggs, & Rankin, 2006) shows that alcohol consumption in college students is moderated around finals, which means the current study's time 2 data may not show quite the extent of true behavior changes. Moreover, collecting data on a Monday versus a day later in the week may alter data, as past research (Del Boca et al., 2004) shows students drink heavier Thursday, Friday, and Saturday.

Additionally, the beginning of the semester and end of semester can potentially have very different weather patterns (August vs. December) which may skew the results. Past research shows that weather is indeed a determinant of exercise and physical activity patterns (Dishman, Sallis, & Oreinstein, 1985), and weather may also affect the other health behavior patterns studied in these students. Collecting at more time points would produce a clearer and more accurate depiction of the health behavior changes that occur throughout the first semester of college.

Another limitation was the method of data collection. Although there are a plethora of students from various majors in introductory psychology, this may have not been a truly representative sample of the freshmen student population. This method, however, did aid in participant follow through at time two, because of the structured classroom setting the questionnaire was administered in. Perhaps future research could sample from introductory courses in a variety of disciplines in order to more closely resemble the class demographics.

Implications and Future Research

The majority of students in the current study did not meet national recommendations for alcohol intake, fruit and vegetable consumption, and physical activity at both times of data collection. This suggests that universities should consider placing more emphasis on personal health and wellness, in addition to the standard curriculum of a college student. Although gender specific programs may not be necessary for all behaviors, programs aimed at limiting high fat
foods may be more successful if specifically targeting males or females, since past research shows genders respond differently to nutrition interventions (Wong, Gucciardi, Ri, & Grace, 2005). To further explore the efficacy of gender specific programs, future researcher should compare gender neutral to gender specific TTM based health behavior interventions in college students.

In addition, in relation to multiple health behavior change in stage of change, future research should perform random data collection and collect at more time points throughout freshmen year. As supported by previous research, employing the TTM to create MHBC interventions framed on the TTM may be valuable in creating successful programs without overwhelming participants (Driskell et al., 2008) and creating synergistic health behavior change (Johnson et al., 2008). Therefore truly understanding students' readiness to change throughout the whole of their first year of college may aid universities in improving the shown health behavior patterns, as well as creating more efficient interventions aimed at health patterns showing the most regression.

This study emphasizes the regression in health behaviors students experience their first semester of college. Alcohol consumption increases, fruit and vegetable intake decreases, and student regress in their readiness to participate in physical activity. Significant relationships exist between readiness to change high fat food avoidance and physical activity in these students in addition to binge drinking and high fat food avoidance. Both relationships may be valuable information for future college health program planning. Gender differences also came into play with relation to change in stage of change for high fat food avoidance. These findings all emphasize the complicated nature of the college environment and the health behavior patterns resulting from it, and future qualitative research may be necessary in fully understanding these health behavior changes and patterns. In the meantime, university health professionals and government agencies should employ this information to aid in creating successful health programs for college freshmen students.
References

American College Health Association National College Health Assessment Spring 2010
vegetable consumption among college students. Oral session presented at the annual meeting of the American Public Health Association, Boston, MA.


Bibliography


behaviors through the transition out of high school. *American Journal of Preventive Medicine, 17*(1), 1-7.


