ABSTRACT

Title of Dissertation: INCREASE IN EXPOSURE TO PEER DRINKERS AS A PREDICTOR OF INCREASE IN POSITIVE ALCOHOL EXPECTATIONS IN EARLY ADOLESCENTS

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It has been shown repeatedly in studies, and is now widely accepted, that adolescents' expectations about the consequences of using alcohol influence their initiation and continuation of alcohol use. Nevertheless, how expectations about alcohol use develop and change during adolescence has been examined in relatively few studies. That exposure to peer drinkers influences adolescents' expectations has been hypothesized by many researchers, though few have examined this influence. Because alcohol use is common among adolescents and is a risk factor for morbidity and mortality, a better understanding of the relationship between exposure to peer drinkers and change in alcohol expectations among early adolescents' could inform interventions to prevent alcohol use and abuse.

This study involved secondary quantitative data analyses using latent growth curve modeling. The data set was from an intervention demonstration project by the National

Institute for Child Health and Human Development, and included longitudinal self-reported data of adolescent drinking, drinking expectations, and peer drinking. To avoid any treatment effect on the research questions, these analyses were conducted using only the non-intervention control group of this data set. The purpose of these analyses was to examine the influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations. In addition, these analyses examined whether increase in alcohol use indirectly influenced the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents.

Results of the latent growth curve analyses further confirm the influence that positive alcohol expectations have on actual alcohol use as previously reported in the literature. In addition, these analyses provide preliminary evidence that increase in exposure to peer drinkers increases positive alcohol expectations. The analyses also provide preliminary evidence that adolescents' personal use of alcohol influences their alcohol expectations indirectly through increased exposure to peer drinkers.

INCREASE IN EXPOSURE TO PEER DRINKERS AS A PREDICTOR OF INCREASE IN POSITIVE ALCOHOL EXPECTATIONS AMONG EARLY ADOLESCENTS

By

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Introduction

Eighty-three percent of US residents, aged 12 and older, report having used alcohol at least once during their lifetime (Center for Substance Abuse Research [CESAR], 2003). The expectations that exist about the effects of using alcohol have been shown in the literature to have a great influence on the initiation of alcohol use during adolescence and the continuation of alcohol use across the ages (Goldman, Brown, & Christiansen, 1987). While the importance of these expectations on alcohol use is well accepted, few studies have examined how these expectations develop and change during adolescence. The influence of the exposure of peer drinkers on the development and change of expectations has been suggested by many researchers (Cumsille, Sayer, & Graham, 2000; Scheier & Botvin, 1997; Simons-Morton, et al, 1999) though few have examined this influence. Because the use of alcohol is a particular health concern for the adolescent population, understanding the influence that the exposure to peer drinkers has on the development and change of expectations in this population is crucial in the effort to prevent alcohol use and abuse.

Alcohol Use Among Adolescents

The adolescent period is a time of transition from childhood to adulthood. It is during this time that biological, emotional, intellectual and social transformations all take place (Bearinger & Blum, 1994). During adolescent development there is an increase in independence; autonomy from the family; sexual awareness and identity formation;

physiologic maturation; and greater peer affiliation and importance. This second decade is a time of striving for a sense of self-identity through close interpersonal relationships and through self-examination. This is a time of experimentation and exploratory behavior. While most adolescent exploratory behavior is developmentally appropriate, those behaviors that are potentially serious, long-term, and have negative consequences are considered to be risk-taking behaviors (Irwin & Igra, 1994). These risk-taking behaviors jeopardize health and well-being. Alcohol use is one of the most popular risk-taking behaviors.

National surveys on substance use show that the prevalence of alcohol use among adolescents continues to be extremely high. According to the Monitoring the Future study, nearly four out of every five students have consumed alcohol (more than just a few sips) by the time they finish high school (Johnston, O'Malley, & Bachman, 2003). More than half (62%) of those twelfth graders in this study reported that they had been drunk at least once in their life. Similarly, the results from the 2001 Youth Risk Behavior Surveillance System (YRBSS) showed that 78.2 % of high school students had had at least one drink of alcohol on one or more days during their life (National Center for Chronic Disease Prevention and Health Promotion [CDC], 2003). For those twelfth graders in this study, 85.1 % reported that they had at least one drink of alcohol on one or more days during their life. In terms of current alcohol use, the YRBSS reports that 47.1% of the high school students surveyed reported having had at least one drink of alcohol on one or more of the past 30 days. The rate of alcohol use during the past 30 days as reported on the 2001 National Household Survey on Drug Abuse (NHSDA) was 17.3 % for youths ages 12 to 17 (Substance Abuse and Mental Health Services

Administration [SAMHSA], 2002). While this percentage is lower than those found in the YRBSS, it is of concern because this percentage is an increase from the 16.4% reported on this same survey the year before.

A recent study conducted by the Parents' Resource Institute for Drug Education (PRIDE) has shown that among high school students the rates of alcohol use from 1998 to 2003 have been declining (PRIDE, 2003). However, this study found a recent statistically significant increase in alcohol use among students in grades 6 through 8. While alcohol use rates in this young age group were found to be declining from 1998 to 2002, they increased from 34% in 2002 to 37% in 2003 ($p \leq .05$).

Alcohol use is not only a crucial issue because of the high prevalence of use among adolescents, but also because alcohol use can result in additional problems and risk-taking behaviors such as academic problems, suicide, drinking and driving, and unwanted and/or early sexual activity (NHSDA, 2003; National Institute on Alcohol Abuse and Alcoholism, 2003). In some studies, as many as one-fourth of students have attributed academic problems to alcohol use (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002). Other studies show that even small alcohol induced learning impairments can affect academic and occupational achievement (Spear, 2002). Alcohol use has also been found to interact with mental health conditions such as depression and stress. This interaction in turn has been found to contribute to suicide (Windle, Miller-Tutzauer, & Domenico, 1992). While one of the major achievements of adolescents is obtaining drivers licenses, the lack of driving experience of these adolescents in combination with alcohol can be deadly. Those adolescents who drink and then drive have been found to be at greater risk of fatal crashes than older drinkers who also drive (National Institute on

Alcohol Abuse and Alcoholism, 2001). This is due in part to their lack of experience (Mayhew, Donelson, Beirness & Simpson, 1986) and overconfidence (Jonah, 1986). Because alcohol impairs cognitive ability and judgment, adolescent alcohol use can result in unwanted sexual activity. According to a National Center on Addiction and Substance Abuse (CASA) study, adolescents who drink are much more likely to engage in sex, initiate sex earlier, and have multiple sex partners (CASA, 1999). In fact, 80% of adolescents aged 15-17 have reported that people their age usually drink or use drugs before having sex (Hoff, Greene, & Davis, 2003). This sexual activity can lead to a sexually transmitted disease or an unwanted pregnancy. Additionally, early alcohol use initiation can lead to future alcohol problems (Falkowiski, 2001). In fact, the earlier one starts drinking, the more likely they are to develop alcohol dependence and alcohol abuse in addition to problems later in life (Grant & Dawson, 1998; Ellickson, Tucker, & Klein, 2003). For example, those who start drinking before the age of 15 are four-times as likely to develop alcohol dependence at some time in their lives in comparison to those who don't have their first drink until age 20 or older (Grant & Dawson, 1998). In a ten-year longitudinal study, those who reported drinking at grade 7 were more likely than nondrinkers to report further substance abuse, academic difficulties, employment problems, and criminal and violent behavior in middle school, high school and in young adulthood (Ellickson, Tucker, & Klein, 2003).

The Influence of Peers and Expectations on Adolescent Alcohol Use

Because these high-risk behaviors are more likely among those who initiate drinking at early ages, the importance of preventing alcohol use is great. In order to create

research driven prevention programs, researchers for many years have been examining correlates and predictors of adolescent alcohol use. Throughout this research much has been learned. For example, the role of peers in an adolescent's alcohol use behavior has been shown repeatedly to be important in understanding adolescents' alcohol use. (Kandel, 1985; Maxwell, 2002; Sieving, Perry, & Williams, 2000). The influence of peers on adolescent alcohol use has been found to be far-reaching. One of the important ways that peers influence an adolescent is through the exposure to peer drinking. This exposure to peer drinking can increase the availability of alcohol, provide role models, establish drinking norms and create the perception that using alcohol can increase social acceptance (Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001). Both experimental and correlational research has been conducted that supports the importance of exposure to peer drinking on adolescent alcohol use (Wood, Read, Palfai, & Stevenson, 2001).

In addition to the exposure to peer drinkers, research on the correlates and predictors of adolescent alcohol use have found that adolescents' alcohol expectations and expectancies predict their alcohol use. Of particular interest are adolescents' positive expectancies about the alcohol using experience (Christiansen, Smith, Roehling, & Goldman, 1989; Killen, 1996). Through studies employing cross-sectional expectancy scores to predict concurrent or future alcohol consumption, several researchers have found that these alcohol expectancies predict alcohol use.

As children age it has been found that their positive alcohol expectancies increase (Cumsille, Sayer, & Graham, 2000). While this is known, little research has been done to determine how these expectancies occur and change (Winslow, 1997). While the research on the development of these expectancies is limited, researchers have suggested

that peer and social influences play an important role (Cumsille, Sayer, & Graham, 2000; Scheier & Botvin, 1997; Simons-Morton et al., 1999). In fact, one longitudinal study found that exposure to peer drinking was important in the development of positive alcohol expectancies (Cumsille, Sayer, & Graham, 2000). This study was conducted on adolescents, regardless of alcohol use status, from the first panel of the Adolescent Alcohol Prevention Trial, a school-based alcohol prevention program. In order to prevent the early initiation of alcohol use and because of the relationship between alcohol expectancies and actual drinking and drinking initiation, understanding the development of alcohol expectations is critical. For this reason the role of exposure to peer drinkers on the development of positive alcohol expectancies in an early adolescent population is the focus of this study.

Going Places Data

The data analyzed in this study was collected during a National Institute for Child Health and Human Development behavioral intervention study – Going Places. Seven middle schools in one Maryland school district were recruited to participate in this intervention study designed to increase social skills and prevent multiple problem behaviors including substance use, aggression, and anti-social behavior. Three of these schools were randomized to the treatment group while four were randomized to the control condition. Students from both the treatment and control conditions were surveyed at the beginning and end of the 6th-grade, toward the end of the 7^{th} and 8th-grades, and again at the beginning of the 9^{th} grade. These students came from schools located in the suburbs of Washington, DC with both a large and rapidly growing

population and a sparse, rural population. School records indicate that 24% of students in this district participate in the free or reduced lunch program.

Over the study time period, analyses have shown that the percentage of current and frequent drinkers increased (Simons-Morton, Chen, Abroms, & Haynie, 2003). Using latent growth curve analyses, it has been shown that the average drinking stage increased over time linearly. Drinking stage in this study was defined as follows: never – no drinking in the past 30 days or past 12 months and no intention of drinking in high school; intent – no drinking in the past 30 days or past 12 months, but intention to drink in high school; 12-month drinker – drinking in the past 12 months but not in the past 30 days; recent drinker – drinking 1-2 times in the past 30 days; and frequent drinker – drinking 3 or more times in the past 30 days. Drinking stage increased over time in near linear fashion from 0.34 to 1.46 on a 0-4 point ordinal scale. In these same analyses, girls were found to drink less than boys at baseline. In addition, girls were found to increase in drinking stage at a faster rate than boys.

Analyses of this dataset have shown further support for the influence that both positive alcohol expectancies and exposure to peer drinkers have on adolescent alcohol use. For example, exposure to problem behaving friends was found to have positive independent associations with drinking (Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001). Interactions between problem-behaving friends and gender reinforced these positive associations, although the association was found to be a greater risk factor for girls (*OR*=7.63 *CI*=4.17, 13.97) than for boys (*OR*=2.81 *CI*=1.68,4.68). Latent growth curve analyses were also used to study the relationship of the changes in the number of friends who drink and changes in alcohol use during the study period. These analyses

demonstrated that those adolescents who initially reported higher levels of drinking tended to increase the number of friends that drink over time (Simons-Morton, Chen, Abroms & Haynie, 2003).

Positive alcohol expectations were found in this data to be positively associated with drinking for both girls and boys (Simons-Morton, Haynie, Crump, Saylor, Eitel, & Yu, 1999). In fact, alcohol expectations were found to be a better predictor of alcohol use than grade. Positive outcome expectations were also found to be independently associated with smoking for both boys and girls.

Research using this data has supported the influence that peers and positive alcohol expectations have on alcohol use. These studies reinforce the need to examine how these expectations develop during early adolescence and the role that exposure to peer drinking plays in that development. The analysis of this study's research questions and hypotheses is an appropriate next investigative step.

Research Questions and Hypotheses

This study is designed to examine five main research questions.

I. Does the rate of change in positive alcohol expectations directly influence the increase in alcohol use?

Hypothesis: It is hypothesized that the rate of change in positive alcohol expectations will directly influence the increase in alcohol use.

II. What are the developmental trajectories of positive alcohol expectations among early adolescents?

Hypothesis: While linear, exponential and more complex models will be examined, it is hypothesized that the developmental trajectories of positive alcohol expectations will best be fit by a linear model.

III. Does the rate of change in exposure to peer drinkers directly influence the increase in positive alcohol expectations among early adolescents?

Hypothesis: It is hypothesized that the increase in exposure to peer drinkers will directly influence the increase in positive alcohol expectations.

IV. How does gender affect 1) the increase of positive alcohol expectations and, 2) the influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations among early adolescents?

Hypothesis 1: It is hypothesized that the trajectories of positive alcohol expectations for males and females will differ, with males having higher positive expectations and higher rates of increase in positive expectations than females.

Hypothesis 2: It is hypothesized that the increase in exposure to peer drinkers will continue to directly influence the increase in positive alcohol expectations even after controlling for gender.

V. Does the increase in alcohol use indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

Hypothesis: It is hypothesized that the increase in alcohol use will indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

Significance of the Study

Because of the many health and safety concerns involved in adolescent alcohol use, creating research-based prevention concepts and programs is crucial. The drinking of alcohol increases dramatically during adolescence (Johnston, O'Malley, & Bachman, 2003). The prevention needs therefore for adolescents as they age, also change. With the amount of research that has demonstrated a link between an adolescent's positive alcohol expectancies and their actual alcohol use, understanding the development of adolescents' positive alcohol expectancies is a crucial step in the prevention of adolescent alcohol use and abuse. While the research on the creation of positive alcohol expectancies is limited, researchers have suggested that peer and social influences play an important role (Cumsille, Sayer, & Graham, 2000; Scheier & Botvin, 1997; Simons-Morton, et al, 1999).

The idea of peer influences playing a major role in the creation of alcohol expectancies is not only backed up by the limited research to date, but also by theory. According to Social Learning Theory, the construct of expectation refers to the anticipatory aspects of behavior or the antecedent determinants of behavior (Perry, Baranowski, & Parcel, 1990). According to this theory, these expectations are developed primarily from previous personal experience and vicarious experience (Bandura, 1986). Translating this to the situation of adolescent alcohol use, an adolescent would develop alcohol expectations through personal experience using alcohol (previous experience), and through the influence of peers (vicarious experience).

Because of the potential that exposure to peers who use alcohol has on the development of positive alcohol expectancies during adolescence, this factor is the focus of this study. Because of the known change in alcohol use as adolescents age and because of the known interaction between alcohol expectancies and alcohol use, the need to examine the change and development of alcohol expectancies over time is apparent. For this reason, this study will examine the effect of the increase in exposure to peers who use alcohol on the development of positive alcohol expectancies over time in early adolescents.

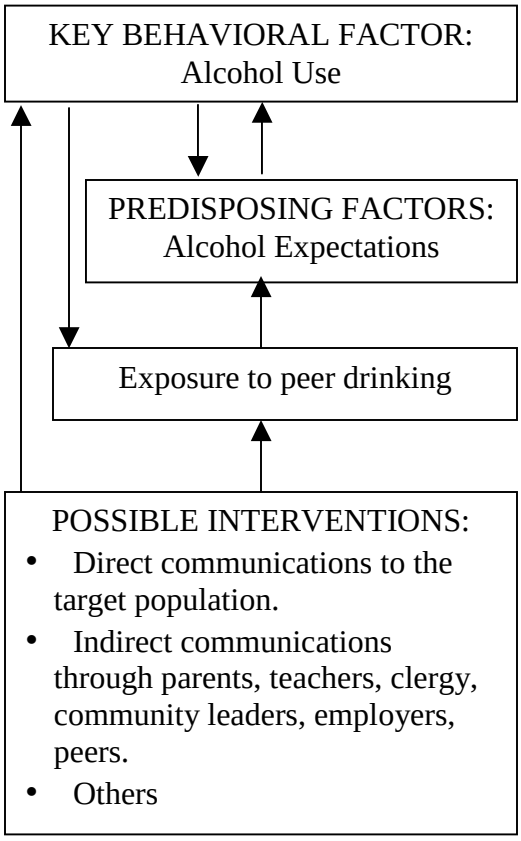
Building Blocks of Prevention

While a few prevention efforts have already attempted to change alcohol expectancies with varying success (Darkes & Goldman, 1993; Fromme, Kivlahan, & Marlatt, 1986; Kraus, Smith, & Ratner, 1994; Trudeau, Spoth, Lillehoj, Redmond & Wickrama, 2003), the current study provides information to help those who are working

with adolescents to prevent alcohol use and abuse. It provides information needed to help them plan and implement successful prevention programs. According to the PRECEDE-PROCEED model, the most popular and most widely used health planning model (Simons-Morton, Greene, & Gottlieb, 1995), understanding the behavioral determinants of risk factors and risk conditions that exist for a health problem is a crucial step in improving behavioral, environmental and health outcomes (Bartholomew, Parcel, Kok, and Gottlieb, 2001). Understanding the factors that are present in adolescents' lives that put them at risk for alcohol use and abuse is therefore essential in creating alcohol prevention programs with the highest chance of producing positive health outcomes. Of the three behavioral determinants or categories of factors that Green and Kreuter suggest affect individual or collective behavior, one is of particular relevance to this study, predisposing factors. Predisposing factors are defined as "antecedents to behavior that provide the rationale or motivation for the behavior" (Green and Kreuter, 1999 p. 153). These predisposing factors can "include a person or population's knowledge, attitudes, beliefs, values and perceptions that facilitate or hinder motivation for change"(p. 40). An adolescent's alcohol expectations are such a predisposing factor. By examining the development of this known predisposing factor, we have gained a greater understanding of this variable and gained the initial building blocks that can then be used in a model such as PRECEDE-PROCEED to help develop successful prevention programs. Understanding the role that exposure to peer drinkers has in the development of this predisposing factor, alcohol expectations, provides an initial target that we can attack with such strategies as direct communications to the target population and indirect

communications through parents, teachers, clergy, community leaders, employers, especially peers. (See Figure 1-1.)

Figure 1-1: Path of Prevention



Principles Guiding Prevention

Recently, the National Institute on Drug Abuse released a research-based guide designed to assist parents, educators, and community leaders in their planning, selection, and delivery of drug abuse prevention programs (National Institute on Drug Abuse [NIDA], 2003). Two of the principles suggested in this guide are of direct relevance to this study. First, this guide suggests that prevention programs should be tailored to reverse or reduce specific risk factors. By providing information about the risk factor

positive alcohol expectations, this study helps prevention programmers to meet this principle. Second, this guide suggests that prevention programs should be tailored to address risks specific to population audience characteristics, such as age, gender, and ethnicity, to improve program effectiveness. This study provides information to guide prevention efforts by helping to delineate the specific age and gender populations where the prevention of positive alcohol expectancy development can be the most influential and successful.

Adolescent alcohol use is a wide spreading issue that can have many negative affects on not only the adolescents themselves but others that they encounter. It is imperative that research be conducted that can lead to a better understanding of this phenomenon as well as lead to more successful prevention programs.

Definition of Variables

Expectation:	"The anticipatory aspects of behavior" (Perry, Baranowski, & Parcel, 1990); "The result the individual anticipates from taking a given course of action" (Simons-Morton, Greene, & Gottlieb, 1995, p. 308);
Expectancy:	"The values that one attaches to a particular outcome." (Simons-Morton, Greene, & Gottlieb, 1995, p. 308); "The residual, representational values of outcome expectations." (Simons-Morton, et al., 1999)
Positive alcohol expectancy:	The belief that positive consequences will be the outcome of using alcohol.
Peer:	"One that is of equal standing with another: One belonging to the same societal group based on age, grade, or status." (Merriam-Webster's collegiate dictionary, 1994).
Exposure to peer drinkers:	The occurrence of an adolescent observing drinking behavior among peers.
Latent Growth Curve Analysis:	"A specific type of random coefficient model developed in the psychometric tradition that utilizes multiple indicator latent factors to estimate the fixed and random components associated with individual differences in developmental trajectories over time." (Curran, 2000).
Intercept:	As in analysis of variance or regression, the intercept may estimate

a number of different parameters, depending on the coding of the categorical variables. In the current study, the intercept is the value of the outcome being measured when the growth curve begins or at the first measurement point. Also referred to as the "initial level,"

Slope: The statistical parameter that informs us how much the curve grows between each measurement point. A mean rate of growth.

Chapter Two: Review of the Literature

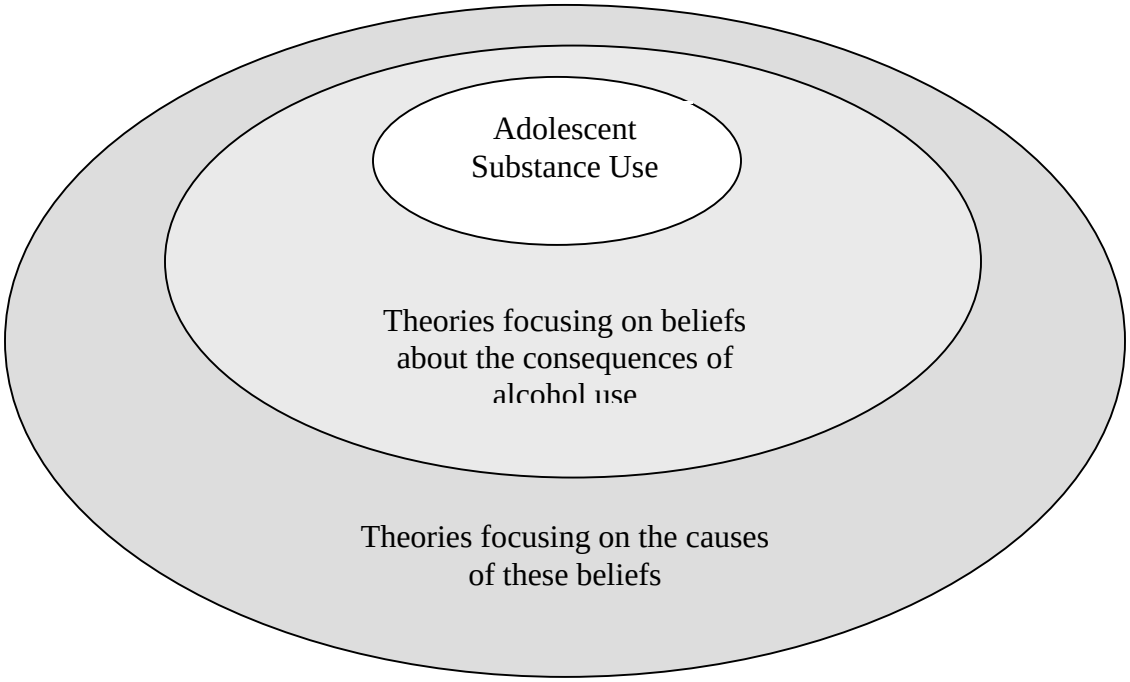
The following literature review provides a theoretical introduction that has guided the current research project. Following this theoretical introduction, this literature review examines the early history and origin of research on alcohol expectancies. This leads to a discussion on the development of expectancy measurement scales. Concurrent and longitudinal research on the relationship between alcohol expectancies and drinking behavior are then discussed. Following this discussion, the research on how expectancies differ by both gender and age groups are presented. The development of alcohol expectancies and the influence of peers on these expectancies are then examined. Lastly, peer influence and how the exposure to peer drinkers fits into the peer influence literature is addressed.

Theoretical Introduction

Many theories have been developed or adapted for use with the issue of substance use. These theories can be combined into at least two layers of understanding and focus. See Figure 2-1 on page 18. One layer or group of theories focuses on how adolescents' cognitions or beliefs about the consequences of alcohol use affect their decisions to use alcohol (Petraitis, Flay, & Miller, 1995). This group of theories suggest that the expectations adolescents have about the act of using substances are the main mechanism through which decisions about alcohol are made. This layer of theories suggests the importance of this concept of expectancies in the adolescent use of alcohol. The Theory of Reasoned Action and the Theory of Planned Behavior are two of the theories that are

found in this theoretical layer attempting to help understand and describe adolescent alcohol use.

Figure 2-1: Layers of Theory Used With Adolescent Substance Use



A second layer of theories that have been used to help understand the phenomenon of adolescent alcohol use are those theories that strive to explain the causes of these cognitions or expectation beliefs. Among this group are those theories that primarily consider these expectations to be a result or effect of behavior. Theories of behavioral choice and self-perception theory are two examples of this type of theory. These theories, inspired by Skinnerian theory, suggest that adolescent expectations about substance use are mainly caused by their own personal substance use experience (Stacy, Newcomb, & Bentler, 1991). Bandura's original Social learning theory (1977) and later his Social Cognitive theory, are two additional theories in this layer that help to explain the causes of expectation beliefs (Bandura, 1986; Stacy, Newcomb, & Bentler, 1991).

According to Social Learning Theory, the construct of expectation refers to the anticipatory aspects of behavior or the antecedent determinants of behavior (Perry, Baranowski, & Parcel, 1990). Bandura asserts that through learning experiences, people anticipate the probable consequence of different events and courses of action and that people regulate their behavior based on these anticipations. These anticipatory outcomes of a behavior are what Bandura calls expectations. He defines outcome expectancy as "a person's estimate that a given behavior will lead to certain outcomes" (Bandura, 1977, pg. 79) or as the value that a person places on a given outcome. It is through a social learning process that these beliefs and expectancies are thought to work. Our early learning experiences create memories or cognitive schemas. That is, children have experiences through which they learn or perceive that drinking is associated with certain outcomes. When these experiences are repeated, they then store these learned associations in memory in the form of expectancies. These expectancies are thought to be in the form of if-then relationships. "If I drink then this consequence will occur." Therefore, early learning experiences are thought to be the original cause of later behavior.

According to social learning theory and social cognitive theory, these expectancies are developed primarily from previous personal experience and vicarious experience (Bandura, 1986). Translating this to the situation of adolescent alcohol use, an adolescent would develop alcohol expectations through personal experience using alcohol (previous experience), and through the influence of peers (vicarious experience).

Bandura suggested that psychological theories have traditionally focused on the influence of performing a behavior on learning. While Bandura asserted that direct

experience with the behavior or situation is important in the development of expectations, he also asserted that the social environment plays an important role in the creation of expectations. In fact, Bandura asserts that, "virtually all learning phenomena, resulting from direct experience, can occur vicariously by observing other peoples' behavior and it's consequences for them" (Bandura, 1986, p 19). Bandura asserts that it is the interplay of both personal experience, and external sources of influence that determine our behavior. However, he also asserts that vicarious experience is actually a superior influence due to its fewer attentional demands. Those directly involved in the performance of a behavior must give some of their attention to creating, selecting and acting out the behavior itself. Observers however, do not have to split their attention between the behavior and the results of the behavior. Therefore it is easier for an observer to construct an expectation of a behavior than the person performing that behavior.

Though many theories exist and have been used in an effort to explain and understand adolescent alcohol use, the Social Cognitive theory, with its focus on vicarious learning provides the best framework for this study. The concept of outcome expectations is not extensively developed in the social cognitive theory though the importance of the concept in adolescent alcohol use is well accepted. Therefore, this research provides preliminary evidence and understanding about the development of the concept of outcome expectation in adolescents.

Early Alcohol Expectancy Research

Much of the research on alcohol expectancies began with a paper written by MacAndrew and Edgerton in 1969 in which these authors suggested that the effects of alcohol on behavior are learned from cultural experiences and not directly a result of the alcohol use itself (Leigh, 1989). These authors used anthropological evidence showing different effects from alcohol for different cultures to back up their assertions (MacAndrew and Edgerton, 1969). Evidence obtained in Marlatt and Rohsenow's balanced placebo design further substantiated the assertion made by MacAndrew and Edgerton (1980). These researchers found when subjects were given either alcohol or a placebo and instructed that they were receiving either alcohol or plain tonic water that changes in behavior occurred only in those who believed themselves to have been given alcohol. This work suggested that it was not the pharmacological effect of alcohol that caused changes in behavior but the beliefs or expectancies about drinking alcohol that caused the behavior change. Since these foundational works, these beliefs or expectancies have become a major area of investigation (Kline, 1996).

Domain and Scale Development

Initial studies following the research by both Marlatt & Rohsenhow, and MacAndrew & Edgerton showed that expectancies were indeed correlated to actual drinking. First, however, researchers began the investigation of alcohol expectancies by trying to better understand the construct of alcohol expectancies through the development of measurement scales. As many as a dozen scales that measure alcohol outcome

expectancies have been developed since these foundational works and while there is evidence for the concurrent validity of many of these scales, there is also controversy about the psychometric properties and construct validities of these expectancy scales (Kline, 1996; Leigh, 1989). The Alcohol Expectancy Questionnaire (AEQ) is not only the most well known scale (Cronin, 1997), it was also the first scale developed to measure alcohol expectancies (Fromme, 2000). Using multivariate procedures, Brown, Goldman, Inn, & Anderson analyzed an exhaustive list of expectancies gained from interviews with 125 adults to determine a set of alcohol expectancy factors (1980). The adults included in the interview process had drinking histories ranging from non-drinkers to chronic alcoholism. Brown, Christiansen, and Goldman took the information found in this study and used it to create the AEQ (1987). The AEQ has 90-items that correspond to the six factors that were analytically derived by Brown, Goldman, Inn & Anderson. These six factors only assess the positive effects of drinking alcohol and include: 1) global positive changes; 2) sexual enhancement; 3) physical and social pleasure; 4) increased social assertiveness; 5) relaxation and tension reduction; and 6) arousal and aggression (Brown, Christiansen, & Goldman, 1987).

In order to study alcohol expectancies in adolescents, Christiansen, Goldman, & Inn first established the domain of alcohol expectancies for adolescents of three different age groups (1982). These age groups included 12 to 14 year olds, 15 to 16 year olds and 17 to 19 year olds. Because the expectancies found in these different age groups were surprisingly consistent regardless of different drinking experience by age group, Christiansen and Goldman refined the expectancy domains for the entire adolescent age

group (ages 12 to 19) (1983). Seven domains, including negative expectancies, were created for the adolescent population. These domains are:

1. Alcohol is a powerful positive transforming agent;
2. Alcohol can enhance or impede social behavior;
3. Alcohol improves cognitive and motor functioning;
4. Alcohol enhances sexuality;
5. Alcohol leads to deteriorated cognitive and behavioral functioning;
6. Alcohol increases arousal; and
7. Alcohol promotes relaxation or tension reduction.

From the information obtained in these studies, the Alcohol Expectancy Questionnaire-Adolescent Form (AEQ-A) was created. This scale contains 90 true false items that make up seven subscales which correspond to the seven expectancy domains uncovered by the foundational research (Christiansen, Smith, Roehling, & Goldman, 1989). The original internal consistency reliability analyses of these seven subscales resulted in coefficient alphas ranging from .77 to .86.

While the AEQ and the AEQ-A are the most widely used alcohol expectancy scales, there is also controversy about the psychometric properties and construct validities of these expectancy scales (Kline, 1996; Leigh, 1989). Specifically, while the AEQ-A includes negative expectancies, the AEQ has been criticized for excluding these expectancies as well as for including items unrelated to the effects of alcohol (Leigh, 1989). Leigh also criticized both the AEQ and the AEQ-A for their dichotomous-bipolar response format. Some researchers have also criticized the factor structure of the AEQ and because of its similarity, the AEQ-A (Kline, 1986). Specifically Kline reports the

claims of other researchers that these scales measure one single, undifferentiated construct instead of distinct beliefs. However, in his study examining this, Kline found that the AEQ-A did not measure a single, undifferentiated expectancy construct, but instead five of the AEQ A scales examined reflected a distinct domain.

In response to the criticisms of the AEQ and AEQ A, the Comprehensive Effects of Alcohol (CEOA) was developed (Fromme, Stroot, & Kaplan, 1993). This scale in comparison to the AEQ uses a continuous response format, is shorter, and assesses subjective evaluations as well as expected effects. The CEOA was developed using exploratory and confirmatory factor analyses and demonstrates adequate internal consistency, temporal stability and construct validity. The CEOA consists of seven subscales that assess both positive and negative outcome expectancies (Cronin, 1997). Four of these subscales measure positive expectancies: 1) sociability; 2) tension reduction; 3) liquid courage; and, 4) sexuality. Three of the subscales measure negative expectancies: 1) cognitive and behavioral impairment; 2) risk and aggression; and, 3) self-perception (Fromme, 1993). In 2000, Fromme and D'Amico examined the use of the CEOA for adolescent populations and found it to be a successful measure for this age population. These researchers also compared the psychometric properties and the construct validity of the CEOA and the AEQ-A. These researchers, using mailed questionnaires, had adolescents between the ages of 13 and 17 complete both the CEOA and the AEQ-A in addition to measures of alcohol use and habits. The results showed that the CEOA was at least as useful if not more useful as a measurement of expectancies than the AEQ-A. While these results were found only using a small self-selected sample,

it showed the potential of the CEOA to be another useful outcome expectancy measurement tool for use with the adolescent population.

While the AEQ, AEQ-A and CEOA are the most widely used measures of alcohol expectancies, others have also been developed and used with varying success. Some of these include the Alcohol Effects Scale (AES) (Southwick, Steele, Marlatt, & Lindell, 1981), Effects of Drinking Alcohol (EDA) (Leigh, 1987), the Alcohol Effects Questionnaire (AEQ) (Rohsenow, 1983), and the Drinking Expectancy Questionnaire (DEQ) (Young and Oei, 1993). Table 2-1 on page 26 describes and compares these measurement scales and their subscales. While all of these scales have uniquenesses, there is a large amount of overlap among the subscales measured.

Relationship to Drinking Behavior

Concurrent Studies

In addition to the development of the domains of expectancies and the measurement of these expectancies, a large group of studies have shown that expectancies are indeed related to actual drinking behavior. In the same study as the one that determined the set of alcohol expectancy factors used to create the AEQ, Brown, Goldman, Inn, & Anderson also found that expectancies were associated significantly with drinking behavior (1980). Specifically, these researchers found that those who reported less exposure to alcohol and limited alcohol consumption were associated with the more general, global positive expectancies while those who reported more alcohol exposure and heavier consumption were associated with more defined expectancies such as sexual enhancement and arousal, and aggressive behavior.

Table 2-1: Scales Measuring Alcohol Expectancy

Scale	Population	Subscales
AEQ[1]	Adults	1. Global positive changes 2. Sexual enhancement 3. Physical and social pleasure 4. Increased social assertiveness 5. Relaxation and tension reduction 6. Arousal and aggression
AEQ-A[2]	Adolescents	1. Global positive changes 2. Sexual enhancement 3. Improved cognitive and motor functioning 4. Changes in social behavior 5. Relaxation 6. Increased arousal 7. Cognitive and behavioral impairment
CEOA[3]	Adults and Adolescents	1. Self-perception 2. Enhanced Sexuality 3. Liquid courage 4. Sociability 5. Tension reduction 6. Risk and aggression 7. Cognitive and behavioral impairment
AES[4]	College students	1. Stimulation 2. Pleasurable disinhibition 3. Behavior impairment
EDA[5]	College students	1. Gregariousness 2. Disinhibition 3. Nastiness 4. Depressant Effects 5. Cognitive/ physical impairment

[1] Alcohol Expectancy Questionnaire (Brown, Christiansen, & Goldman, 1987).
[2] Adolescent Form (Christiansen, Smith, Roehling, & Goldman, 1989)
[3] Comprehensive Effects of Alcohol Questionnaire (Fromme, Stroot, & Kaplan, 1993)
[4] Alcohol Effects Scale (Southwick, Steele, Marlatt, & Lindell, 1981)
[5] Effect of Drinking Alcohol (Leigh, 1987)

Table 2-1: Scales Measuring Alcohol Expectancy (continued)

Scale	Population	Subscales
AEQ[6]	College students	1. Global Positive 2. Sexual Enhancement 3. Social and physical pleasure 4. Social expressiveness 5. Relaxation 6. Power and aggression 7. Cognitive and physical impairment 8. Careless unconcern
DEQ[7]	Adults and Adolescents	1.Affective change 2.Sexual functioning 3.Cognitive Change 4.Assertiveness 5.Relaxation 6.Dependence

[6] Alcohol Effects Questionnaire (Rohsenow, 1983)
[1] Drinking Expectancy Questionnaire (Young & Oei, 1993)

In 1983, Christiansen and Goldman using the AEQ-A found that expectancies actually increased the concurrent predictive strength of the most powerfully associated demographic and background variables. The demographic and background variables that were used in this study included age, socioeconomic status, parents drinking behavior, religiosity, and attitude about the acceptability of drinking. As expected, strong significant multiple correlation coefficients were found between these demographic and background variables and frequent social drinking, problem drinking and family drinking. Strong significant multiple correlation coefficients were also found between expectancy and frequent drinkers and problem drinkers. Specifically, using stepwise multiple regression analysis, two AEQ-A scales (altered social behavior and enhanced cognitive and motor functioning) were found to be significant predictors of these two drinking styles. These two expectancy scales were found to actually be stronger predictors of

frequent and problem drinking styles than the background variables. When expectancy was added to the background variables, these combined multiple correlation coefficients were even stronger than either variable individually.

Similarly, Brown examined the predictive value of demographic variables and expectancy (1985). The demographic variables used in this study included gender, age, ethnicity, marital status, socioeconomic status, religious affiliation and frequency of attendance, number of family generations raised in the US, and family history of alcohol problems. Expectancy was measured using the AEQ. As in the previous study, Brown found as expected significant multiple correlation coefficients between the demographic variables and drinking styles. The drinking styles in this study are defined as heavy drinkers, problem drinkers, and context-determined drinkers. The strongest demographic predictors of drinking were ethnic background, gender, religiosity, and socioeconomic status. Additionally, expectancy was found to be a strong significant predictor of these drinking styles. The best expectancy predictor for heavy drinkers and context-determined drinkers was the AEQ scale 3, social and physical pleasure. The best expectancy predictor of problem drinkers was the AEQ scale 5, tension reduction expectancy. In general, the demographic variables were better predictors than the alcohol expectancies. However, for each of the drinking styles the single best predictor was an expectancy scale. When expectancies were added to background predictors an increase in multiple correlation coefficients was found suggesting that expectancy does add to the predictive power of these demographic variables.

In their study comparing the CEOA and the AEQ-A measurement tools, Fromme and D'Amico examined the associations between outcome expectancy and adolescent

alcohol use (2000). Both the quantity and frequency of alcohol use were examined. Using both measurement tools, these authors found that alcohol expectancies explained significant percentages of the variance in both quantity and frequency of alcohol use. While the AEQ-A explained 20% of the variance in quantity of alcohol drunk, the CEOA explained 28%. Both the CEOA and the AEQ-A explained 15% of the variance in frequency of alcohol use in this population.

This finding that alcohol expectancies predict quantity and frequency of alcohol use differently is supported by the findings of Chen, Grube & Madden (1994). In this study of 1,781 adolescents ages 13 to 19, these researchers used structural equation analyses to determine that alcohol expectancies were better predictors of quantity of alcohol drunk than of frequency or intoxication. Though examined separately for males and females, analyses in both genders showed significant differences in R^2 values among the three drinking behavior equations. Expectancies were found to be the most predictive of usual quantity of alcohol drunk (R^2*=.45-Male; .41-Female)* followed by frequency of drinking (R^2*=.33-Male; .35-Female)* and finally frequency of intoxication (R^2*=.30-Male; .26- Female).*

Not only has much research supported alcohol expectancies' relationship to actual drinking behavior, research has also shown that these expectancies are related to adolescents' intentions to drink. Using an early adolescent Norwegian study population, Aas, Klepp, Laberg, and Edvard examined the relationship between intention to drink alcohol, alcohol outcome expectancies and alcohol-related self-efficacy (1995). Alcohol outcome expectancies were measured using the AEQ-A. The results showed that for both seventh and ninth graders all of the alcohol outcome expectancy domains measured by

the AEQ-A were significantly related to intentions to drink alcohol in the near future regardless of drinking experience. Results also showed that a significantly higher proportion of adolescents with drinking experience reported positive alcohol expectancies.

Longitudinal Studies

Christiansen et al. (1989), in addition to providing further concurrent support for a relationship between expectancies and alcohol use, also provided evidence for a longitudinal, predictive relationship. Using the AEQ-A, these researchers found that in a group of seventh and eighth graders expectancies predicted both a quantity/frequency of drinking index and a problem-drinking index one year later. The quantity/frequency index represented the amount typically consumed per occasion and the frequency of drinking. The subscale of the AEQ-A measuring the domain, alcohol can enhance or impede social behavior, was the best predictor of drinking one year later followed by the subscale measuring the domain, alcohol improves cognitive and motor functioning.

In addition to providing evidence for a longitudinal relationship between expectancies and alcohol use, this study also provided evidence of a relationship between these expectancies and problem drinking onset. These researchers, in addition to the quantity/frequency of drinking and problem-drinking indices, also created a measure of problem drinking onset. This measure of problem drinking onset was created by looking at changes in drinking from the first year of data to the second for those subjects whose responses at year one corresponded to no drinking problem on the problem-drinking index. Subjects were classified into one of three change groups. The first group

represented no change, continued no problem. The second group represented a small change and was classified as indications of problem-drinking onset. The third group represented a larger change and was classified as onset of significant problem drinking. These researchers found initial evidence that alcohol expectancies did in fact predict a change from no problem drinking to problem drinking onset. Five of the seven expectancy scales at initial measurement discriminated between problem drinkers and those who became problem drinkers over the study time period. The AEQ-A scale representing the expectancy domain alcohol can enhance or impede social behavior was a consistent, significant predictor not only of drinking behavior but also of the transition from non-problem to problem drinking during the study time period.