Table 1
The Processes of Change

<table>
<thead>
<tr>
<th>Name</th>
<th>Definition</th>
<th>Examples (for someone attempting to reduce alcohol consumption)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness raising</td>
<td>Increased knowledge and understanding about the causes, consequences, and treatment for a behavior</td>
<td>Educating college students on the negative effects of binge drinking and steps that can be taken to minimize the behavior.</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>Expressing feelings about the target behavior and possible solutions</td>
<td>Talking with friends/family about your feelings (anxiety, anger, depression, etc.) regarding your binge drinking behaviors.</td>
</tr>
<tr>
<td>Self-reevaluation</td>
<td>Recognizing consequences and self-image with and without the behavior</td>
<td>Reflect upon how you view yourself when you are drinking. Is this different from the sober you? Why/why not?</td>
</tr>
<tr>
<td>Environmental reevaluation</td>
<td>Realization of the effect one’s behavior has on their social environment and others around them</td>
<td>Reflect upon how your drinking may affect the social situations you put yourself in, your friends and/or those close to you.</td>
</tr>
<tr>
<td>Social liberation</td>
<td>Changing the social environment, policies, or social norms to help one move towards the target behavior</td>
<td>Look at the social environment (friends, living situation, work, recreational environment, etc.) you place yourself in on a day to day basis. Does this allow for more drinking? Does it increase your drinking?</td>
</tr>
<tr>
<td>Self liberation</td>
<td>Belief that one can change and committing to that change</td>
<td>Make a verbal/written statement to yourself that you can and will reduce your drinking. Believe that this is a possible and attainable goal.</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>Controlling environmental cues that would have previously lead to the target behavior</td>
<td>Not attending parties where there will be excessive drinking in order to minimize the temptation to participate.</td>
</tr>
<tr>
<td><strong>Contingency management</strong></td>
<td>Use of punishment and reinforcement to promote the desired behavior and inhibit the target behavior; reinforcement and punishments can be administered by self or others</td>
<td>Rewarding oneself for not binge drinking on the weekends. Maybe putting aside the money one would have spent on alcohol and saving up for some greater reward in the future (long-term) or using that money to reward oneself instantly (short-term).</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Helping relationships</strong></td>
<td>Use of social support during the change process</td>
<td>Communicating with friends what your goals are and asking for them to support you and help monitor your behavior.</td>
</tr>
<tr>
<td><strong>Counterconditioning</strong></td>
<td>Learning to substitute alternative behaviors for undesired behavior</td>
<td>Substituting soda or sparkling water instead of alcohol when at a party.</td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>Gender</td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>Brevard &amp; Ricketts</td>
<td>1996</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Lowry et al.</td>
<td>2000</td>
<td>M &amp; F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suminski &amp; Petosa</td>
<td>2002</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Huang et al.</td>
<td>2003</td>
<td>M &amp; F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clement et al.</td>
<td>2004</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kilpatrick et al.</td>
<td>2005</td>
<td>M &amp; F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racette et al.</td>
<td>2005</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Study</td>
<td>Year</td>
<td>Gender</td>
</tr>
<tr>
<td>---------------------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>Racette et al.</td>
<td>2008</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Laska et al.</td>
<td>2009</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Greene et al.</td>
<td>2011</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>Gender</td>
</tr>
<tr>
<td>-----------------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>Lowry et al.</td>
<td>2000</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Huang et al.</td>
<td>2003</td>
<td>M &amp; F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clement et al.</td>
<td>2004</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Racette et al.</td>
<td>2005</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Racette et al.</td>
<td>2008</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Keller et al.</td>
<td>2008</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>Laska et al.</td>
<td>2009</td>
<td>M &amp; F</td>
</tr>
<tr>
<td>ACHA-NCHA</td>
<td>2010</td>
<td>M &amp; F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erinosho et al.</td>
<td>2011</td>
<td>M &amp; F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greene et al.</td>
<td>2011</td>
<td>M &amp; F</td>
</tr>
</tbody>
</table>
Table 4
*Single behavior stage of change movement from time 1 to time 2*