Further evidence for both the longitudinal predictive power of alcohol expectancies and the use of expectancies to predict problem drinking comes from a 9-year longitudinal study. In the study of Stacy, Bentler and Newcomb (1991) comparing the validity of outcome expectancy theory, a behavioral approach and a reciprocal determinism approach for assessing the motivating factors in adult alcohol and marijuana use, these researchers determined that adolescent expectancies predicted not only adult drug use, but also adult drug problems. These researchers defined outcome expectancy by cognitive motivation. They found that adolescent expectancies predicted adult drug use nine years later, even after adolescent drug use was controlled. Specifically, using path modeling, these researchers found a significant longitudinal path from adolescent alcohol motivation to adult drug problems (.30). None of the other constructs in the model (social conformity, drug use frequency, and marijuana motivation) showed similar significant paths.

Killen et al. reported expectancies as the only significant predictor of drinking onset in a population of high school students (1996). In this study this group of researchers examined the influence of expectancy and temperament on the onset of drinking over a 12-month study period. These researchers using univariate analyses to compare students who reported no drinking at both baseline and at follow-up and those who began drinking between the baseline and follow-up, found that those who began to drink during this time period reported significantly higher expectancies for enhanced social function and sexuality as measured by the AEQ-A. Other significant differences in the univariate analyses included being more likely to come from a broken home, and two measures of the temperament scale, fear and sociability. Using stepwise logistic regression however, these researchers found that the only significant predictor of drinking onset was expectancy for enhanced social behavior (OR=1.1).

In a two-year longitudinal study of alcohol expectancies among Norwegian early adolescents, Aas, Leigh, Anderssen and Jakobsen (1989) also found support for alcohol expectancies predicting future alcohol use and even drinking initiation. These researchers using structural equation modeling found significant cross-lagged predictive paths between expectancies and drinking. That is, among all respondents' expectancies at time 1 and 2 significantly predicted drinking at time 2 and 3 respectively. Additionally, these researchers found evidence that expectancies actually predicted initiation of drinking. Expectancies among non-drinkers at time point 1 predicted initiation of drinking by time 2 (R=0.12, p<.05).

More recently, Blume, Schmaling and Marlatt (2003) found that over a three-month period positive expectancies predicted greater alcohol consumption and a specific

type of problem drinking, binge drinking. These researchers through regression analysis showed that the global positive changes scale of the AEQ significantly predicted the total number of binge drinking days at follow-up even after controlling for baseline binge drinking (ß=.23, $p<.05$).

Expectancy Differences By Group

In addition to showing that a relationship exists between alcohol expectancies and drinking behavior both concurrently and longitudinally, researchers have examined the differences in expectancies among different groups of adolescents. Two of the most consistent groups that have been shown to differ in expectancies are gender groups and age groups. For example, Kraus, Smith and Ratner (1994) showed in their experimental study differences in the strength of expectancies between male and female children. In this study these researchers examined four different experimental groups; two different expectancy modification groups and two control groups. Using a 39-item measure of children's' alcohol-related expectancies that was found to correlate highly with the AEQ-A, these researchers found that boys (11.88) had significantly higher mean expectancies than girls (9.81). In addition, these researchers found that older children held a significantly higher mean expectancy score than younger children (8.62, 10.44 and 13.53 for second, third and fourth graders respectively). Using a linear trend test, this progression by age was found to be significant.

Chen, Grube and Madden found in their study on the predictive power of expectancies, that expectancy's ability to predict drinking was different for males and females (1994). Males and females in this population of adolescents reported similar

drinking of any alcohol during the past 30 days and the past 12 months. Males, however reported drinking more often and consuming greater quantities than females. Separate analyses were conducted on the predictive value of expectancies for males and females. These analyses showed that for males, expectancies predicted quantity of alcohol drunk (R^2 = .45) and frequency of intoxication (R^2 = .30) more strongly than in females (R^2 = .41 and .26 respectively).

Loveday, Oei, and Young's work examining the role that alcohol expectancies have in the development of drinking behavior (1997) also support these gender and age differences. These researchers, in MANOVA analyses showed main effects for sex with positive alcohol expectancies tending to be higher in males than in females. They also found significant main effects for age with expectancies increasing by grade level. This increase by grade level was found in both genders.

In their study examining the effects of specific demographic variables on alcohol expectancies, Lundahl, Davis, Adesso and Lukas (1997) provide further evidence for both the gender and age difference in expectancies. In this study of college age, heavy drinkers these researchers found in multivariate analyses significant main effects for both age and gender. Using univariate analyses for gender, they found a significant main effect for the AEQ scale 4 – power and aggression. In this study, females reported stronger expectancies of feelings of power and aggression than males. Univariate analyses for age revealed significant main effects for AEQ Scale 1 (Global, Positive effects), Scale 3 (Sexual Enhancement), Scale 4 (Power and aggression) and Scale 5 (Social Assertion). These results suggest that individuals under the age of 20 had higher expectancies as measured by these four AEQ scales than those over the age of 20. These

researchers also found a significant gender x age interaction in their multivariate analyses. In univariate analyses, the gender x age interaction was only found to be significant on the AEQ Scale 1 – Global Positive effects. Females over the age of 21 scored significantly lower on this scale than all other subjects.

Musher-Eizenma, Holub and Arnett (2003), provide even more evidence for these expectancy differences by age and gender. In their study, examining both adolescents during a time of known transition and experimentation with substance use (ages 12-15) and older adolescents ages 18-22, these researchers found results indicating that outcome expectancies were differentially related to use by gender and age. These researchers found that females (mean = 4.4) reported significantly more negative expectancies than males (4.2). When examining the predictive value of outcome expectancies among males and females separately these researchers found that outcome expectancies predicted drinking for girls but not for boys. This was true in both the younger population and the older population. In addition, the older group of adolescents in this study was found to have more positive outcome expectancies than the younger adolescents (t (430) =6.5, p<.05).

Development of Alcohol Expectancies

In addition to the research showing differences in alcohol expectancies by age group, research has also shown that these expectancies actually appear before initiation of alcohol use and even as early as the third grade (Miller, Smith & Goldman, 1990). Using the Assessment of Children's Alcohol Related Expectancies (CARE) procedure, a procedure based on the AEQ-A that was developmentally appropriate for all of the age

groups studied, these researchers examined the existence and level of expectancies among subjects in the first through fifth grades. Their results showed that older children responded as having more positive expectancies than younger children and that there was a substantial increase in positive expectancies during the third and fourth grades. This substantial shift is in comparison to minor shifts between the earlier and later grades. They further tested these trends using analyses of variance, comparing the number of positive expectancy statement the children endorsed for each of the subscales across all grade levels. A significant overall grade effects was found for each subscale as well as for the combined scale ($F = 10.70$, 4/84 df, $p < .001$). Linear trend tests were then conducted which showed significant linear trends for 4 of the 5 subscales examined and the combined scale. Lastly, these researchers found a significant cubic trend for the combined alcohol expectancy scale.

Johnson and Johnson provided further evidence that alcohol expectancies increase during this early time period (1996). Using a cross-sectional design this study compared the expectancies of first, fourth and seventh graders. This study employed an alcohol vignette procedure that was developed by Gaines, Brooks, Maisto & Shagena in 1988 to elicit children's responses about alcohol. They used this procedure to reveal children's understanding of alcohol's effects on behavior and of drinking motives. Using only a small sample of children, 20 from each of the three grades, these researchers demonstrated not only that children have social expectancies of drinking prior to drinking, but also that more fourth and seventh graders expected positive peer reactions to drinking than first graders. Additionally, fourth and seventh graders cited more social motives for drinking behavior than first graders. Interestingly, 90% of both fourth and

seventh graders attributed adolescent drinking to social motives while only 45 percent of first grades attributed drinking the same. Further, 40% of first graders responded to the vignettes with other motives for drinking such as “don’t know”, “to crash,” or “he’s drunk”. None of the fourth or seventh graders responded with a nonsocial or personal motive. This difference between first graders and the older populations provides further evidence that the time frame directly before fourth grade is an important time for the development of alcohol expectancies.

Gustafson examined two slightly older adolescent populations to see not only if alcohol expectancies had been formed by age 12 but also to examine whether the alcohol expectancies changed between the ages of 12 and 15 (1992). His results demonstrated that alcohol expectancies, as measured by an instrument created for the study based on the AEQ, the Alcohol Effects Questionnaire, and work done by Isaacs (1977), did indeed exists at age 12 in both samples examined. Additionally, using one-way analysis of variance with grade level as the independent variable, Gustafson showed that in both samples, alcohol expectancies increased between the ages of 12 and 15.

Similarly, Christiansen, Goldman and Brown (1985) found that alcohol expectancies increased with age. Using the AEQ-A to measure expectancies among three age groups of adolescents (ages 12-14, 15-16, and 17-19), these researchers found significant differences by age group in 5 of the 6 AEQ-A scales. Using trend tests for each of the expectancy scales it was found that three of the adolescent alcohol expectancies become stronger with age. Specifically expectations for relaxation, enhanced social function and arousal all increased with age.

While these studies strongly suggest that there are age-related differences in expectancy scores, with older adolescents having stronger expectancies only one multi-wave longitudinal investigation of the pattern of change in alcohol expectancies over early adolescence was found (Sayer & Willett, 1998). In this article these researchers use their examination of the change in alcohol expectancies over time to demonstrate the use of a cross-domain model for growth in adolescence. Using this cross-domain model for growth, these researchers found that change in positive expectancies could be represented by a "piecewise" growth model that allowed for discontinuity in the trajectory at grade seven. The individual change in alcohol expectancies between grades 5 and 10 in this sample increased at a moderate linear rate between Grades 5 and 7 and then there was an increase in the rate of change after Grade 7. These researchers had hypothesized this discontinuity based on the work of Eccles and colleagues (1997), who suggest that the school transition that can take place between the sixth and seventh grades, from elementary school to junior high school could affect the growth trajectory of expectancies. This data shows this to be true with the seventh grade representing a transition point in the overall growth trajectory of expectancies.

Peer Influence and Exposure to Peer Drinkers

The important role of peers in an adolescent's alcohol use behavior has been shown repeatedly to be important in understanding adolescents' alcohol use. (Kandel, 1985; Maxwell, 2002; Sieving, Perry, & Williams, 2000). Because of the need to better delineate the relationship between peer influence factors and alcohol use, researchers have theorized that there are two main types of peer influences: passive and active peer

influences (Graham, Marks, & Hansen, 1991; Wood, Read, Palfai, and Stevenson, 2001). Both of these types of peer influences have been found to be important in relation to adolescent alcohol use. Active peer influences are described as explicit offers to try alcohol or other substances. Passive peer pressure involves situations where there is no explicit offer or demand to try a substance. It has been theorized that there are two types of passive peer influences. These two passive peer influences include social modeling of behavior or exposure to peer drinkers and the perception of peer use of a substance. Each of these types of peer influences have been researched individually and found to be important in relation to adolescent alcohol use. In addition, Graham, Marks and Hansen found that each of these types of peer influence account for unique variance for adolescent alcohol and cigarette use (1991).

Of the two passive peer influences, exposure to peer drinkers is thought to be more proximal than the perception of peer use. Further, the importance of exposure to peer drinkers has had consistent support in the literature (Newcomb & Bentler, 1986; Wood et al, 2001). As mentioned, Graham, Marks and Hansen (1991) found that each of the types of peer influence accounted for unique variance for adolescent alcohol use. In their hierarchical regression analysis predicting alcohol use, peer modeling added a significant contribution in accounting for alcohol use. These researchers also examined their model among those adolescents who had previous experience with alcohol and among those with no previous experience with alcohol. They found that peer modeling was a significant predictor of alcohol use among those with no prior drinking experience although peer modeling was not a significant predictor among those with previous drinking experience.

Other correlational studies examining the relationship between exposure to peer drinkers and alcohol use have provided consistent support for the importance of this peer modeling. For example, Curran, Stice and Chassin (1997) showed in a cross lag model examining the effects of adolescent alcohol use on peer alcohol use and the effects of peer alcohol use on adolescent alcohol use, that time 1 peer alcohol use was a significant predictor of time 2 adolescent alcohol use. Additionally, time 2 peer alcohol use was a significant predictor of time 3 adolescent alcohol use. The model used in this study controlled for adolescent age, adolescent gender and parental alcoholism status.

Oostveen, Knibbe and De Vries (1996) examined the types of social influences correlated with adolescents' heavy drinking in public places during the weekend. These researchers found in their stepwise regression analyses that peer modeling was one of the three most important factors in predicting heavy drinking. The other two factors found to be important in predicting heavy drinking were the social norms of family and peers, and the importance of socializing. These researchers also found that peer modeling of heavy drinking was significantly correlated with the frequency of drinking ($r = .28$, $p<.001$).

Kandel in 1985 reviewed selected findings from her work from the previous decade in an effort to provide an overview of what had been learned about the nature and role of peer influences in adolescent drug involvement. Her work involved analysis of a large scale longitudinal survey that was carried out on a representative sample of the adolescent population attending public high schools in New York State. In this study she examined among other questions what mechanisms, either role modeling or social reinforcement, underlie processes of interpersonal influences. She found that peer

modeling was consistently stronger than social reinforcement in predicting frequency of alcohol use. Best friends' alcohol use had a significant direct effect on alcohol use.

Huba and Bentler (1980) examined the role of peer and adult models for alcohol use at different stages of adolescent development. These researchers, in a summary of their many statistical tests conducted, report that there is the perception among adolescents of increasing exposure to peer drinkers during the transition from seventh to ninth grade. They further conclude that as the adolescents progress through these early adolescent years they are more aware of alcohol use among their peers.

Peer Influences on Alcohol Expectancies

With the wealth of research demonstrating that alcohol expectancies are related to actual drinking behavior, little research has been done to determine how these expectancies occur and change (Winslow, 1997). While this research on the development of these expectancies is limited, researchers have suggested that they develop from social-learning influences. For example, Christiansen, Goldman and Inn (1982) investigated whether these expectancies developed from actual experience with alcohol or from social-learning factors. These researchers concluded from their study that these expectancies did in fact exist prior to actual experience drinking alcohol, therefore lending credence to expectancies developing from social-learning influences. These authors suggest that actual use of alcohol helped to clarify and strengthen the existing expectancies of this study population.

Further evidence for social-learning influences on the development of expectancies can be found in the work conducted by Cumsille, Sayer, and Graham

(2000). These researchers examined the effect of adolescents' perceived exposure to both peer and adult drinking on the growth trajectory of these adolescents' alcohol expectancies. Both perceived exposure to peer and adult drinking were found to influence this growth trajectory. That is, positive alcohol expectancies were shown to increase faster for those adolescents who were exposed to drinking peers and adults however, the influence of peers was found to be far more important in the development of positive alcohol expectancies than exposure to adult drinking. Prototypical fitted trajectories are used to demonstrate these influences. These prototypes show a sharp increase in alcohol expectancies between Grades 5 and 7 for high-exposure adolescents and a more moderate increase between grades 7 and 10. In contrast, the low-exposure adolescents show a slight decrease in expectancies between grades 5 and 7 and a sharper increase after grade 7. These researchers used additional prototypical trajectories to assess the importance of each type of influence, peer and adult. These trajectories demonstrated a weak influence of adult exposure.

Further support for the influence of peers on the development of alcohol related expectancies is found in the dissertation work of Malow-Iroff (2001). This study of over 300 sixth and seventh grade students found evidence that all peer relationships studied (friends, best friends and siblings), were influential in the prediction of positive expectancies.

Ellickson and Hays (1992) also found support for peer influences on the development of alcohol expectancies. These researchers measured peer influences as pro-drug social influences measured by how often the child had ever been offered alcohol. They felt that this measure tapped into the child's exposure to role models for

use (friends, family members, or others who use drugs). Their results indicated that those children who reported receiving offers to use drugs were more likely to anticipate positive consequences as a result of drug use.

Finally, Scheier and Botvin (1997) in their study of the direct and indirect relations of peer social influences and alcohol-related expectancies as well as alcohol knowledge use path-analytic techniques to examine the influence of peers on the development of alcohol expectancies. They examine their hypothesized path both cross-sectionally and longitudinally. Their cross-sectional results showed significant paths between both friends' attitude to alcohol (β=.25, p<.001) and perceived friends' alcohol use (β=.31, p<.001) and alcohol expectancies. Longitudinal results showed significant paths between both 8th-grade friends' attitude to alcohol (β=.22, p<.001) and perceived friends' alcohol use (β=.14, p<.001) and ninth grade alcohol expectancies.

Chapter Three: Research Methodology

Introduction

This study was designed to examine the influence of exposure to peer drinkers on the development of positive alcohol expectations. This chapter includes a discussion of the subjects included in the study, the data collection procedures used, measurement of the theoretical constructs and treatment of the data. University of Maryland IRBapproval was obtained for this study. A copy of the IRB approval can be found as Appendix A.

Subjects

The subjects included in this study participated as the control group in the National Institute for Child Health and Human Development's intervention study, Going Places. All of the subjects in this intervention study were recruited from the seven middle schools in one Maryland school district. All of these schools are located in suburbs of Washington, DC and include both a large and rapidly growing population closer to the city and a sparse, rural population as the distance from the city increases. School records indicate that 24% of students in this district participate in the free or reduced lunch program. Each of the schools in this district was randomized to either a treatment or a control condition. Three of the schools were randomized to the treatment condition and four were randomized to the control condition. Beginning in the 1996 school year, two successive cohorts of sixth grade students were recruited and surveyed. These subjects were surveyed at the beginning and the end of the sixth grade. In addition these subjects were again surveyed at the end of the 7th and 8th-grades as well as the beginning of the

9th grade. While these subjects were surveyed at the beginning of the 9th grade, they were not asked survey questions critical to this study and therefore, only the first four measurement points are included in this study. Those subjects randomized to the treatment condition schools participated in Going Places, a multiple component intervention, based on the principles of Social Cognitive Theory. Going Places was designed to increase school engagement and prevent increases in smoking, drinking, and anti-social behavior.

There were 1,490 students in thecontrol schools and therefore in thecontrol group who were eligible to participate in the Time 1 assessment. At this time point, parental consent was refused for 118 of these 1,490 students and these students are therefore excluded from the analysis. Another 47 students failed to return consent forms and 55 students were absent both assessment days. Of the 1,270 completed surveys at this first time point, three were deemed unusable. Therefore, 1,267 students were assessed at the first time point. Between the first time point and the fourth time point, a total of 280 new or additional students completed surveys. Table 3-1 on page 46 describes the addition and loss of students at each time point. The total added refers to students who were originally eligible to participate and who were measured at the current measurement but for one reason or the other did not participate in at least one previous measurement point. The final sample used for all analyses was constructed using these individual time point samples.

Table 3-1: Study Participation and Loss to Follow-up

Category	Grade 6 – Fall	Grade 6 – Spring	Grade 7 – Fall	Grade 8 - Fall
Total Eligible	**1490**	**1267**	**1186**	**1164**
Total Lost	223	175	121	71
Consent Refused	118	41	1	3
Consent not Returned	47	60		
Absent	55	18	24	17
Moved Away		7	3	1
Special Education		19	9	5
Incomplete survey	3			
No data		30	75	38
Failed grade			9	7
Total Added*		94	99	89
Analysis Sample	1267	1186	1164	1182

*Total added refers to students who were originally eligible to participate and who were measured at the current measurement, but did not participate in at least one previous measurement point.

Going Places Measurement Tool

The initial measurement questionnaire consisted of 116 items that covered a variety of smoking and drinking variables, background/contextual information as well as a variety of psychosocial, school and parent variables. The measures in this questionnaire were piloted on a sample of 130 6th-grade students. In addition to variables measuring drinking, exposure to peer drinking and alcohol use, this questionnaire measured current and past cigarette use and intention to use, antisocial behavior, peer influence, self-control efficacy, social competence, deviance acceptance,

school engagement and three aspects of parenting behavior (parental expectations, parental involvement and parental monitoring). Appendix B, Going Places Student Health Survey, lists all of the questions used and possible responses.

Data Collection

Following randomization to treatment or control condition, parental consent was obtained for each subject in each school. This parental consent was obtained in 6th-grade before the first assessment time and again in the 9th grade before the high school follow-up assessment. Questionnaires were administered during class and during make-up sessions. Each class session during which questionnaires were administered was 90 minutes. The make-up sessions were scheduled the following week for students who were absent on the initial assessment day. Two trained proctors administered data collection to intact classes of 20 to 30 students each. Each proctor received four hours of training based on a standard data collection protocol developed for the study. Study investigators and project staff provided the training and acted as team leaders supervising several pairs of proctors. Classroom teachers remained in the classroom to manage student behavior. While these teachers were in the classroom during questionnaire administration, they were instructed not to circulate around the room or otherwise be involved in the conduct of the survey. In order to assure subject confidentiality, subjects completed and turned in separately from the actual questionnaire, a cover page that included name, survey identification number, birth date, and homeroom teacher's name. The actual questionnaire only had a numerical identifier that matched the one on the cover page. Students were then tracked across the different measurement time points

using birth date, student identification number, last name, and first name. School personnel provided verification on any matches that were difficult for study personnel to ascertain such as any changes in student names during the study time period. The Institutional Review Board of the NICHD as well as authorized representatives of the school district reviewed and approved the original study.

Measurement of Theoretical Constructs

In order to answer the research questions of this study, the following key variables are needed. Information on the measurement and scoring of positive alcohol expectancy, exposure to peer drinkers, and personal alcohol use is described in this section.

Positive Alcohol Expectations

The outcome variable in this study is positive alcohol expectancy. The Going Places Student Health Questionnaire contained five questions that were developed for this study by the original research team as developmentally appropriate measures of outcome expectations. These five questions were piloted along with the other 111 items of the Going Places Student Health Questionnaire. All of the measures were piloted on a sample of 130 sixth-grade students. All subscales including the outcome expectation subscale were subjected to a factor analysis with a promax rotation to simplify the interpretation of the factor structure. This analysis either confirmed that the structure of the data was consistent with the intended subscale structure or led to the modification of these subscales to fit the empirical findings. Items were eliminated if they were associated with multiple factors or not adequately associated with a factor.

These researchers felt that the AEA-A (90 questions) and CEOA (38 questions), two of the most used scales to measure alcohol expectancy, were designed to capture outcome expectations among those with substantial drinking experience. Therefore, this research group felt that these measures would be inappropriate for this young population of early adolescents, most with no direct personal drinking experience (B. Simons-Morton, April 2, 2004). Other researchers also shared this concern about the developmental appropriateness of these other scales for a younger, mostly non-drinking population. For example, Johnson and Johnson (1996) in their study of first, fourth, and seventh graders, instead of one of the more popular outcome expectancy measurement scales, used an alcohol vignette procedure to elicit expectancies. Kraus, Smith and Ratner (1994) as well as Miller, Smith, and Goldman (1990), used the Children's alcohol-related expectancies (CARE) procedure in an effort to measure expectancies across a wide age range of children. In this procedure, items with very simplified language were designed and then administered by an adult and two hand puppets (Miller, Smith, & Goldman, 1990). The procedure was designed to be relatively brief as to fall within the attention span of a younger population. Additional researchers have used shorter measurement scales in efforts to address the developmental needs of their study populations or to address other study constraints (Aas, 1993; Musher-Eizenman, Holub, & Arnett, 2003; Sayer & Willett, 1998). Sayer & Willett (1998) in their study asked adolescents to respond to a limited number of questions (7) to measure alcohol expectancy. This was done to limit respondent burden due to the multiple measurement points. Musher-Eizenman, Holub, and Arnett (2003) used three questions to measure outcome expectancy for alcohol, for cigarettes, and for marijuana. This scale

demonstrated good reliability (α = .86 for the younger sample and α = .73 for the older sample).

The five questions developed for this study to measure outcome expectations are similar to the questions used in these two studies as well as similar to questions used to measure this concept of alcohol expectation by the larger more well known measurement tools. Table 3-2 on page 51 compares the Going Places outcome expectation questions to questions from the AEQ-A, the CEOA and other studies found in the literature. As with the other measures used in the literature, the outcome expectation measure used in this study captures both positive and negative expectations. In addition, the idea of alcohol promoting an enjoyable experience, alcohol affecting social status and alcohol creating problems are all similar ideas measured by both the Going Places construct and the measurement constructs found in the literature. The Going Places construct however, does not measure alcohol's affect on sexuality. Neither does it directly measure alcohol's ability to promote relaxation or tension reduction as do some other measurement constructs found in the literature.

The possible responses to the series of questions related to alcohol expectations used in this study used a four-point Likert type scale ranging from "very likely" to "very unlikely." Each response is coded with a number from one to four. Because there are only four responses, two that are likely and two that are unlikely, each subject was forced to make a decision of likelihood for each statement. No middle, or undecided option was given. The five questions asking subjects about their alcohol outcome expectations are used to create a composite scale measuring positive alcohol expectations. This measure is a continuous summative scale. That is, in order to create a total scale score, the coded

response from each item (1-4) were added or summed. This lead to a total scale score from 5-20. A score of 20 represented the highest possible positive outcome expectation while a score of 5 represented the lowest possible positive outcome expectation. Table 3-3 on page 52 demonstrates the coding of each response for the five questions making up this scale.

Table 3-2: Alcohol Expectancy Measurement Comparison

AEQ-A* Sample Questions (5 out of 90 Questions)	**CEOA** Sample Questions** (5 out of 38 Questions)	**Additional Questions used in the Literature**	**Going Places Questions** ***(If you were to drink alcohol, how likely would each of the following be?)***
• Teenagers drink alcohol because they feel forced to do so by their peers. • Drinking alcohol creates problems • Drinking alcohol makes a person feel good and happy. • People drink alcohol because it gives them a neat, thrilling, high feeling. • People get in better moods after a few drinks of alcohol	• I would feel guilty • I would feel self-critical • I would feel calm • My body would feel relaxed • I would feel unafraid	• If you drank alcohol regularly, would you get into trouble at school? (Sayer & Willett, 1998) • How do his/her friends feel about his/her drinking beer? (Johnson & Johnson, 1996) • Using alcohol can make you more popular (Musher-Eizenman, Holumb & Arnett, 2003)	• Some of my friends would not approve • Someone would try to stop me • I would get in trouble • I would feel badly about it • I would enjoy it

*Alcohol Expectancy Questionnaire-Adolescent Form
**Comprehensive Effects of Alcohol

Table 3-3: Response Coding for the Positive Alcohol Expectation Measure

Question Number	**Question** *(If you were to drink alcohol, how likely would each of the following be?)*	**Response Option**	**Coding**
30.a	I would get in trouble	Very unlikely	4
		Unlikely	3
		Likely	2
		Very likely	1
30.b	Some of my friends would not approve	Very unlikely	4
		Unlikely	3
		Likely	2
		Very likely	1
30.c	I would enjoy it	Very unlikely	1
		Unlikely	2
		Likely	3
		Very likely	4
30.d	Someone would try to stop me	Very unlikely	4
		Unlikely	3
		Likely	2
		Very likely	1
30.e	I would feel badly about it	Very unlikely	4
		Unlikely	3
		Likely	2
		Very likely	1
Continuous additive scale from 5 to 20. Highest possible positive expectation score would be 20; Lowest possible positive expectation score would be 5.			

In order to examine the reliability of this expectation scale, Cronbach's alpha was computed. This Cronbach's alpha measured the inter-item consistency, and therefore, the scale's reliability. Cronbach's alpha was computed for the totalcontrol group s ample, and each gender sample. If the Cronbach's alpha had suggested that this set of items was not reliable, one question among this set would have been used alone to measure positive

alcohol expectations. This question would have been question 30b, "If you were to drink alcohol, how likely would it be that you would enjoy it?"

Exposure to Peer Drinking

The key explanatory variable in this study is exposure to peer drinking. This variable was measured with a single question asking how many of the subject's five closest friends drink alcohol. Subjects were able to respond as being exposed to as few as zero close friend drinkers or as many as five. This variable was treated as a continuous variable.

Alcohol Use

Alcohol use was measured for this study with a single question asking about past 30-day alcohol use. The question reads, "How many times have you had alcoholic beverages (beer, wine, liquor) to drink other than for religious purposes in the last 30 days?" Possible responses include zero, 1 to 2, 3 to 9, 10 to 19, and 20 or more. This variable was treated as a continuous variable.

Statistical Analysis

A fairly new and exciting statistical technique called Latent Growth Curve Analysis (LCA) was used in this study. Latent curve analysis is part of a broad class of newly developed statistical techniques called random coefficient models that are better suited for studying individual differences in development and change than traditional methods (Curran, 2000). This approach takes advantage of both structural equation

modeling that incorporates latent variables and hierarchical linear modeling that allows random coefficients across individual developmental trajectories. LCA was developed in the psychometric tradition, and it utilizes multiple indicator latent factors to estimate the fixed (or group level) and random (or individual level) components associated with individual differences in developmental trajectories over time. A basic LCA model is comprised of two latent factors, the intercept and the slope (Curran & Muthen, 1999). The intercept may estimate a number of different parameters, depending on the coding of the variables. In the current study the intercept represents the initial status and is defined by fixing all of the factor loadings at Time 1. The intercept captures a starting point of the developmental growth trajectory at Time 1. The second latent factor, the slope represents the growth rate over time. The factor loadings of the repeated measures are parameters that define the shape of the developmental growth trajectory over time.

This technique is both powerful and flexible and it has many advantages over more common methods of studying change over time. An advantage of latent growth curve analysis is its ability to describe data at the individual level. Specifically, LCA can be used to describe individuals' behavior in terms of initial levels and their developmental trajectories from and to those levels Most of the traditional methods used to study longitudinal data are only able to provide researchers with information about the behavior of groups as a whole and not information at the individual level. The fact that LCA is also able to provide information on the group level variability in both the initial levels and in the trajectories helps to make this analysis technique unique and extremely useful. Further, this technique can also be used to test the contribution of other variables to explain the initial levels and growth trajectories. The technique allows for

simultaneous focus on correlations over time, changes in variance, and shifts in mean values. (Hancock, Kuo, & Lawrence, 2001). It allows for the identification of growth in individual variables as well as the relations between the growth in multiple variables (Ferrar & McArdle, 2003). In addition, the technique does not have the variable distribution assumption restraints that many other techniques have. For example, an advantage of growth modeling in a latent variable framework is that categorical latent variables can be used (Muthen & Muthen, 2003).

While other statistical models are often used to analyze longitudinal data, recently there has been a great push to better link theoretical models and statistical models in studies of change over time (Curran, 2000). Until recently however, this has been difficult due to a lack of appropriate statistical techniques. The introduction and better researcher understanding of LCA has helped to better link theoretical models and statistical models in studies of change over time. For several reasons, the use of LCA in this study is the best matched statistical model. First the research questions in this study are asking about the relation between characteristics of variables (adolescent alcohol use and peer alcohol use) in the prediction of patterns of intra-individual change in adolescent positive alcohol expectations. Intra-individual change refers to individual change within each individual adolescent and not individual change relative to a larger group. The theoretical models in this study, suggest inter-individual differences in variables (adolescent alcohol use and peer alcohol use) that are related to the intra-individual change in alcohol expectations over time. Inter-individual differences refer to change relative to other individuals. This study's theoretical models therefore examine how individual changes in adolescent alcohol use and peer alcohol use compared to the group

of adolescents predicts individual change in positive alcohol expectations within each individual.

Other models discussed for use in the study, for example, an auto-regressive, cross-lagged (ARCL) panel model analyze change relative to the study group, and not individual change. In addition, the prospective paths of an ARCL model represent average relative standing between two discrete time points and not continuous change across all three-time-points. Therefore, this model only answers part of the question about change over time. The LCA model however, represents continuous change across all time points (Curran, 2000; Ferrar, & McArdle, 2003).

A final advantage of using LCA over other longitudinal techniques is how this technique handles clustering of data. Researchers have struggled with how to handle clustered data because more traditional analytical methods are limited in their handling of the technical difficulties posed by clustering. LCA however actually offers the possibility of making use of within-cluster differences in parameter estimates, by treating these differences as a meaningful source of variance rather than as within-group error (Duncan, et al, 1999). While clustering will affect the resulting parameter estimates in LCA it should not affect whether or not the variables in question are related (K. O'Grady, August 2, 2004). Since the research questions in this study are simply asking about relationships between key research variables, how LCA handles clustered data is one more reason why this technique is the most appropriate for the study.

A fundamental assumption of LCA is that the variable under question is systematically related to the passage of time (Duncan, Duncan, Strycker, Li, & Alpert, 1999). As demonstrated by the literature (Kraus, Smith & Ratner, 1994; Loveday, Oei, &

Young, 1997; Lundahl, Davis, Adesso & Lukas, 1997; Musher-Eizenma, Holub & Arnett, 2003) the development of positive alcohol expectations does indeed seem to be systematically related to the passage of time or age progression. Another requirement for the use of LCA is multiple measurements over time. Again, with four measurement time points the Going Places data fit this requirement.

Because LCA starts with the specification of a model or models to be estimated, assessing the goodness of fit of the data to the models will be a crucial first step. The χ^2 goodness-of-fit statistic is the original fit statistic for structural models (Newsom, 2001). The χ^2 statistic however is sensitive to sample size. That is, large samples often return statistically significant χ^2 values. Therefore it is recommended that other fit indexes be used to supplement the χ^2 statistic. Hu and Bentler (1999) recommend using a two-index strategy to supplement the χ^2 values. These authors suggest that practitioners use a cutoff value of .08 for the standardized root mean square residual (SRMR) with a cutoff value of .95 for the Comparative Fit Index (CFI) or other similar index to evaluate model fit. These two indices and respective cutoff values are therefore used in this study to evaluate the fit of the data to the hypothesized models.

Preliminary Analyses

In an effort to inform the analysis of the main study research questions, the following preliminary analyses were conducted.

Variable Descriptions

Five analysis steps were taken in an effort to describe the variables used in this study. A part of these five steps was to identify any confounding variables that needed to be controlled for during the analysis of the major research questions.

1. Frequency data describing the sample such as the frequencies of gender, ethnicity, study school, and socioeconomic status was calculated.
2. Both the mean and standard deviations were calculated at all measurement time points for positive alcohol expectations and exposure to peer drinkers.
3. The correlation between the alcohol expectation scale and the exposure to peer drinkers was calculated at each measurement point.
4. The relationships between the alcohol expectation scale and possible confounding variables were examined. Possible confounding variables included: school attended; intervention group; gender; ethnicity; socioeconomic status; and parental involvement, monitoring, and expectations.
5. The relationships between both the exposure to peer drinkers and alcohol use and possible confounding variables were examined. Possible confounding variables included: school attended; intervention group; gender; ethnicity; and parental involvement, monitoring, and expectations.

Preliminary Associations

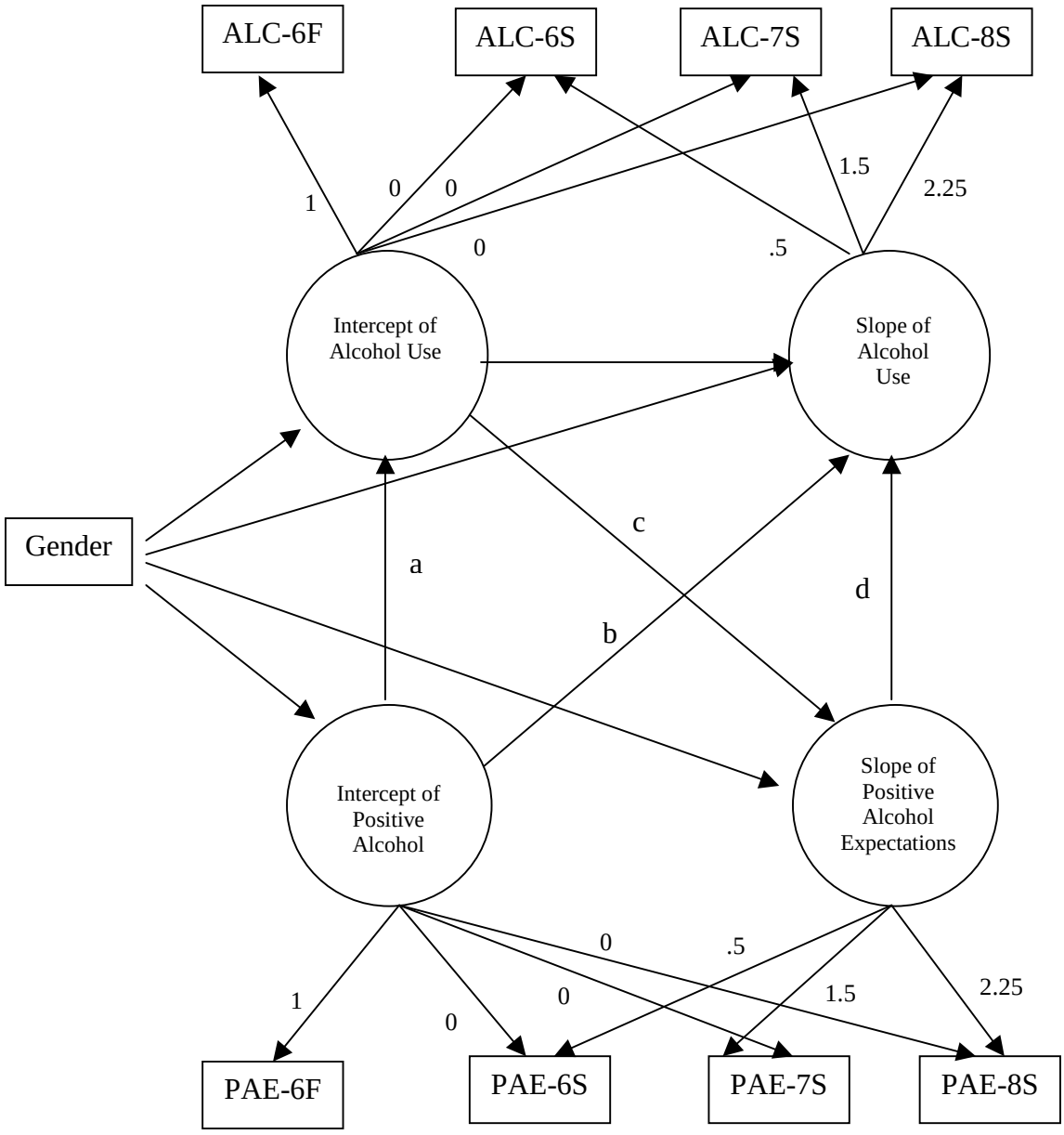
Based on the previous variable description steps, the following analysis steps were conducted.

1. A cross-sectional regression at time point 1 was conducted of the predictive value of exposure to peer drinkers on positive alcohol expectations. This analysis was done with and without controlling for significant confounders.
2. Three prospective regression analyses were conducted. These three prospective regressions analyzed the predictive value of exposure to peer drinkers on positive alcohol expectations at the following measurement points. These analyses were also conducted with and without controlling for significant confounders.
    - Examining the predictive value of Time 1 (6th-grade fall) exposure to peer drinkers on Time 2 (6th-grade spring) positive alcohol expectations.
    - Examining the predictive value of Time 2 (6th-grade spring) exposure to peer drinkers on Time 3 (7th-grade spring) positive alcohol expectations.
    - Examining the predictive value of Time 3 (7th-grade spring) exposure to peer drinkers on Time 4 (8th-grade fall) positive alcohol expectations.

Analysis to Answer Research Questions

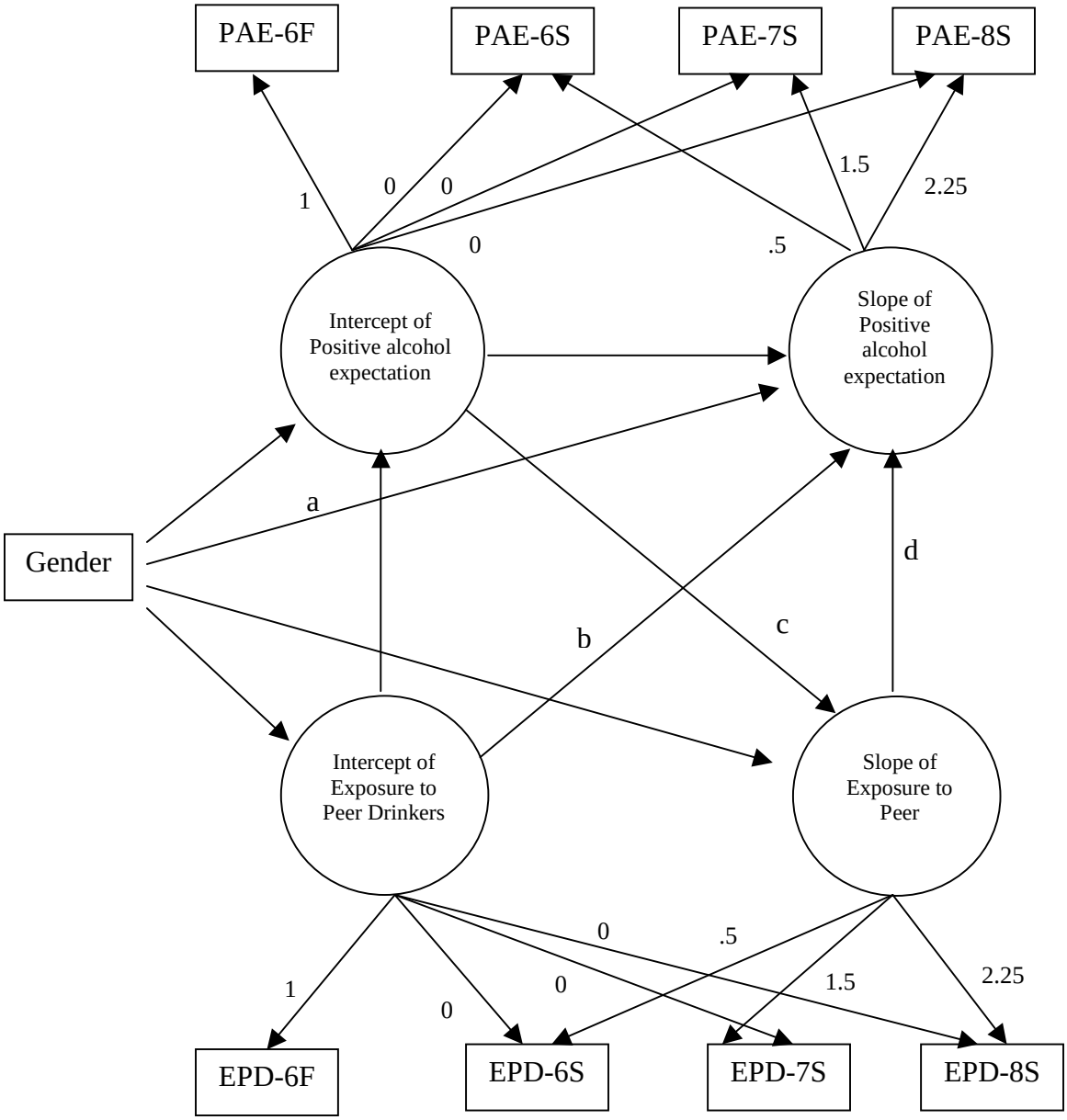
Specific analysis steps for each research question can be found in the following section. Figures 3-1, 3-2 and 3-3 on pages 60 through 62 provide an overview of the latent growth models that were examined in this study. These models were used to answer each research question below.