<table>
<thead>
<tr>
<th></th>
<th>Binge Drinking (%)</th>
<th>Exercise (%)</th>
<th>Fat (%)</th>
<th>Fruit/Vegetable (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$p &lt; 0.001$</td>
<td>$p &lt; 0.001$</td>
<td>$p &lt; 0.001$</td>
<td>$p &gt; .05$</td>
</tr>
<tr>
<td>Stable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>39.80</td>
<td>0.40</td>
<td>18.40</td>
<td>---</td>
</tr>
<tr>
<td>C</td>
<td>0.80</td>
<td>4.30</td>
<td>2.40</td>
<td>0.00</td>
</tr>
<tr>
<td>PR</td>
<td>1.60</td>
<td>5.90</td>
<td>1.20</td>
<td>94.10</td>
</tr>
<tr>
<td>A</td>
<td>1.20</td>
<td>7.80</td>
<td>6.30</td>
<td>---</td>
</tr>
<tr>
<td>M</td>
<td>0.00</td>
<td>38.70</td>
<td>16.10</td>
<td>0.00</td>
</tr>
<tr>
<td>NB (Non-bingers)</td>
<td>17.10</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Total Stable (%)</td>
<td>60.50</td>
<td>57.10</td>
<td>44.40</td>
<td>94.10</td>
</tr>
<tr>
<td>Progressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC→C</td>
<td>2.00</td>
<td>0.80</td>
<td>5.10</td>
<td>---</td>
</tr>
<tr>
<td>PC→PR</td>
<td>0.40</td>
<td>0.00</td>
<td>2.00</td>
<td>---</td>
</tr>
<tr>
<td>PC→A</td>
<td>0.40</td>
<td>0.00</td>
<td>3.50</td>
<td>---</td>
</tr>
<tr>
<td>PC→M</td>
<td>0.00</td>
<td>0.00</td>
<td>2.40</td>
<td>---</td>
</tr>
<tr>
<td>PC→NB</td>
<td>0.40</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>C→PR</td>
<td>0.80</td>
<td>2.00</td>
<td>3.90</td>
<td>2.70</td>
</tr>
<tr>
<td>C→A</td>
<td>0.40</td>
<td>0.80</td>
<td>4.30</td>
<td>---</td>
</tr>
<tr>
<td>C→M</td>
<td>0.80</td>
<td>0.80</td>
<td>2.00</td>
<td>0.00</td>
</tr>
<tr>
<td>C→NB</td>
<td>0.40</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>PR→A</td>
<td>2.00</td>
<td>5.90</td>
<td>5.10</td>
<td>---</td>
</tr>
<tr>
<td>PR→M</td>
<td>0.00</td>
<td>2.30</td>
<td>1.20</td>
<td>0.80</td>
</tr>
<tr>
<td>PR→NB</td>
<td>0.40</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>A→M</td>
<td>0.00</td>
<td>3.50</td>
<td>5.50</td>
<td>---</td>
</tr>
<tr>
<td>A→NB</td>
<td>0.40</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>M→NB</td>
<td>1.60</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Total Progressed (%)</td>
<td>10.00</td>
<td>16.10</td>
<td>35.00</td>
<td>3.50</td>
</tr>
<tr>
<td>Regressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C→PC</td>
<td>6.80</td>
<td>1.20</td>
<td>2.40</td>
<td>---</td>
</tr>
<tr>
<td>PR→C</td>
<td>0.80</td>
<td>4.70</td>
<td>2.70</td>
<td>2.00</td>
</tr>
<tr>
<td>PR→PC</td>
<td>2.80</td>
<td>2.00</td>
<td>1.20</td>
<td>---</td>
</tr>
</tbody>
</table>

105
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A→PR</td>
<td>0.80</td>
<td>2.70</td>
<td>2.70</td>
<td>---</td>
</tr>
<tr>
<td>A→C</td>
<td>2.80</td>
<td>1.60</td>
<td>0.40</td>
<td>---</td>
</tr>
<tr>
<td>A→PC</td>
<td>3.60</td>
<td>0.80</td>
<td>1.60</td>
<td>---</td>
</tr>
<tr>
<td>M→A</td>
<td>0.80</td>
<td>5.10</td>
<td>5.50</td>
<td>---</td>
</tr>
<tr>
<td>M→PR</td>
<td>0.80</td>
<td>5.90</td>
<td>2.00</td>
<td>0.40</td>
</tr>
<tr>
<td>M→C</td>
<td>1.20</td>
<td>2.30</td>
<td>1.20</td>
<td>0.00</td>
</tr>
<tr>
<td>M→PC</td>
<td>1.20</td>
<td>0.80</td>
<td>1.20</td>
<td>---</td>
</tr>
<tr>
<td>NB→M</td>
<td>1.20</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NB→A</td>
<td>2.40</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NB→PR</td>
<td>0.40</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NB→C</td>
<td>1.20</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NB→PC</td>
<td>2.80</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Total Regressed</strong></td>
<td><strong>Total Regressed</strong></td>
<td><strong>Total Regressed</strong></td>
<td><strong>Total Regressed</strong></td>
<td><strong>Total Regressed</strong></td>
</tr>
<tr>
<td>(%)</td>
<td>29.60</td>
<td>27.10</td>
<td>20.90</td>
<td>2.40</td>
</tr>
</tbody>
</table>
Table 5
*Multiple health behavior relationships at time 1.*