Figure 3-1: Latent Growth Model of the Influence of Increase in Positive Alcohol Expectation (PAE) on Increase in Alcohol Use (ALC)*



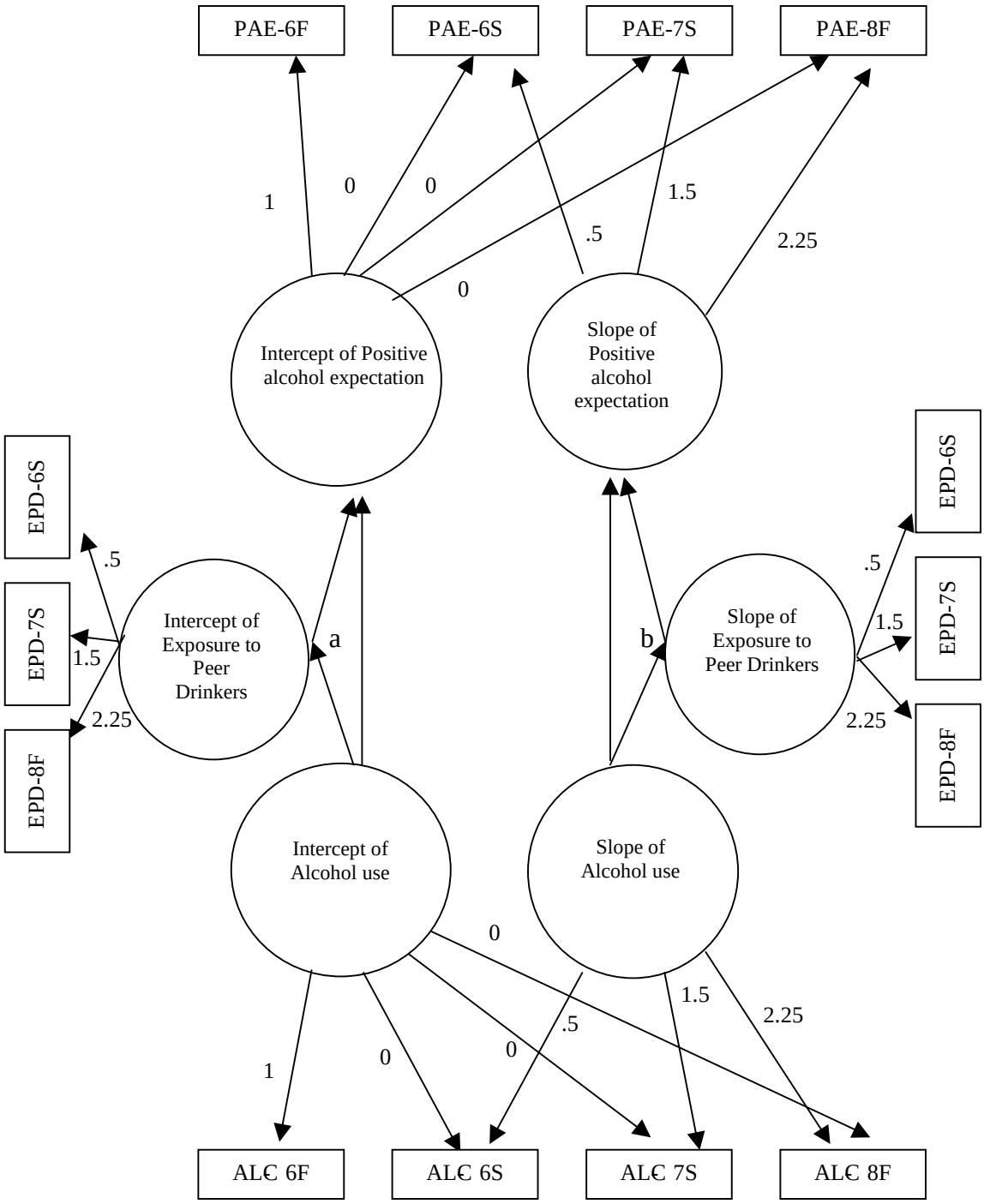
*6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

Figure 3-2: Latent Growth Model of the Influence of Increase in Exposure to Peer Drinkers (EPD) on Increase in Positive Alcohol Expectations (PAE)*



*6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

Figure 3-3: Latent Growth Model of the Indirect Influence of the Increase of Alcohol Use (ALC) on the Increase of Positive Alcohol Expectations (PAE) through the Increase of Exposure to Peer Drinkers (EPD)*



*6F=fall of the 6th grade; 6S=spring of the 6th grade; 7S=spring of the 7th grade; and 8F=fall of the 8th grade

Research Question I

I. Does the rate of change in positive alcohol expectations directly influence the increase in alcohol use?

Hypothesis: It is hypothesized that the rate of change in positive alcohol expectations will directly influence the increase in alcohol use.

Analysis Steps:

1. LGC modeling was used to examine if initial positive alcohol expectations (intercept) predict the initial alcohol use (intercept). See Figure 3-1(a).
2. LGC modeling was used to examine if initial positive alcohol expectations (intercept) predicts the mean rate of alcohol use change (slope) See Figure 3-1(b).
3. LGC modeling was used to examine if initial alcohol use (intercept) predicts the mean rate of positive alcohol expectation change (slope). See Figure 3-1(c).
4. LGC modeling was used to examine if the mean rate of positive alcohol expectation change (slope) predicts the mean rate of alcohol use change (slope). See Figure 3-1(d).

Research Question II

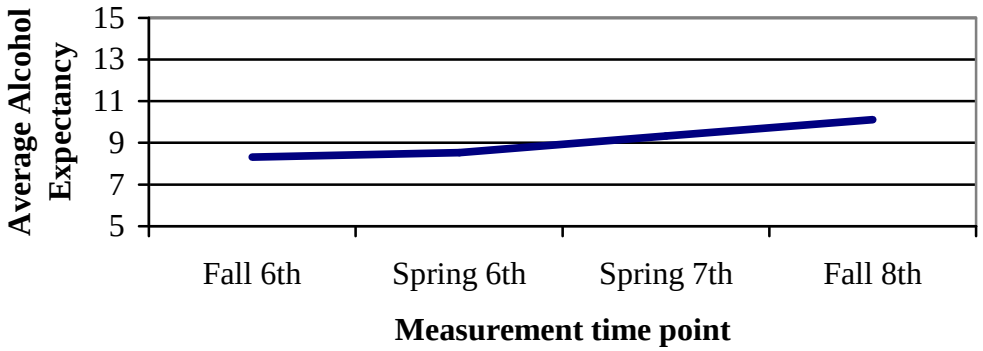
II. What are the developmental trajectories of positive alcohol expectations among early adolescents?

Hypothesis: While linear, exponential and other more complex models will be examined, it is hypothesized that the developmental trajectories of positive alcohol expectations will best be fit by a linear model.

Analysis Steps:

1. Calculate average positive alcohol expectation for study population from the beginning of 6th-grade to the beginning of 8th-grade. See Figure 3-4.

Figure 3-4: Hypothetical Average Positive Alcohol Expectations Grades 6 to 8



2. LGC modeling was used to:

- Determine the shape of the trajectory of the dependent variable in question – positive alcohol expectations. Data was fit to a linear model, exponential model and other models as necessary.
- Determine if significant individual differences in the rate of alcohol expectation increase exist. Significant individual differences in the rate of alcohol expectancy increase were found if a significant variance of the slope factor was found.
- Determine if initial levels of alcohol expectation affect the rate of increase of alcohol expectation. If this was true, the intercept and slope covary.

Research Question III

III. Does the rate of change in exposure to peer drinkers directly influence the increase in positive alcohol expectations among early adolescents?

Hypothesis: It is hypothesized that the increase in exposure to peer drinkers will directly influence the increase in positive alcohol expectations.

Analysis Steps:

1. LGC modeling was used to examine if initial exposure to peer drinking (intercept) is related to the initial alcohol expectation (intercept). See Figure 3-2(a).
2. LGC modeling was used to examine if initial exposure to peer drinking (intercept) is related to the mean rate of alcohol expectation change (slope) See Figure 3-2(b).
3. LGC modeling was used to examine if initial alcohol expectation (intercept) is related to the mean rate of exposure to peer drinking change (slope). See Figure 3-2(c).
4. LGC modeling was used to examine if the mean rate of exposure to peer drinking change (slope) is related to the mean rate of alcohol expectation change (slope). See Figure 3-2(d).

Research Question IV

IV. How does gender affect 1) the increase of positive alcohol expectancy and, 2) the influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations among early adolescents?

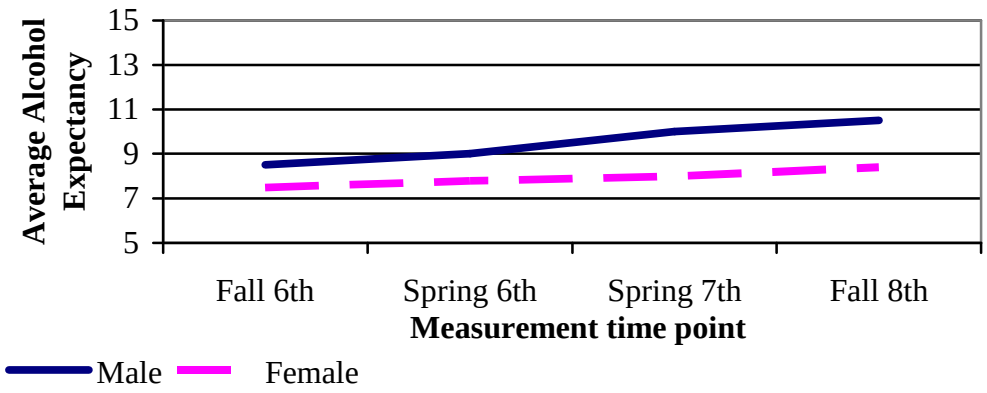
Hypothesis 1: It is hypothesized that the trajectories of positive alcohol expectations for males and females will differ with males having higher positive expectations and higher rates of increase in positive expectations than females.

Hypothesis 2: It is hypothesized that the increase in exposure of peer drinkers will continue to directly influence the increase in positive alcohol expectations even after controlling for gender.

Analysis Steps:

1. Calculate average positive alcohol expectation for males and females from the beginning of 6th-grade to the beginning of 8th-grade. See Figure 3-5.

Figure 3-5: Hypothetical Average Positive Alcohol Expectations by Gender, Grades 6 to 8



2. LGC modeling was used to examine the conditional model. This conditional model will be used to:

- Determine whether gender is associated with individual differences in alcohol expectations at time 1.
- Determine whether gender predicts the increase in alcohol expectations.
- Determine if initial exposure to peer drinking (intercept) is related to the initial alcohol expectation (intercept) while controlling for gender.

- Determine if initial exposure to peer drinking (intercept) is related to the mean rate of alcohol expectation change (slope) while controlling for gender.
- Determine if initial alcohol expectation (intercept) is related to the mean rate of exposure to peer drinking change (slope) while controlling for gender.
- Determine if the mean rate of exposure to peer drinking change (slope) is related to the mean rate of alcohol expectation change (slope) while controlling for gender.

Research Question V

V. Does the increase in alcohol use indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

Hypothesis: It is hypothesized that the increase in alcohol use will indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

Analysis Steps:

- LGC modeling was used to examine if initial personal alcohol use (intercept) is indirectly related to the initial alcohol expectation (intercept) through the initial exposure to peer drinking (intercept). See Figure 3-3(a).
- LGC modeling was used to examine if the increase in personal alcohol use (slope) is indirectly related to the increase in alcohol expectation (slope) through the increase in exposure to peer drinking (slope). See Figure 3-3(b).

Chapter Four: Results

Introduction

The following pages present the results of the statistical analyses conducted for this study. First, a discussion of the selection of the final sample will be given followed by a description of this final sample. The results of the preliminary analyses including descriptions of all main study variables as well as the relationships between study variables and potential confounding variables will be presented. Next, preliminary associations among the three main study variables including cross-sectional and prospective regression analyses will be presented. Finally, the results of the analyses conducted to answer the specific study research questions will be presented.

Final Sample Selection

It was desired to create a dataset that included as many cases as possible for analysis yet use the fullest information possible (least number of missing values). Therefore, the final sample was determined by limiting the full sample (N = 1,660) to those who responded to all five of the questions making up the alcohol expectation scale, the study dependent variable, at three or more measurement points (n = 1,060). This sample size was the same for the analysis of all models however, the sample size did vary between individual measurement points. Several comparison analyses were conducted between the full sample and the final sample to ensure that major significant differences did not exist between these two samples that could create a bias in the results. Chi-square goodness-of-fit tests revealed a significant difference (χ^2 = 9.43, df = 2, p = .01) between the groups in ethnicity with a slightly higher percentage of the final sample reporting

being of white ethnicity than the full sample (73.2% versus 67.7%). Additionally, a *t* test revealed a significant difference ($t = -2.90$, $df = 987$, $p < .01$) in the fall 6th-grade measurement of the alcohol expectation scale between the full sample and the final sample The mean of the fall 6th-grade alcohol expectation scale for the final sample was slightly lower ($M = 8.02$, $SD = 3.48$) than the full sample ($M = 8.34$, $SD = 3.69$). No other significant differences were found in any of the other demographic or study variables examined. Tables 4-1 to 4-3 on pages 69 through 71 present the results of the comparison analyses.

Table 4-1: Baseline Comparison of the Full Sample and Final Sample

Demographic Variable	**Full Sample**		**Final Sample**	
	N	**%**	**N**	**%**
Gender				
Male	816	49.2	486	45.8
Female	844	50.8	574	54.2
Ethnicity*				
White	1103	66.4	776	73.2
Black	375	22.6	198	18.7
Other	151	9.1	86	8.1
Missing	31	1.9	0	0
Mother's Education				
Less than High School	46	2.8	31	2.9
High School	359	21.6	278	26.2
Some College	183	11.0	149	14.1
College Graduate	320	19.3	275	25.9
Graduate School	82	4.9	71	6.7
Don't Know	216	13.0	165	15.6
Doesn't live with	11	.7	9	.8
Missing	443	26.7	82	7.7

* $\chi^2 = 9.43$, $df = 2$, $p = .01$

Table 4-2: Comparison of the Full Sample and Final Sample by Measurement Point

Demographic Variable	Measurement Point															
	Fall 6th-grade				Spring 6th-grade				Spring 7th-grade				Fall 8th-grade			
	Full Sample		Final Sample		Full Sample		Final Sample		Full Sample		Final Sample		Full Sample		Final Sample	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
School																
School One	7	.4	6	.6	0	0	0	0	10	.6	10	.9	11	.7	9	.8
School Two	264	15.9	222	20.9	252	15.2	231	21.8	265	16.0	228	21.5	278	16.7	224	21.1
School Three	234	14.1	194	18.3	226	13.6	200	18.9	211	12.7	195	18.4	214	12.9	189	17.8
School Four	1	.1	1	.1	0	0	0	0	9	.5	8	.8	9	.5	8	.8
School Five	3	.2	3	.3	0	0	0	0	8	.5	7	.7	16	1.0	14	1.3
School Six	372	22.4	281	26.5	356	21.4	291	27.5	322	19.4	280	26.4	315	19.0	256	24.2
School Seven	386	23.3	302	28.5	352	21.2	316	29.8	339	20.4	309	29.2	339	20.4	295	27.8
Missing	393	23.7	51	4.8	474	28.6	22	2.1	496	29.9	23	2.2	478	28.8	65	6.1
FARM*																
Yes					236	14.2	187	17.6	181	10.9	156	14.7	175	10.5	148	14.0
No					705	42.5	636	60.0	813	49.0	745	70.3	860	51.8	742	70.0
Don’t know					216	13.0	198	18.7	155	9.3	126	11.9	130	7.8	93	8.8
Missing					503	30.3	39	3.7	511	30.8	33	3.1	495	29.8	77	7.3

*Free and Reduced Meal Program (FARM)

Table 4-3: Comparison of the Full Sample and Final Sample – Main Study Variables

Measurement Point	Main Study Variable								
	Alcohol Use in the last 30 days			Alcohol Expectation Scale			Exposure to Peer Drinkers		
	***M* (*n*)**	***SD***	***p***	***M* (*n*)**	***SD***	***p***	***M* (*n*)**	***SD***	***p***
Fall 6th-grade									
Full Sample	.08 (1177)	.32	.07	8.34 (1220)	3.69	< .01*	.26 (1240)	.79	.11
Final Sample	.06 (955)	.29		8.02 (955)	3.48		.22 (994)	.72	
Spring 6th-grade									
Full Sample	.18 (1177)	.54	.75	8.49 (1163)	3.79	.40	.49 (1181)	1.10	.71
Final Sample	.17 (1031)	.52		8.40 (1026)	3.76		.48 (1036)	1.09	
Spring 7th-grade									
Full Sample	.31 (1155)	.75	.90	9.42 (1157)	4.13	.68	.92 (1163)	1.47	.43
Final Sample	.31 (1030)	.75		9.37 (1032)	4.13		.89 (1036)	1.43	
Fall 8th-grade									
Full Sample	.40 (1179)	.79	.92	10.03 (1177)	4.29	.75	1.25 (1182)	1.64	.99
Final Sample	.40 (994)	.79		9.99 (993)	4.32		1.25 (995)	1.64	

* $t = -2.902$, $df = 987$

Sample Description

Demographic Variables

A description of the demographic characteristics of the final sample can be found in Tables 4-1 and 4-2 on pages 69 and 70. The final sample was overwhelmingly of White ethnicity (73.2%). Over half (50.6%) of the students reported that their mothers had more than a high school education and only 31.6% reported that their mothers had a high school education or less. Seven different schools were represented in this dataset. Of these seven schools, four represent the majority of the respondents over the four measurement points. School One, School Four and School Five have far fewer respondents. Over the three measurement points available describing the student's participation in the Free and Reduced Meal Program (FARM), the majority of respondents reported not participating (60.0% to 70.3%).

Other Substance Use Variables

A description of the final sample's cigarette and marijuana use can be found in Table 4-4 on page 73. Very few respondents reported at each measurement point having used marijuana in the last 30 days. A significant increase in marijuana use over the four measurement points however was found. More students reported at each measurement point having smoked a cigarette in the last 30 days than having used marijuana. In addition, as with marijuana, a significant increase in cigarette use over the four measurement points was also found.

Table 4-4: Sample Description: Other Substance Use Variables

Demographic Variable	Measurement Point							
	Fall 6th-grade		Spring 6th-grade		Spring 7th-grade		Fall 8th-grade	
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Have you smoked a cigarette, even just a puff in the last 30 days?								
Yes	36	3.8	102	9.8	183	17.7	178	17.9*
No	923	96.2	931	90.1	852	82.3	815	82.1
Have you used marijuana in the last 30 days?								
Yes	2	.2	22	2.2	51	5.0	52	5.2*
No	961	99.8	1010	97.9	984	95.1	941	94.8

* χ^2 goodness-of-fit tests showed that the difference between the percentage from fall 6th-grade to fall 8th-grade is significant at the $p < .01$ level.

Main study Variables

Alcohol Use

Alcohol use was measured with the question, "How many times have you had alcohol beverages (beer, wine, liquor) to drink other than for religious purposes in the last 30 days?" Responses were scored as 0 (0 times), 1 (1 to 2 times), 2 (3 to 9 times), 3 (10 to 19 times), and 4 (20 or more times). These responses represented a 4 point scale and a mean scale score was then calculated. A higher mean demonstrates more frequent 30-day alcohol use. Table 4-5 on page 74 presents the percentage of responses as well as the mean alcohol use scale score at each measurement. Alcohol use was reported by more students in this sample than either cigarettes or marijuana. The majority of those who reported using alcohol reported using it less than 10 times in the last month with the highest percentage of users reporting using alcohol only 1 or 2 times in the last 30 days.

Very few students reported using alcohol 20 or more times at each measurement point. The mean alcohol use was .06 (*SD* = .29) at the first measurement point and rose to .40 (*SD* = .79) at the last measurement point. The mean alcohol use increased significantly between each measurement point. Figures 4-1 and 4-2 on page 75 demonstrate the increase in alcohol use over the study time period.

Table 4-5: Number of Times Participants Used Alcohol in Last 30 Days

Number of Times Used Alcohol in last 30 Days	**Measurement Point**											
	Fall 6th-grade			**Spring 6th-grade**			**Spring 7th-grade**			**Fall 8th-grade**		
	n	**%**	***M* (*SD*)**	***n***	**%**	***M* (*SD*)**	***n***	**%**	***M* (*SD*)**	***n***	**%**	***M* (*SD*)**
0 (0)	901	94.3	.06 (.29)	906	87.9	.17* (.52)	829	80.5	.31* (.75)	730	73.4	.40* (.79)
1 (1-2)	48	5.0		93	9.0		126	12.2		175	17.6	
2 (3-9)	5	.5		20	1.9		46	4.5		59	5.9	
3 (10-19)	0	0		8	.8		13	1.3		16	1.6	
4 (20+)	1	.1		4	.4		16	1.6		14	1.4	

* *t* tests showed that the difference between the mean at this measurement point and the previous measurement point is significant at the $p < .01$ level.

Figure 4-1: Percent Using Alcohol in Last 30 Days Over Time

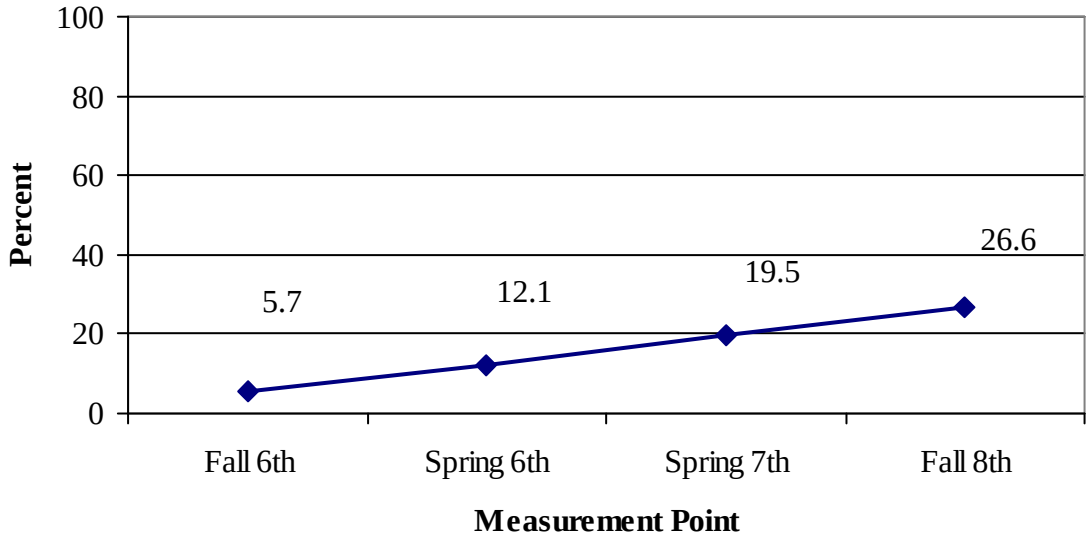
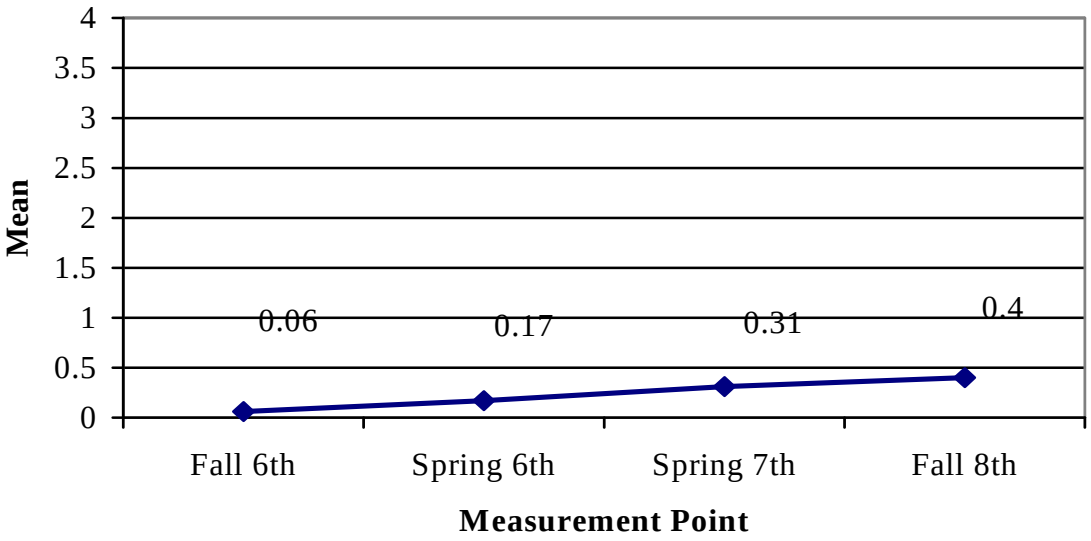


Figure 4-2: Mean 30-Day Alcohol Use Scale Score Over Time



Positive Alcohol Expectation Scale

Participants were asked five questions about their positive alcohol expectations. These five questions were combined into one positive alcohol expectation scale. In order to examine the reliability of this scale, Cronbach's α was computed for each measurement time point. Cronbach's α measures the inter-item consistency, and therefore, the scale's reliability. Cronbach's α was computed for the final sample as well as each gender sample. Tables 4-6 and 4-7 present the Cronbach's α for this scale at each measurement point.

Table 4-6: Reliability of Alcohol Expectation Scale by Measurement Point

Measurement Point	**Cronbach's α**
Fall 6th-grade	.72
Spring 6th-grade	.80
Spring 7th-grade	.82
Fall 8th-grade	.85

Table 4-7: Reliability of Alcohol Expectation Scale by Gender and Measurement Point

Measurement Point	**Cronbach's α**	
	Male	**Female**
Fall 6th-grade	.73	.70
Spring 6th-grade	.80	.78
Spring 7th-grade	.82	.82
Fall 8th-grade	.84	.86

Table 4-8 on page 77 presents summary information about this positive alcohol expectation scale for the final sample. On a scale of 5 to 20, with a higher score

representing having more positive alcohol expectations, the mean scale score ranged from 8.02 at the first measurement point to 9.99 at the last measurement point. This mean increased significantly between each measurement point.

Table 4-8: Summary Information for the Positive Alcohol Expectation Scale

Measurement Point	N	Minimum	Maximum	Mean	Standard Deviation
Fall 6th-grade	955	5	20	8.02	3.48
Spring 6th-grade	1031	5	20	8.40*	3.76
Spring 7th-grade	1030	5	20	9.37*	4.13
Fall 8th-grade	994	5	20	9.99*	4.32

* *t* tests showed that the difference between the mean at this measurement point and the previous measurement point is significant.

Figure 4-3 on page 78 graphically presents the increase in positive alcohol expectations over time found in the final sample. Figure 4-4 on page 78 presents the differences between genders of the increase in positive alcohol expectations over time. Independent-samples *t* tests were conducted to determine if in this sample males differed significantly from females. Table 4-9 on page 79 presents the results of this analysis. At each measurement point, females reported significantly lower positive alcohol expectations than did males. This difference was greatest at the first measurement point (fall 6th-grade) with a mean difference of 1.11 (*SE* = .22) and smallest at the third measurement point (spring 7th-grade) with a mean difference of .66 (*SE* = .26).

Figure 4-3: Mean Positive Alcohol Expectations Over Time

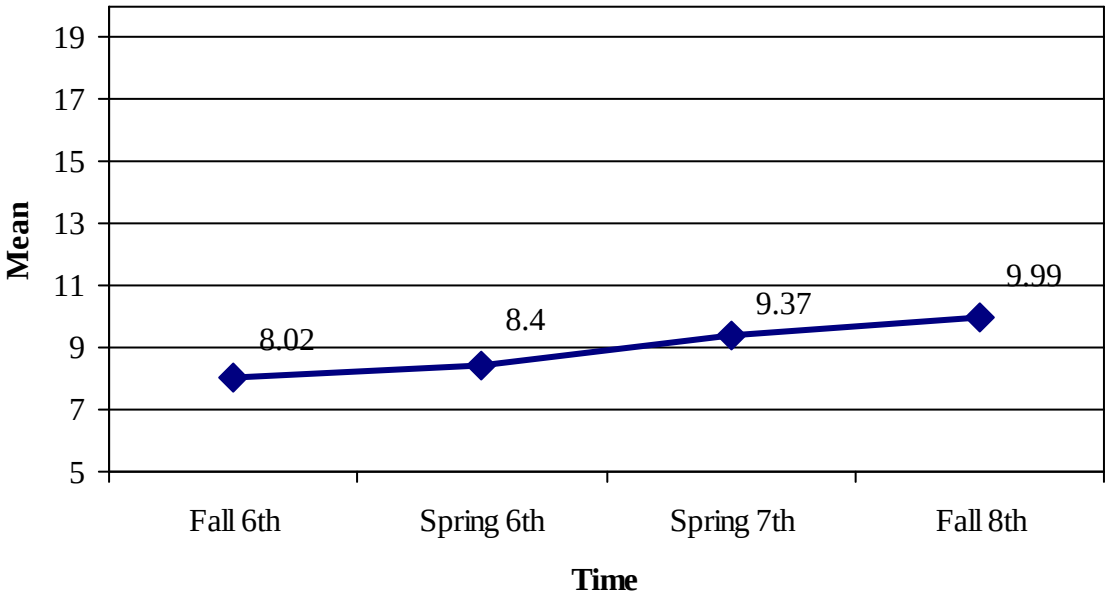


Figure 4-4: Gender Differences in Mean Positive Alcohol Expectations Over Time

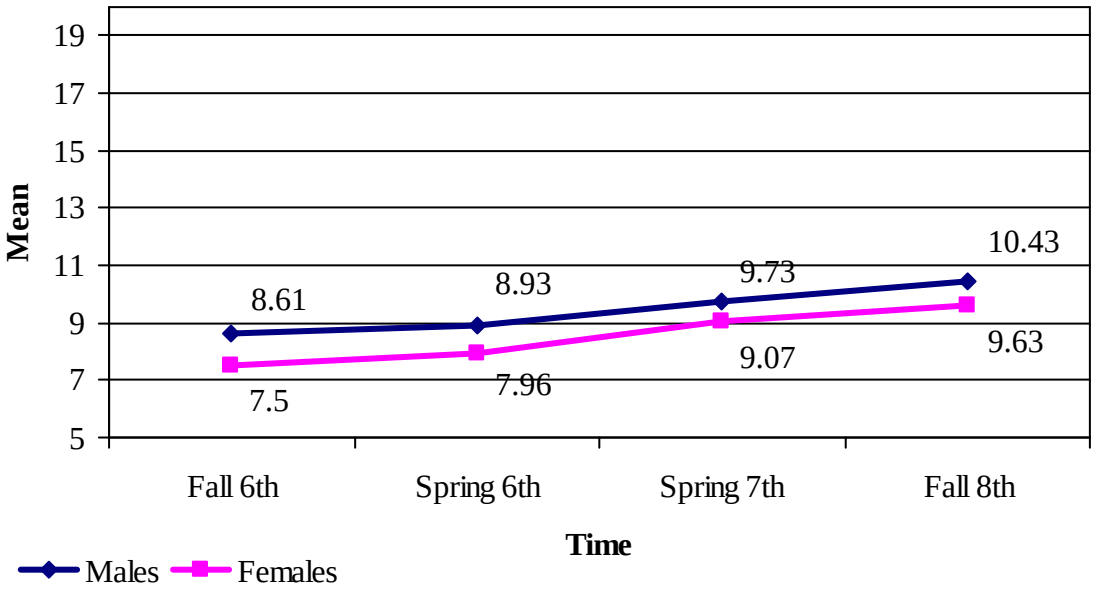


Table 4-9: Gender Differences in Alcohol Expectation Scale Over Time

Measurement Point	Males		Females		*M* Difference	*t*	*df*	*p*
	M	SD	*M*	SD				
Fall 6th-grade	8.61	3.71	7.50	3.19	1.11	4.98	910.4	< .01
Spring 6th-grade	8.93	4.02	7.96	3.47	.97	4.08	926.9	< .01
Spring 7th-grade	9.73	4.22	9.07	4.03	.66	2.58	1030	.01
Fall 8th-grade	10.43	4.28	9.63	4.32	.81	2.93	991	< .01

Exposure to Peer Drinkers

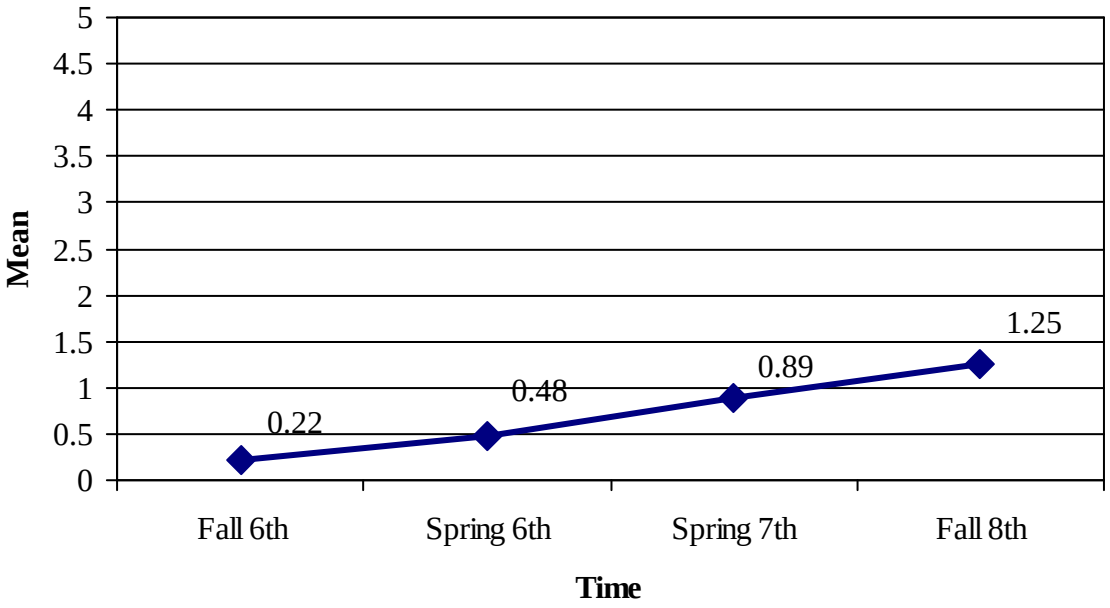
One question was used to measure participants' exposure to peer drinkers. Participants responded to this one question, "How many of your five closest friends drink alcohol" as being exposed to as few as zero close friend drinkers or as many as five. The mean number of closest friends reported ranged from .22 at the first measurement point to 1.25 at the final measurement point. The difference between the means at each measurement point increased significantly. Table 4-10 presents the summary information for this main study variable. Figure 4-5 on page 80 graphically presents the increase in exposure to peer drinkers over time.

Table 4-10: Summary Information for Exposure to Peer Drinkers

Measurement Point	*N*	Minimum	Maximum	*M*	*SD*
Fall 6th-grade	994	0	5	.22	.72
Spring 6th-grade	1036	0	5	.48*	1.09
Spring 7th-grade	1036	0	5	.89*	1.43
Fall 8th-grade	995	0	5	1.25*	1.64

**t* tests showed that the difference between the mean at this measurement point and the previous measurement point is significant at the $p < .01$ level.

Figure 4-5: Mean Exposure to Peer Drinkers Over Time



Variable Associations

Main Study Variables

In an effort to further inform the analyses of the key research questions, associations between all study variables were examined. First, simple Pearson Product-Moment Correlations were examined between each of the main study variables at each measurement point. Tables 4-11 through 4-13 on pages 82 through 84 present these correlation coefficients.

The correlation coefficients between alcohol use and the other two main study variables ranged from –.02 to .53. The smallest correlations were with alcohol use and gender. These correlation coefficients ranged from only -.02 to -.05. All of these correlations with gender also resulted in negative coefficients. The largest correlation

coefficient between alcohol and the other two main study variables was between the spring 6th-grade measurements of alcohol use and exposure to peer drinkers.

The correlation coefficients between positive alcohol expectations and the other two main study variables ranged from -.08 to .66. Again as with alcohol use the correlations with the smallest coefficients were between positive alcohol expectations and gender. These coefficients were again all negative and ranged from -.08 to -.16. The largest coefficient was between the spring 7th-grade and fall 8th-grade measurements of positive alcohol expectations.

As with the other two main study variables, the correlations with the lowest coefficients between exposure to peer drinkers and the other main study variables were between exposure to peer drinkers and gender. These correlation coefficients were again all negative and ranged from -.08 to -.16. The three highest correlation coefficients between exposure to peer drinking and the main study variables were between the correlations of exposure to peer drinkers and positive alcohol expectations at each measurement point. That is, the three highest three correlations were between the exposure to peer drinkers and positive alcohol expectations at the 8th-grade measurement (.60), both at the 7th-grade measurement (.58) and at the spring 6th-grade measurement (.53).

Table 4-11: Correlations of Key Study Variables Over Time – Alcohol Use

Measurement Point	**Measurement Point**	Fall 6th-grade	Spring 6th-grade	Spring 7th-grade	Fall 8th-grade
	Variable	**Alcohol Use *r***			
Spring 6th-grade	Alcohol Use	.20			
Spring 7th-grade		.13	.40		
Fall 8th-grade		.12	.33	.49	
Fall 6th-grade	Positive Alcohol Expectations	.21	.21	.26	.17
Spring 6th-grade		.19	.44	.36	.34
Spring 7th-grade		.14	.32	.47	.44
Fall 8th-grade		.09	.24	.36	.52
Fall 6th-grade	Exposure to Peer Drinkers	.29	.29	.24	.21
Spring 6th-grade		.16	.53	.34	.32
Spring 7th-grade		.17	.28	.48	.42
Fall 8th-grade		.09	.25	.36	.52
Gender		-.04	-.02	-.05	-.02

Table 4-12: Correlations of Key Study Variables Over Time – Positive Alcohol Expectations

Measurement Point	**Measurement Point**	Fall 6th-grade	Spring 6th-grade	Spring 7th-grade	Fall 8th-grade
	Variable	**Positive Alcohol Expectations *r***			
Spring 6th-grade	Positive Alcohol Expectations	.41			
Spring 7th-grade		.37	.55		
Fall 8th-grade		.28	.44	.66	
Fall 6th-grade	Exposure to Peer Drinkers	.27	.26	.22	.20
Spring 6th-grade		.26	.53	.42	.49
Spring 7th-grade		.26	.38	.58	.44
Fall 8th-grade		.17	.31	.49	.60
Fall 6th-grade	Alcohol Use	.21	.21	.26	.17
Spring 6th-grade		.19	.44	.36	.34
Spring 7th-grade		.14	.32	.47	.44
Fall 8th-grade		.09	.24	.36	.52
Gender		-.16	-.13	-.08	-.08

Table 4-13: Correlations of Key Study Variables Over Time – Exposure to Peer Drinkers

Measurement Point	**Measurement Point**	Fall 6th-grade	Spring 6th-grade	Spring 7th-grade	Fall 8th-grade
	Variable	**Exposure to Peer Drinkers** ***r***			
Spring 6th-grade	Exposure to Peer Drinkers	.34			
Spring 7th-grade		.28	.46		
Fall 8th-grade		.21	.33	.52	
Fall 6th-grade	Alcohol Use	.29	.29	.24	.21
Spring 6th-grade		.16	.53	.34	.32
Spring 7th-grade		.17	.28	.48	.42
Fall 8th-grade		.09	.25	.36	.52
Fall 6th-grade	Positive Alcohol Expectations	.27	.26	.22	.20
Spring 6th-grade		.26	.53	.42	.49
Spring 7th-grade		.26	.38	.58	.44
Fall 8th-grade		.17	.31	.49	.60
Gender		-.16	-.13	-.08	-.08

Potential Confounding Variables

In addition to examining associations between the main study variables, additional associational analyses were also conducted with each of the main study variables and the potential confounding variables of school, gender, ethnicity, participation in the Free and Reduced Meal Program (FARM), parental monitoring, parental involvement and parental expectations. The participants were coded based on their responses into one of three ethnicity categories, white, black or other. Descriptive information about school, ethnicity and FARM participation can be found in Tables 4-1 and 4-2. Parental monitoring and parental involvement each were measured by separate scales created for this purpose. The parental monitoring scale was created from four questions and the parental involvement by six questions from the original Going Places questionnaire. Table 4-14 on page 86 further describes these two scales and the scoring of these scales. Parental expectations were measured using one question, "How upset would your parents or guardians be if they found out that you drank alcohol?" Response options for this question included not at all (1), a little (2), somewhat (3) and extremely (4) upset. Each of the parental variables was treated as a continuous variable. Table 4-15 on page 87 presents the descriptive information of these parental variables.

Table 4-14: Parental Monitoring and Involvement Information

Scale	Questions	Cronbach's α			
		Fall 6th-grade	**Spring 6th-grade**	**Spring 7th-grade**	**Fall 8th-grade**
Parental Monitoring Response Options – Strongly Agree (4), Agree (3) Disagree (2) Strongly Disagree (1)	I have a parent who: ▪ Would find out if I misbehaved. ▪ Checks up to see if I have done what they told me to do. ▪ Expects me to work hard at school. ▪ Believes in having rules and sticking to them.	.64	.64	.71	.73
Parental Involvement Response Options – Almost Nothing (1), A little (2), A lot (3)	My parents/guardians know: ▪ How I spend my free time. ▪ Who my friends are ▪ About my activities ▪ About my health habits ▪ How I am doing at school ▪ About my school life	.78	.75	.78	.80

Table 4-15: Descriptive Information for Parental Variables

Measurement Point	Parental Monitoring*			Parental Involvement**			Parental Expectations***		
	n	***M***	***SD***	***n***	***M***	***SD***	***n***	***M***	***SD***
Fall 6th-grade	996	14.41	1.78	993	16.61	2.04	1000	3.77	.624
Spring 6th-grade	1035	14.13	1.91	1033	15.99	2.27	1036	3.70	.658
Spring 7th-grade	1036	13.87	2.11	1035	15.54	2.50	1036	3.58	.761
Fall 8th-grade	988	13.64	2.12	990	15.48	2.54	995	3.51	.786

* The parental monitoring scale scores ranged from 4-16 with a higher means score representative of more parental monitoring.
** The parental involvement scale scores ranged from 6-18 with a higher means score representative of more parental involvement.
*** The parental expectation scale score ranged from 1-4 with a higher mean score representative of a more negative response from the parent if they found out the student drank alcohol.