### Binge Drinking

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>PC</th>
<th>C</th>
<th>PR</th>
<th>A</th>
<th>M</th>
<th>NB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise (p &gt; .05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>0.60</td>
<td>0.60</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.60</td>
</tr>
<tr>
<td>C</td>
<td>3.80</td>
<td>1.30</td>
<td>0.30</td>
<td>1.30</td>
<td>0.00</td>
<td>3.80</td>
</tr>
<tr>
<td>PR</td>
<td>7.60</td>
<td>1.30</td>
<td>1.90</td>
<td>1.30</td>
<td>1.30</td>
<td>6.00</td>
</tr>
<tr>
<td>A</td>
<td>6.30</td>
<td>1.90</td>
<td>0.90</td>
<td>0.30</td>
<td>1.30</td>
<td>6.30</td>
</tr>
<tr>
<td>M</td>
<td>21.80</td>
<td>5.70</td>
<td>3.80</td>
<td>6.00</td>
<td>2.80</td>
<td>10.40</td>
</tr>
<tr>
<td>Fruit-Vegetable (p &gt; .05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>11.40</td>
<td>2.20</td>
<td>2.20</td>
<td>2.50</td>
<td>1.60</td>
<td>11.40</td>
</tr>
<tr>
<td>C</td>
<td>7.60</td>
<td>1.30</td>
<td>0.00</td>
<td>0.60</td>
<td>0.60</td>
<td>4.40</td>
</tr>
<tr>
<td>PR</td>
<td>3.20</td>
<td>0.90</td>
<td>0.90</td>
<td>1.60</td>
<td>0.60</td>
<td>2.50</td>
</tr>
<tr>
<td>A</td>
<td>6.90</td>
<td>2.80</td>
<td>2.20</td>
<td>0.90</td>
<td>0.90</td>
<td>3.50</td>
</tr>
<tr>
<td>M</td>
<td>11.00</td>
<td>3.50</td>
<td>1.60</td>
<td>3.20</td>
<td>1.60</td>
<td>6.30</td>
</tr>
</tbody>
</table>

### Exercise

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>PC</th>
<th>C</th>
<th>PR</th>
<th>A</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit-Vegetable (p &gt; .05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.00</td>
<td>0.90</td>
<td>0.30</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>PR</td>
<td>2.80</td>
<td>9.30</td>
<td>19.30</td>
<td>16.50</td>
<td>49.20</td>
</tr>
<tr>
<td>M</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.30</td>
</tr>
<tr>
<td>High Fat Avoidance (p = .006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>2.20</td>
<td>4.10</td>
<td>6.90</td>
<td>2.20</td>
<td>16.30</td>
</tr>
<tr>
<td>C</td>
<td>0.30</td>
<td>1.30</td>
<td>2.50</td>
<td>4.40</td>
<td>5.90</td>
</tr>
<tr>
<td>PR</td>
<td>0.00</td>
<td>0.60</td>
<td>3.10</td>
<td>1.60</td>
<td>4.40</td>
</tr>
<tr>
<td>A</td>
<td>0.00</td>
<td>1.60</td>
<td>4.10</td>
<td>4.40</td>
<td>7.50</td>
</tr>
<tr>
<td>M</td>
<td>0.30</td>
<td>2.80</td>
<td>2.80</td>
<td>4.70</td>
<td>16.30</td>
</tr>
</tbody>
</table>

### Fruit-Vegetable

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>C</th>
<th>PR</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Fat Avoidance (p &gt; .05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>0.30</td>
<td>30.90</td>
<td>0.30</td>
</tr>
<tr>
<td>C</td>
<td>0.00</td>
<td>14.40</td>
<td>0.00</td>
</tr>
<tr>
<td>PR</td>
<td>0.00</td>
<td>9.70</td>
<td>0.00</td>
</tr>
<tr>
<td>A</td>
<td>1.30</td>
<td>16.30</td>
<td>0.00</td>
</tr>
<tr>
<td>M</td>
<td>0.90</td>
<td>25.90</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Table 6
Correlation table for health behavior change in stage of change variables