In order to examine the relationships between these potential confounding variables and the main study variables several analyses were conducted. Simple Pearson Product-Moment Correlations were examined at each measurement point for each of the main study variables with all three parental variables. A *t* test was conducted to examine the association between gender and the main study variables. One-way ANOVA analyses were conducted at each time point for each of the main study variables and school, FARM, and ethnicity. Tables 4-16 through 4-20 on pages 90-94 provide the results of these analyses.

The correlation coefficients of the parenting variables and the main study variables ranged from -.00 to -.61 and are presented in Tables 4-16 through 4-18 found on pages 90-92. The smallest coefficients were with the parental variables and gender. These coefficients ranged from -.00 (gender and spring 6th-grade parental involvement) to .12 (gender and fall 6th-grade parental expectations). The largest coefficients were between

the fall 8th-grade measurements of parental expectations and positive alcohol expectations (-.61) and the 7th and 8th-grade measurements of parental involvement (.61).

The *t* test analyses of the main study variables and gender showed significant differences between males and females for positive alcohol expectations at each measurement point as previously discussed in the section on Sample Description, Positive Alcohol Expectations. That is, in this sample males differed significantly from females on their positive alcohol expectations. Males did not differ significantly from females in this sample however, on either their exposure to peer drinkers or on their alcohol use.

The One-Way ANOVA analyses of the main study variables and school attended resulted in significant omnibus *F* test values at each measurement point except the first measurement point. That is, the students from each of the schools differed from each other significantly on all three of the main study variables at the spring 6th-grade, spring 7th-grade and fall 8th-grade measurement points. Neither ethnicity nor FARM participation showed consistent differences by school group.

While the omnibus *F* test values for the analyses of school and the main study variables were consistently significant at the last three measurement points, the post hoc analyses (Tukey HSD) did not show consistent differences in school groups for the three main study variables. Post Hoc analyses showed that for the spring 6th-grade measurement, the difference in positive alcohol expectations was between schools 3 and 6. While each of the last two measurement points resulted in significant *F* test values, the post hoc analyses showed either no significant comparisons or only a significant comparison within a non-significant contrast.

Post Hoc analyses of the difference between school groups on exposure to peer drinkers found that at the spring 6th-grade measurement point schools 3 and 2, schools 3 and 6 and schools 3 and 7 differed significantly on exposure to peer drinkers. At the spring 7th-grade measurement point, while the omnibus F test was significant, the post hoc analyses with significant results (schools 3 and 6, 3 and 2 and 3 and 7) were within a non significant contrast (schools 4 and 6). At the fall 8th-grade measurement point, schools 1 and 6, schools 1 and 2 and schools 1 and 7 differed significantly on exposure to peer drinkers.

Post Hoc analyses of the difference in school group on alcohol use showed that schools 3 and 6, 3 and 7 and 3 and 2, each differed from each other significantly on reported alcohol use. While the spring 7th-grade and fall 8th-grade measurement points resulted in significant omnibus *F* tests, either none of the post hoc comparisons were significant or those that were significant were within a non-significant contrast.

Table 4-16: Correlations of Main Study Variables and Parental Variables Over Time – Parental Expectations

Measurement Point	**Measurement Point**	Fall 6th-grade	Spring 6th-grade	Spring 7th-grade	Fall 8th-grade
	Variable	Parental Expectations *r*			
Spring 6th-grade	Parental Expectations	.39			
Spring 7th-grade		.28	.49		
Fall 8th-grade		.23	.39	.49	
Fall 6th-grade	Parental Monitoring	.21	.20	.18	.18
Spring 6th-grade		.10	.24	.27	.29
Spring 7th-grade		.14	.20	.36	.27
Fall 8th-grade		.05	.16	.29	.31
Fall 6th-grade	Parental Involvement	.22	.12	.19	.15
Spring 6th-grade		.10	.17	.25	.23
Spring 7th-grade		.13	.20	.33	.26
Fall 8th-grade		.09	.10	.20	.29
Fall 6th-grade	Alcohol Use	-.22	-.18	-.19	-.11
Spring 6th-grade		-.14	-.44	-.34	-.23
Spring 7th-grade		-.11	-.33	-.41	-.12
Fall 8th-grade		-.09	-.27	-.31	-.43
Fall 6th-grade	Positive Alcohol Expectations	-.45	-.38	-.28	-.22
Spring 6th-grade		-.27	-.56	-.42	-.31
Spring 7th-grade		-.25	-.38	-.59	-.44
Fall 8th-grade		-.19	-.33	-.46	-.61
Fall 6th-grade	Exposure to Peer Drinkers	-.25	-.22	-.18	-.11
Spring 6th-grade		-.25	-.45	-.27	-.22
Spring 7th-grade		-.22	-.33	-.37	-.32
Fall 8th-grade		-.15	-.27	-.28	-.39
Gender		.12	.06	.02	.04

Table 4-17: Correlations of Main Study Variables and Parental Variables Over Time – Parental Monitoring

Measurement Point	**Measurement Point**	Fall 6th-grade	Spring 6th-grade	Spring 7th-grade	Fall 8th-grade
	Variable	Parental Monitoring *r*			
Spring 6th-grade	Parental Monitoring	.43			
Spring 7th-grade		.32	.44		
Fall 8th-grade		.30	.43	.51	
Fall 6th-grade	Parental Expectations	.21	.20	.18	.18
Spring 6th-grade		.10	.24	.27	.29
Spring 7th-grade		.14	.20	.36	.27
Fall 8th-grade		.05	.16	.29	.31
Fall 6th-grade	Parental Involvement	.33	.29	.23	.22
Spring 6th-grade		.30	.43	.32	.33
Spring 7th-grade		.24	.34	.47	.42
Fall 8th-grade		.23	.27	.38	.42
Fall 6th-grade	Alcohol Use	-.08	-.19	-.17	-.10
Spring 6th-grade		-.09	-.20	-.21	-.17
Spring 7th-grade		-.07	-.17	-.19	-.24
Fall 8th-grade		-.01	-.16	-.22	-.28
Fall 6th-grade	Positive Alcohol Expectations	-.22	-.24	-.21	-.19
Spring 6th-grade		-.17	-.33	-.31	-.29
Spring 7th-grade		-.15	-.28	-.38	-.32
Fall 8th-grade		-.16	-.25	-.35	-.38
Fall 6th-grade	Exposure to Peer Drinkers	-.14	-.22	-.14	-.12
Spring 6th-grade		-.13	-.28	-.24	-.26
Spring 7th-grade		-.13	-.25	-.28	-.23
Fall 8th-grade		-.10	-.21	-.22	-.25
Gender		.01	-.05	.02	-.05

Table 4-18: Correlations of Main Study Variables and Parental Variables Over Time – Parental Involvement

Measurement Point	**Measurement Point**	Fall 6th-grade	Spring 6th-grade	Spring 7th-grade	Fall 8th-grade
	Variable	Parental Involvement *r*			
Spring 6th-grade	Parental Involvement	.43			
Spring 7th-grade		.34	.54		
Fall 8th-grade		.27	.43	.61	
Fall 6th-grade	Parental Expectations	.22	.12	.19	.15
Spring 6th-grade		.10	.17	.25	.23
Spring 7th-grade		.13	.20	.33	.26
Fall 8th-grade		.09	.10	.20	.29
Fall 6th-grade	Parental Monitoring	.33	.29	.23	.22
Spring 6th-grade		.30	.43	.32	.33
Spring 7th-grade		.24	.34	.47	.42
Fall 8th-grade		.23	.27	.38	.42
Fall 6th-grade	Alcohol Use	-.16	-.17	-.20	-.12
Spring 6th-grade		-.12	-.23	-.22	-.21
Spring 7th-grade		-.06	-.23	-.29	-.25
Fall 8th-grade		-.06	-.16	-.20	-.26
Fall 6th-grade	Positive Alcohol Expectations	-.33	-.30	-.24	-.22
Spring 6th-grade		-.20	-.36	-.30	-.28
Spring 7th-grade		-.18	-.32	-.42	-.35
Fall 8th-grade		-.15	-.23	-.30	-.36
Fall 6th-grade	Exposure to Peer Drinkers	-.26	-.25	-.22	-.16
Spring 6th-grade		-18	-.32	-.24	-.23
Spring 7th-grade		-.14	-.29	-.30	-.26
Fall 8th-grade		-.12	-.20	-.22	-.27
Gender		.11	-.00	-.01	.01

Table 4-19: *t* Test Analyses of Main Study Variables and Gender

Measurement Point	Males		Females		*M* Difference	*SE*	*t*	*df*	*p*
	M	SD	***M***	SD					
Positive Alcohol Expectations									
Fall 6th-grade	8.61	3.71	7.50	3.19	1.11	.22	4.98	910.35	< .01
Spring 6th-grade	8.93	4.02	7.96	3.47	.97	.24	4.08	926.9	< .01
Spring 7th-grade	9.73	4.22	9.07	4.03	.66	.26	2.58	1030	.01
Fall 8th-grade	10.43	4.28	9.63	4.32	.81	.27	2.93	991	< .01
Exposure to Peer Drinkers									
Fall 6th-grade	.27	.86	.17	.57	.10	.05	2.17	774.74	.03
Spring 6th-grade	.52	1.12	.45	1.05	.07	.07	1.07	1034	.28
Spring 7th-grade	.91	1.45	.87	1.42	.03	.09	.37	1034	.72
Fall 8th-grade	1.17	1.60	1.31	1.67	-.14	.11	-1.29	993	.20
Alcohol Use									
Fall 6th-grade	.08	.33	.05	.25	.03	.02	1.36	815.84	.18
Spring 6th-grade	.18	.56	.16	.48	.02	.03	.62	1029	.54
Spring 7th-grade	.35	.84	.28	.67	.07	.05	1.49	901.92	.14
Fall 8th-grade	.42	.84	.38	.75	.04	.05	.88	992	.38

Table 4-20: One-Way ANOVA Analyses of Main Study Variables and Ethnicity, School and FARM

Main Study Variable and Potential Confounding Variable	Fall 6th Grade		Spring 6th-grade		Spring 7th-grade		Fall 8th Grade	
	F	***p***	***F***	***p***	***F***	***p***	***F***	***p***
Positive Alcohol Expectations								
Ethnicity	2.92	.05	1.59	.21	1.95	.14	2.19	.11
School	1.40	.21	2.69	.05	3.88	< .01	2.21	.04
FARM*			.44	.65	.56	.57	3.49	.03
Exposure to Peer Drinkers								
Ethnicity	3.24	.04	.18	.83	1.59	.20	1.24	.29
School	1.10	.36	11.14	.00	6.18	< .01	4.24	< .01
FARM*			.02	.98	3.44	.03	.89	.41
Alcohol Use								
Ethnicity	.83	.44	.42	.66	1.88	.15	1.25	.29
School	1.40	.21	5.43	< .01	3.40	< .01	2.56	.02
FARM*			.00	1.00	1.38	.25	1.81	.16

***Free and Reduced Meal Program (FARM)**

Preliminary Assessment of Relationships

In an effort to further set the stage for the analysis of the main research questions, the growth curve analyses, a series of linear regression analyses were conducted predicting positive alcohol expectations from exposure to peer drinkers. These analyses were conducted with and without controlling for those variables thought to be potential confounding variables based on the bivariate analyses discussed above. Table 4-21 on

page 96 presents the results of a cross-sectional regression analysis conducted at the first measurement point, fall 6th-grade. Tables 4-22 through 4-24 on pages 98 to 100 present the results of three prospective regression analyses. These three prospective regression analyses analyzed the predictive value of exposure to peer drinkers on positive alcohol expectations longitudinally. First, spring 6th-grade alcohol expectations were predicted from fall 6th-grade exposure to peer drinkers. Second, spring 7th-grade alcohol expectations were predicted from spring 6th-grade exposure to peer drinkers. Finally, fall 8th-grade alcohol expectations were predicted from spring 7th-grade exposure to peer drinkers.

The fall 6th-grade cross-sectional regression analysis resulted in a significant *F* value for both the model without confounding variables (Model 1) and the model with confounding variables (Model 2). There was an increase in R^2 value in Model 2 (R^2=.29) over Model 1 (R^2=.08). In both of these models, exposure to peer drinkers was a significant predictor of positive alcohol expectations. That is, exposure to peer drinkers continued to be a significant predictor of positive alcohol expectations even when controlling for the potential confounding variables.

Table 4-21: Fall 6th-Grade Cross Sectional Regression Predicting Alcohol Expectations

Variable	*B*	*SE B*	β	*t*	*p*	95% CI
Model 1						
Constant	7.69	.12		66.22	< .01	7.46 to 7.92
Exposure to peer drinkers	1.32	.15	.28	8.66	< .01	1.02 to 1.62
Model 2						
Constant	23.17	1.15		20.12	< .01	20.91 to 25.42
Exposure to peer drinkers	.50	.15	.10	3.39	< .01	.21 to .79
30-Day Alcohol Use	.76	.35	.06	2.15	.03	.08 to 1.45
Gender	-.52	.20	-.08	-2.62	.01	-.91 to -.13
Parental Monitoring	-.13	.06	-.07	-2.25	.02	-.25 to -.02
Parental Involvement	-.29	.05	-.17	-5.43	< .01	-.39 to -.18
Parental Alcohol Expectations	-2.07	.17	-.36	-11.93	< .01	-2.41 to-1.73

B represents the unstandardized coefficient and β represents the standardized coefficient.
Model 1 resulted in an $R = .28$, and a significant $F = 75.0$ with $p<.01$.
Model 2 resulted in an $R = .54$, and a significant $F = 60.7$ with $p<.01$.

As with the cross-sectional regression analysis, each of the prospective regression analyses resulted in significant F values at the $p < .01$ level. The R^2 values in each of the analyses for Model 1 ranged from .07 to .20. These R^2 values for Model 1 increased at each measurement point. That is, the regression analysis predicting spring 6th-grade positive alcohol expectations from fall 6th-grade exposure to peer drinkers resulted in the smallest Model 1 R^2 value while the regression analysis predicting fall 8th-grade positive alcohol expectations from spring 7th-grade exposure to peer drinkers resulted in the largest Model 1 R^2 value. The R^2 values in each of the analyses for Model 2 were slightly

higher than Model 1 and ranged from .23 to .33. As with Model 1, the R^2 values for Model 2 increased at each measurement point.

Exposure to peer drinkers was a significant predictor of positive alcohol expectations in each of the prospective regression analyses. Additionally, exposure to peer drinkers had progressively higher *t* values from the first prospective regression analysis to the last. Exposure to peer drinking being a significant predictor of positive alcohol expectations was true even when controlling for the potential confounding variables. In each Model 2 prospective analysis except the last one, parental alcohol expectations had the highest *t* value in the model. However, in contrast to the *t* tests associated with exposure to peer drinking, the *t* tests associated with this variable decreased from the first prospective regression analysis to the last. Exposure to peer drinkers had the highest *t* value in this last prospective Model 2 analysis.

Table 4-22: Prospective Regression Predicting Spring 6th-Grade Alcohol Expectations from Fall 6th-Grade Variables

Variable	*B*	*SE B*	β	*t*	*p*	95% CI
Model 1						
Constant	8.07	.13		62.98	< .01	7.82 to 8.32
Exposure to peer drinkers	1.39	.17	.27	8.26	< .01	1.06 to 1.72
Model 2						
Constant	23.54	1.30		18.16	< .01	21.00 to 26.09
Exposure to peer drinkers	.59	.17	.11	3.52	< .01	.26 to .92
30-Day Alcohol Use	.87	.40	.07	2.16	.03	.08 to 1.66
Gender	-.56	.23	-.07	-2.45	< .01	-1.01 to -.11
Parental Monitoring	-.24	.07	-.11	-3.56	< .01	-.37 to -.11
Parental Involvement	-.31	.06	-.17	-5.05	< .01	-.43 to -.19
Parental Alcohol Expectations	-1.58	.20	-.26	-8.01	< .01	-1.96 to -1.19

B represents the unstandardized coefficient and β represents the standardized coefficient.
Model 1 resulted in an $R = .27$, and a significant $F = 68.23$ with $p<.01$.
Model 2 resulted in an $R = .48$, and a significant $F = 43.60$ with $p<.01$.

Table 4-23: Prospective Regression Predicting Spring 7th-Grade Alcohol Expectations from Spring 6th-Grade Variables

Variable	*B*	*SE B*	β	*t*	*p*	95% CI
Model 1						
Constant	8.56	.13		66.70	< .01	8.30 to 8.801
Exposure to peer drinkers	1.610	.11	.43	14.86	< .01	1.40 to 1.82
Model 2						
Constant	22.93	1.29		17.77	< .01	20.40 to 25.47
Exposure to peer drinkers	.83	.13	.22	6.51	< .01	.58 to 1.08
30-Day Alcohol Use	.37	.26	.045	1.46	.15	-.13 to .87
Gender	-.52	.22	-.06	-2.37	.02	-.96 to -.09
Parental Monitoring	-.31	.07	-.14	-4.69	< .01	-.43 to-.18
Parental Involvement	-.22	.06	-.12	-4.02	< .01	-.33 to -.11
Parental Alcohol Expectations	-1.46	.20	-.23	-7.39	< .01	-1.85 to -1.08

B represents the unstandardized coefficient and β represents the standardized coefficient.
Model 1 resulted in an $R = .43$, and a significant $F = 220.76$ with $p < .01$.
Model 2 resulted in an $R = .54$, and a significant $F = 67.00$ with $p < .01$.

Table 4-24: Prospective Regression Predicting Fall 8th-Grade Alcohol Expectations from spring 7th-Grade Variables

Variable	*B*	*SE B*	β	*t*	*p*	95% CI
Model 1						
Constant	8.74	.15		59.85	< .01	8.45 to 9.03
Exposure to peer drinkers	1.35	.09	.45	15.46	< .01	1.18 to 1.52
Model 2						
Constant	21.02	1.08		19.44	< .01	18.90 to 23.14
Exposure to peer drinkers	.77	.10	.26	8.17	< .01	.59 to .96
30-Day Alcohol Use	.47	.186	.08	2.54	.01	.11 to .84
Gender	-.65	.229	-.08	-2.85	< .01	-1.10 to -.20
Parental Monitoring	-.20	.064	-.10	-3.12	< .01	-.33 to -.07
Parental Involvement	-.23	.054	-.13	-4.25	< .01	-.33 to -.12
Parental Alcohol Expectations	-1.28	.18	-.23	-7.20	< .01	-1.63 to -.93

B represents the unstandardized coefficient and β represents the standardized coefficient.
Model 1 resulted in an $R = .45$, and a significant $F = 238.97$ with $p < .01$.
Model 2 resulted in an $R = .58$, and a significant $F = 78.46$ with $p < .01$.

Analysis to Answer Research Questions

In order to answer the five main study research questions, three latent growth models were examined. The results of each of these latent growth models are presented below, by research question.

Research Question I

I. Does the rate of change in positive alcohol expectations directly influence the increase in alcohol use?

To answer Research Question I, *MPlus* (Muthen & Muthen, 2001) was used to examine Model 1 (See Figure 3-1), which reflects the hypothesis that the rate of change in positive alcohol expectations influences the increase of alcohol use. The overall fit indices of this model (*CFI* = .92, *SRMR* = .06) did not indicate a close fit to the data per the two index cutoff criteria suggested by Hu and Bentler (1999).

Because the hypothesized model did not fit the data, other more complex models were then examined to determine if a better model could be found. Table 4-25 on page 102 presents the results of all of the models examined to study the direct influence of the rate of change in positive alcohol expectations on the increase in alcohol use. Given the criteria recommended by Hu and Bentler as discussed in the Statistical Analysis section of Chapter Three, the only model that provided a reasonable fit to the data was one in which the errors or residuals associated with each observed variable were allowed to correlate across variables within a given time.

Table 4-25: Models Examined to Analyze Research Question I with Model Fit Data

Brief name of model	χ^2	*df*	*p* <	*CFI**	*SRMR***
1. Hypothesized Model 1	136.16	27	.01	.92	.06
2. Exponential Model 1 – Base *e*	265.35	27	.01	.83	.09
3. Exponential Model 1 – Base 10	409.44	27	.01	.73	.12
4. Partially specified growth model	126.88	23	.01	.93	.05
5. Hypothesized Model 1 with Correlated errors within	120.44	21	.01	.93	.05
6. Hypothesized Model 1 with Correlated errors across	62.57	23	.01	.97	.04
7. Hypothesized Model 1 with Correlated errors across and with parental variables as covariates	273.96	95	.01	.93	.06
Final Model					
Hypothesized Model 1 with Correlated Errors Across and nonsignificant Paths fixed at Zero	69.15	29	.01	.97	.04

*Comparative Fit Index (CFI)
** Standardized Root Mean Square Residual

As is evident in Table 4-25, following the hypothesized model, two models for which growth was hypothesized to be exponential rather than linear were examined. One of these models was with base equal to *e* and the other was with base equal to 10. That is, base *e* and base 10 antilogs of the original slope coefficients representing linear growth (.5, 1.5, and 2.25) were calculated and used in these two exponential models, respectively. Had either of these exponential models fit the data, it would have suggested that the increase in the positive alcohol expectations and alcohol use variables increased at an exponential rate over time rather than in a linear fashion. For example, the rate of change in alcohol use and positive alcohol expectations of this early adolescent population would have increased dramatically as the children grew older if either of these two models fit the data.