<table>
<thead>
<tr>
<th></th>
<th>T2-T1 exercise SOC</th>
<th>T2-T1 Fat SOC</th>
<th>T2-T1 Fruit and Veggie SOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2-T1 exercise SOC</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2-T1 Fat SOC</td>
<td>-.01</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>T2-T1 Fruit and Veggie SOC</td>
<td>-.06</td>
<td>-.03</td>
<td>--</td>
</tr>
<tr>
<td>T2-T1 Alcohol SOC</td>
<td>-.16*</td>
<td>-.02</td>
<td>-.05</td>
</tr>
</tbody>
</table>

Note: *Correlation is significant at the 0.05 level (2-tailed).
Table 7
Percent of students moving the same number of stages of change from time 1 to time 2

<table>
<thead>
<tr>
<th>Change in SOC (T2-T1)</th>
<th>Binge-Exercise (p &gt;0.05) n = 251</th>
<th>Binge-Fruit/Veg. (p &gt;0.05) n = 251</th>
<th>Binge-Fat Avoidance (p = 0.014) n = 250</th>
<th>Exercise-Fruit/Veg. (p = 0.046) n = 256</th>
<th>Exercise-Fat Avoidance (p &gt;0.05) n = 255</th>
<th>Fruit/Veg.-Fat Avoidance (p &gt;0.05) n = 255</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>---</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>-3</td>
<td>0.00</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
</tr>
<tr>
<td>-2</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>-1</td>
<td>1.20</td>
<td>0.80</td>
<td>1.20</td>
<td>0.00</td>
<td>2.70</td>
<td>0.40</td>
</tr>
<tr>
<td>0</td>
<td>35.10</td>
<td>57.00</td>
<td>30.80</td>
<td>54.30</td>
<td>26.70</td>
<td>40.40</td>
</tr>
<tr>
<td>1</td>
<td>1.20</td>
<td>0.00</td>
<td>1.60</td>
<td>0.00</td>
<td>3.50</td>
<td>0.40</td>
</tr>
<tr>
<td>2</td>
<td>0.00</td>
<td>0.00</td>
<td>0.40</td>
<td>0.00</td>
<td>0.40</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>0.00</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>0.00</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
<td>0.00</td>
<td>---</td>
</tr>
<tr>
<td>Total (%)</td>
<td>37.50</td>
<td>57.80</td>
<td>34.00</td>
<td>54.30</td>
<td>33.30</td>
<td>41.20</td>
</tr>
</tbody>
</table>
Table 8
Gender breakdown of change in stage of change from time 1 to time 2

<table>
<thead>
<tr>
<th>Change in SOC from Time 1 to Time 2 (T2-T1)</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>1.40</td>
<td>3.30</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>-4</td>
<td>1.40</td>
<td>2.80</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4.10</td>
<td>0</td>
</tr>
<tr>
<td>-3</td>
<td>4.30</td>
<td>5.50</td>
<td>0.00</td>
<td>1.10</td>
<td>---</td>
<td>---</td>
<td>6.80</td>
<td>1.1</td>
</tr>
<tr>
<td>-2</td>
<td>7.10</td>
<td>9.40</td>
<td>2.70</td>
<td>3.30</td>
<td>1.40</td>
<td>0.00</td>
<td>0.00</td>
<td>4.9</td>
</tr>
<tr>
<td>-1</td>
<td>5.70</td>
<td>12.20</td>
<td>9.60</td>
<td>13.10</td>
<td>1.40</td>
<td>2.20</td>
<td>11.00</td>
<td>14.3</td>
</tr>
<tr>
<td>0</td>
<td>71.40</td>
<td>56.40</td>
<td>61.60</td>
<td>55.20</td>
<td>91.80</td>
<td>95.10</td>
<td>56.20</td>
<td>39.6</td>
</tr>
<tr>
<td>1</td>
<td>5.70</td>
<td>6.60</td>
<td>13.70</td>
<td>13.70</td>
<td>4.10</td>
<td>2.20</td>
<td>12.30</td>
<td>22.5</td>
</tr>
<tr>
<td>2</td>
<td>1.40</td>
<td>1.10</td>
<td>6.80</td>
<td>10.40</td>
<td>1.40</td>
<td>0.50</td>
<td>1.40</td>
<td>9.9</td>
</tr>
<tr>
<td>3</td>
<td>1.40</td>
<td>1.70</td>
<td>2.70</td>
<td>3.30</td>
<td>---</td>
<td>---</td>
<td>5.50</td>
<td>5.5</td>
</tr>
<tr>
<td>4</td>
<td>0.00</td>
<td>0.60</td>
<td>2.70</td>
<td>0.00</td>
<td>---</td>
<td>---</td>
<td>2.70</td>
<td>2.2</td>
</tr>
<tr>
<td>5</td>
<td>0.00</td>
<td>0.60</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
Figure 1
*Stage distribution of students for binge drinking at time 1 and time 2*
Figure 2
Stage distribution of students for intention to exercise at time 1 and time 2
Figure 3
Stage distribution of students for high fat food avoidance at time 1 and time 2
Figure 4
Stage distribution of students for fruit and vegetable consumption at time 1 and time 2
Appendix A: Consent Form  
College Health Study II

Dear Participant:

You have been asked to take part in the research project described below. The researcher will explain the project to you in detail. If you have any questions, please feel free to call Dr. Rose Marie Ward, the person mainly responsible for the study.

The purpose of the study is to gather information from students about issues of health behavior change. Responses to these items will be completely anonymous. At no time will your name be tied to your responses. Only project personnel will have access to the survey responses.

1. **YOU MUST BE AT LEAST 18 YEARS OLD** to be in this research project.

2. If you decide to take part in this study, your participation will involve filling out a survey pertaining to attitudes towards different aspects of healthy living. The survey will ask you questions about your sleep, diet, exercise, smoking, drinking, teeth, and other health behaviors. The survey will take approximately 50 minutes to complete.

3. The possible risks or discomforts of the study are minimal, although you may feel some embarrassment answering some of the questions about private matters.

4. Although there are no direct benefits of the study, your answers will help increase the knowledge regarding the status of problems in psychology.

5. **Your part in the study is confidential.** That means your answers to all questions are private. No one else can find out what your answers are. Scientific reports will be based on group data and will not identify you or any individual as being in this project. You will be assigned a participant number for tracking purposes only.

6. **The decision to participate in this research is up to you.** You do not have to participate and you can refuse to answer any question.

7. Participation in this study is not expected to be harmful or injurious to you. However, if this study causes you any injury, you should write or call Dr. Rose Marie Ward at (513) 529-3751.

   If you have questions about the study, you can contact the investigator, Dr. Rose Marie Ward, 513-529-3751 or wardrm1@muohio.edu.

   If you have any questions or concerns about your rights as a subject, you may contact Miami University's Office for the Advancement of Research and Scholarship, (513) 529-3734 or humansubjects@muohio.edu.

You are at least 18 years old. You have read the consent form and your questions have been answered to your satisfaction. Your filling out the survey implies your consent to participate in this study.

If these questions are upsetting and you want to talk, please use the phone numbers below:

- Miami University Student Counseling Service 529-4634
- Psychology Clinic Benton Hall 529-2423
- Community Counseling and Crisis Center 523-4146

Thank you,

Rose Marie Ward, Ph.D.
Principal Investigator
Appendix B: Debrief Sheet at Time 1

Thank you for participating in our experiment. You have finished the first part of a two-part study. The second part of the study will be later in the semester. We will contact you to remind you of your commitment.

The study in which you have just participated was designed to examine attitudes and beliefs about health behaviors among college students. Each of you was asked the same series of questions. Specifically, we will be examining the situations in which college students feel most comfortable expressing their health beliefs. We will also examine the prevalence rates of certain health behaviors among college students. We hope to use this data to add to the body of literature concerning college student health behavior. We are interested in seeing if this decision to practice health behaviors occurs in a stage-like progression that is readily identifiable.

We appreciate your participation in this study.

If you would like more information concerning our theories, please read:


If you have questions/comments, or if you are interested in getting information about the results, please call Dr. Ward at 529-3751 or e-mail wardrm1@muohio.edu.
Appendix C: Debrief Sheet at Time 2

Thank you for participating in our experiment. You have finished the second part of a two-part study. The first part of the study was earlier in the semester.

The study in which you have just participated in was designed to examine attitudes and beliefs about health behaviors among college students. Specifically, we asked you questions about your smoking practices, alcohol consumption, eating practices, exercise habits, teeth care habits, and many other health related behaviors. Each of you was asked the same series of questions. Specifically, we will be examining the situations in which college students feel most comfortable expressing their health beliefs. We will also examine the prevalence rates of certain health behaviors among college students. We hope to use this data to add to the body of literature concerning college student health behavior. We are interested in seeing if this decision to practice health behaviors occurs in a stage-like progression that is readily identifiable. We are also interested in examined which health behaviors seem to impact the practice of other health behaviors. For example, are you more or less willing to exercise when you have had little sleep.

We appreciate your participation in this study.

If you would like more information concerning our theories, please read:


If you have questions/comments, or if you are interested in getting information about the results, please call Dr. Ward at 529-3751 or e-mail wardrm1@muohio.edu. Results will be available in the Spring of 2005.
Appendix D: Measures

Alcohol Consumption Stage of Change (Laforge, Maddock, & Rossi, 1998)

A drink is defined as one bottle of beer, one ounce of liquor, or a four-ounce glass of wine.

In the last month have you had 5 or more (for males) or 4 or more (for females) drinks in a row?

- Yes, and I do not intend to stop drinking 5 or more (4 or more) drinks in a row.
- Yes, but I intend to stop drinking 5 or more (4 or more) drinks in a row during the next 6 months.
- Yes, but I intend to stop drinking 5 or more (4 or more) drinks in a row during in the next 30 days.
- No, but I have had 5 or more (4 or more) drinks in a row in the past 6 months.
- No, and I have not had 5 or more (4 or more) drinks in a row in the past 6 months.
- No, I have never had 5 or more (4 or more) drinks in a row.

Think back over the last month. How many times have you consumed 5 or more drinks in one day?

- Never
- Once
- 2 to 3 times
- 4 to 6 times
- 7 or more times

Did you drink until you got drunk or intoxicated at least once in the last month?

- No, I have not been drunk in the last 6 months.
- No, I have not been drunk in the last month, but I have been drunk in the last 6 months.
- Yes, but I intend to stop getting drunk in the next 30 days.
- Yes, but I intend to stop getting drunk in the next 6 months.
- Yes, and I do not intend to stop getting drunk
**Alcohol Decisional Balance** (Laforge, Maddock, & Rossi, 1999)

How important are the following in your decision about how much to drink?

1 = Not At All Important  2 = Not Important  3 = Somewhat Important  
4 = Very Important  5 = Extremely Important

1. Drinking could get me addicted to alcohol.
2. I do not like myself as much when I drink.
3. I feel happier when I drink.
4. I can talk with someone I am attracted to better after a few drinks.
5. Drinking helps keep my mind off problems.
6. Drinking makes me more relaxed and less tense.
7. Drinking helps me have fun with friends.
8. Drinking too much could make me do things I regret.
9. I could accidentally hurt someone because of my drinking.
10. I am setting a bad example for others with my drinking.

**Physical Activity Stage of Change** (Marcus, Selby, Niauea, & Rossi, 1992)

Regular exercise is any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 or more times per week for 20 or more minutes per session at a level that increases your breathing rate and causes you to break a sweat.

Do you exercise regularly according to the definition above?

- Yes, I have been for more than 6 months.
- Yes, I have been, but for less than 6 months.
- No, but I intend to in the next 30 days.
- No, but I intend to in the next 6 months.
- No, and I do not intend to in the next 6 months.

**Fruit and Vegetable Consumption Stage of Change** (Laforge, Greene, & Prochaska, 1994)

How many servings of fruits and vegetables do you usually eat each day?

- Zero
- One to Two
- Three to Four
Have you been eating 5 or more servings of fruits and vegetables a day for more than 6 months?
  - Less than 6 months
  - More than 6 months

Do you intend to start eating 5 or more servings of fruits and vegetables a day in the next 6 months?
  - No, and I do not intend to in the next 6 months
  - Yes, and I intend to in the next 6 months
  - Yes, and I intend to in the next 30 days

**High Fat Food Avoidance Stage of Change** (Greene & Rossi, 1998)

Do you consistently avoid eating high fat foods?
  - No, and I do not intend to in the next 6 months
  - No, but I intend to in the next 6 months
  - No, but I intend to in the next 30 days
  - Yes, and I have been, but for less than 6 months
  - Yes, and I have been for more than 6 months