Because neither the hypothesized linear nor either exponential models resulted in suitable fits to the data, a partially defined growth model was examined next. In this model, both the alcohol use and alcohol expectations at the 3rd and 4th measurement points were not specified; rather, they were allowed to be free, that is, estimated from the data. By allowing these measurement points to be free, the growth rate was not fixed to a specific form; instead, the data itself were used to partially estimate the growth rate. Because it was known that the previous models did not fit the data well, this model was examined to determine if it was possible that a more complex growth process gave rise to the data. The fact that this model also did not adequately fit the data suggests that the measures of alcohol use and positive alcohol expectations were not simple expressions of two separate underlying constructs as was anticipated.

Given the results of the previously examined models, the next step in the analysis process was to attempt to determine if the examined models were not being supported by the data due to potential measurement or conceptual issues at each specific time point or over time. Therefore, the next model examined was a model that included the correlated errors within each construct across time. That is, in addition to the paths described in Model 1, the residuals associated with each observed variable were freed, thus allowing correlations between each adjacent time point within each construct. For example, the correlation between the residual of alcohol use at the first measurement point and the residual of alcohol use at the second measurement point was added to the model. Adding these correlations to the model allowed for the addition of a third variable or variables into the model for each construct across time points. If this model fit the data, it would have suggested either a measurement and/or conceptual problem. For example, if this

model adequately fit the observed data, it could have suggested a possible carryover effect of testing. That is, that answering the Going Places questions at one time point had some effect on the students' responses at the subsequent time point. However, this model did not adequately explain the observed data suggesting that the reason that the previously examined models were not being supported by the data was not due to a measurement or conceptual issue that occurred over time.

Following the model with errors correlated within each construct across time, a model was examined that included correlated errors across constructs within each time period. That is, in addition to the paths described in Model 1, correlations were added between the residuals of the observed variables at each measurement point. For example, the correlation between the residual of alcohol use at the first measurement point and the residual of positive alcohol expectations at the first time point was added to the model. These correlations were added to the model to determine if, as with the correlated errors within variables across time model, the previously examined models were not being supported by the data due to a potential measurement or conceptual issue. However, allowing for the errors of measurement to correlate across constructs within time, in contrast to allowing for the errors of measurement to correlate within constructs across time allows for the examination of a common cause or causes operating within the model at each time point that was not specified in the model itself. Specifically, adding these correlations to the model allows for the addition of a third variable or variables into the model at each time point. The fact that this model adequately fits the data suggests that there is a third variable or variables at each time point that when added to the model allows for adequate fit with this data.

Because this model, with correlated errors across constructs within each time period fit the data, the next step in the analysis process was to add covariates into this model in an effort to determine the role if any that these covariates had on the model. No role for these covariates was hypothesized. This step was completed in an effort to examine what if any role these covariates had on the model. These covariates were chosen based on the results of the preliminary analyses and the potential confounding role that the preliminary analyses suggested might exist. These preliminary analyses suggested that the three parental variables might play a confounding role on the model. Therefore, these three parental variables (parental expectations, parental monitoring and parental involvement) were added to the correlated errors across constructs within each time period model. The addition of these variables to the model allowed for the effects of these parental variables on the adolescents positive alcohol expectations at each measurement point to be partialed out or controlled for. In addition, it allowed for the effect of these parental variables on alcohol use at each measurement point to be partialed out or controlled for. The addition of these variables to the model does not partial out or control for the effects of the parental variables on either of the intercepts or slopes, only on the observed variables. The fact that the model with the covariates added does not fit the data well, suggests that the parental variables do not play a significant role in the hypothesized model.

The only model that provided an adequate fit to the data was the model with correlated errors across constructs within each time period (*CFI* = .97, *SRMR* = .04). Because some of the hypothesized paths in this model were nonsignificant, this model was then examined with all of the nonsignificant paths fixed at 0 to confirm that such a

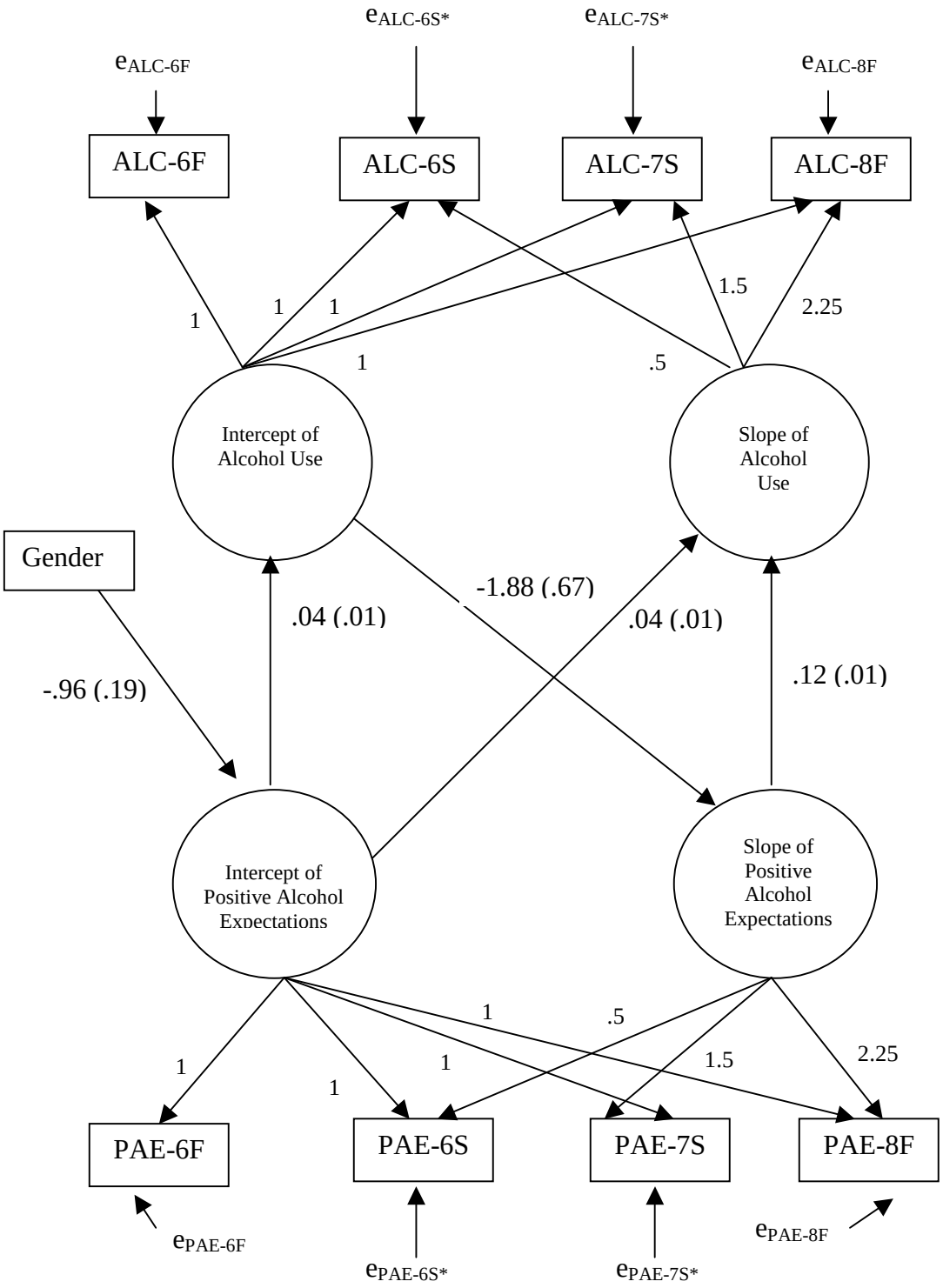
model was suitable for the observed data. The model fit statistics and path estimates of this model with nonsignificant paths fixed at 0 did indicate this final Model 1 was a plausible model for this data (*CFI* = .97, *SRMR* = .04) and all of the remaining free paths were significant. Figure 4-6 on page 109 presents the final Model 1 with estimates and standard errors for all significant paths. As hypothesized in the original model, significant paths were found between the intercept, representing the fall 6th-grade alcohol expectations, and both the intercept, representing the fall 6th-grade alcohol use (.04, *SE* = .01, $p < .01$) and the slope or increase in alcohol use (.04, *SE* = .01, $p < .01$). In addition, a significant path was found between the intercept representing the fall 6th-grade alcohol use and the slope or increase in positive alcohol expectations (-1.88, *SE* = .67, $p = .01$). The path between the slope or increase in positive alcohol expectations and the slope or increase in alcohol use was also found to be significant (.12, *SE* = .01, $p < .01$). A significant path was not found from the intercept of alcohol use to the rate of change in alcohol use. The covariate of gender that was included in this model only had one significant path, from gender to the intercept representing the fall 6th-grade positive alcohol expectations (-.96, *SE* = .12, $p < .01$). Two of the error correlations between alcohol use and positive alcohol expectations were found to be significant. Specifically, the error or residual of the 6th-grade spring alcohol use was significantly correlated with the error or residual of the 6th-grade spring positive alcohol expectations (.37, *SE* = .07, $p < .01$) Also, the error or residual of the 7th-grade spring alcohol use was significantly correlated with the error or residual of the 7th-grade spring positive alcohol expectations (.35, *SE* = .08, $p < .01$).

The residual variance of both the alcohol use intercept representing the fall 6th-grade alcohol use (.02, *SE* = .01, $p < .01$) and the positive alcohol expectations intercept representing the fall 6th-grade positive alcohol expectations (5.67, *SE* = .50, $p < .01$) were significant indicating significant individual variability unexplained by the predictors of both alcohol use and positive alcohol expectations at the beginning of the 6th-grade. The only predictor of alcohol use at the beginning of the 6th-grade was positive alcohol expectations at the beginning of the 6th-grade. The only predictor of positive alcohol expectations at the beginning of the 6th-grade was gender. In addition to the residual variance of both intercept factors, the residual variance of both of the slope factors (alcohol use = .04, *SE* = .01, $p < .01$; positive alcohol expectations = 2.12, *SE* = .17, $p < .01$) were also found to be significant indicating individual variability unexplained by the predictors of both the increase of alcohol use and the increase of positive alcohol expectations. The predictors of the increase of alcohol use in this model were the fall 6th-grade positive alcohol expectations and the increase of positive alcohol expectations. The predictor of the increase of positive alcohol expectations in this model was the fall 6th-grade measure of alcohol use.

The R^2 values for the structural equations provide the proportion of the variance explained by its respective predictors for each such outcome variable. The R^2 values for this final Model 1 are presented in Table 4-26 on page 110. In this model, the intercept representing the fall 6th-grade alcohol use was predicted by the fall 6th-grade positive alcohol expectations. This predictor explained 38% of the variance of this variable. The intercept or fall 6th-grade positive alcohol expectations had only one predictor in this model, gender. Gender therefore explained 4% of the variance of positive alcohol

expectations. The slope of alcohol use had two predictors in this model, the intercept representing the fall 6th-grade positive alcohol expectations and the slope of positive alcohol expectations. These predictors explained 51% of the variance of the slope of alcohol use. The slope of positive alcohol expectations was predicted in this model by the fall 6th-grade alcohol use. This variable made up about 4% of the variance of the increase in positive alcohol expectations.

Figure 4-6: Final Latent Curve Model of the Parallel Process Relationships of Increase in Alcohol Use (ALC) and Positive Alcohol Expectations (PAE) with Significant Model Estimates and (Standard Errors) Fall 6th to Fall 8th-grades[+]



[+] 6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

* The error or residuals of 6th-grade Spring alcohol use and positive alcohol expectations were significantly correlated (.37, *SE* = .07, $p < .01$). The error or residual of 7th Grade Spring alcohol use and positive alcohol expectations were significantly correlated (.35, *SE* = .08, $p < .01$).

Table 4-26: Final Model 1 R^2 Values

Latent Variable	R^2 Value
Alcohol Use Intercept (Fall 6th-grade alcohol use)	.38
Alcohol Use Slope	.51
Positive Alcohol Expectation Intercept (Fall 6th-grade positive alcohol expectations)	.04
Positive Alcohol Expectation Slope	.04

Research Questions II, III, and IV

II. What are the developmental trajectories of positive alcohol expectations among early adolescents?

III. Does the rate of change in exposure to peer drinkers directly influence the increase in positive alcohol expectations among early adolescents?

IV. How does gender affect 1) the increase of positive alcohol expectancy and, 2) the influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations among early adolescents?

To answer Research Questions II, III and IV, a latent growth model of the parallel processes of increase in exposure to peer drinkers and increase in positive alcohol expectations was examined. The hypothesized linear model was examined first. The overall fit indices of this model (*CFI* = .91, *SRMR* = .06) did not indicate a close fit to the data per the two index cutoff criteria of Hu and Bentler (1999).

As in Model 1, because the hypothesized model did not fit the data other more complex models were then examined to determine if a better model could be found.

Table 4-27 presents the results of all of the models examined to answer research questions II through IV. Appendix C presents further discussion of the more complex models examined. The only model that per the criteria recommended by Hu and Bentler provided a reasonable fit to the data was one in which the errors or residuals associated with each observed variable were allowed to correlate across variables within a given time period (*CFI* = .98, *SRMR* = .04). The fact that this model with correlated errors across variables within time adequately fits the data suggests that there is a third variable or variables at each time point that when added to the model allows for adequate fit to with the data.

Table 4-27: Models Examined to Analyze Research Questions II, III and IV With Model Fit Data

Brief name of model	χ^2	***df***	***P*** <	***CFI****	***SRMR****
1. Hypothesized Model 2	219.94	27	.01	.91	.06
2. Exponential Model 2 – Base e	378.46	27	.01	.83	.09
3. Exponential Model 2– Base 10	566.17	27	.01	.74	.12
4. Hypothesized Model 2 with Correlated errors within	201.91	21	.01	.91	.05
5. Hypothesized Model 2 with Correlated errors across	75.40	23	.01	.98	.04
6. Hypothesized Model 2 with Correlated errors across and all parental variables and alcohol use as covariates	318.37	119	.01	.94	.05
Final Model					
Hypothesized Model 2 with Correlated errors across & Nonsignificant Paths fixed at Zero	80.19	26	.01	.97	.04

*Comparative Fit Index (CFI)
** Standardized Root Mean Square Residual

Because some of the hypothesized paths in the model with correlated errors across constructs within each time period were nonsignificant, this model was examined with all

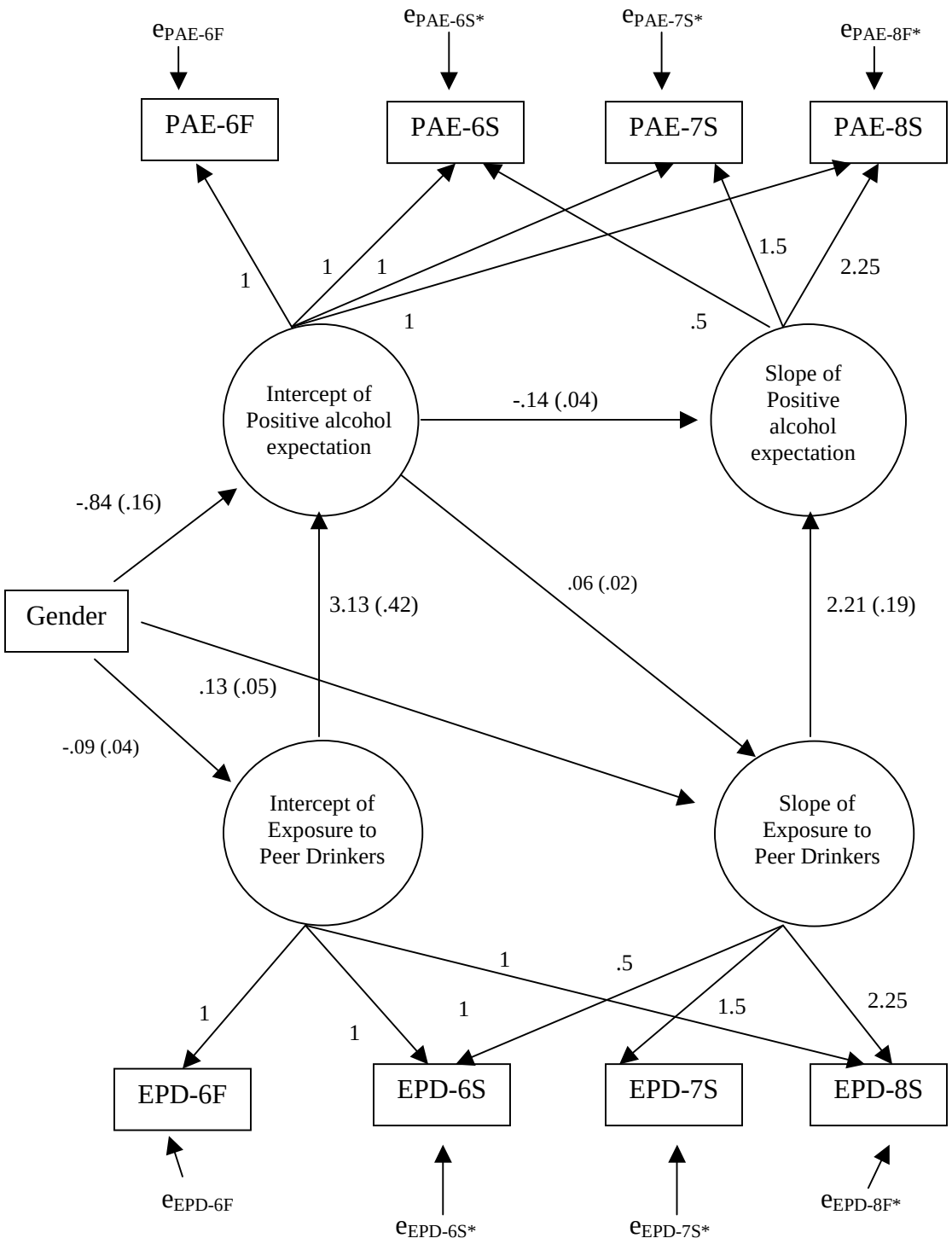
of the nonsignificant paths fixed at 0 to confirm that such a model was suitable for the observed data. The Lagrange multiplier tests (Bentler, 1986) were also used to modify models as needed to confirm a model that was suitable for the observed data. The model fit statistics and path estimates of this model with nonsignificant paths fixed at 0 did indicate this final Model 2 was a plausible model for this data (*CFI* = .97, *SRMR* = .04) and all of the remaining free paths were significant. Figure 4-7 on page 115 presents the final Model 2 with estimates and standard errors for all significant paths. As hypothesized, a significant path was found from the intercept representing the fall 6th-grade exposure to peer drinkers to the intercept representing the fall 6th-grade positive alcohol expectations (3.13, *SE* = .42, $p < .01$). In addition, significant paths were found from the intercept representing the fall 6th-grade positive alcohol expectations to both the slope or increase in positive alcohol expectations (-.14, *SE* = .04, $p < .01$) and the slope or increase in exposure to peer drinkers (.06, *SE* = .02, $p < .01$). The path from the slope or increase in exposure to peer drinkers to the slope or increase in positive alcohol expectations was also found to be significant (2.21, *SE* = .19, $p < .01$). A significant path however, was not found between the fall 6th-grade exposure to peer drinkers and the increase or slope of positive alcohol expectations. Significant paths were found from gender to the positive alcohol expectation intercept representing the fall 6th-grade positive alcohol expectations (-.84, *SE* = .16, $p < .01$), to the exposure to peer drinkers factor representing the fall 6th-grade exposure to peer drinkers (-.09, *SE* = .04, $p = .03$) and to the slope of exposure to peer drinkers (.13, *SE* = .05, $p < .01$). The paths from gender to both intercepts were negative while the path from gender to the slope of exposure to peer drinkers was positive. Three of the correlations of the residuals of

positive alcohol expectations and the residuals of exposure to peer drinkers were found to be significant. Specifically, the only error or residual of positive alcohol expectations that was not significantly correlated with the error or residual of exposure to peer drinkers was the fall 6th-grade measurement.

The residual variance of both the positive alcohol expectations intercept representing the fall 6th-grade positive alcohol expectations (293, SE = .44, p < .01) and the positive alcohol expectations slope (.73, SE = .15, p < .01) were found to be significant. This indicates significant individual variability unexplained by the predictors of positive alcohol expectations at the beginning of the 6th-grade and by the predictors of the increase of positive alcohol expectations. The predictors of positive alcohol expectations at the beginning of the 6th-grade were gender and the exposure to peer drinkers at the beginning of the 6th-grade. The predictors of the increase of positive alcohol expectations were both the positive alcohol expectations at the beginning of the 6th-grade and the increase in exposure to peer drinkers. The residual variance of both the exposure to peer drinkers intercept representing the fall 6th-grade exposure to peer drinkers (.23, SE = .05, p < .01) and the exposure to peer drinkers slope (.24, SE = .03, p < .01) were also significant. This indicates significant individual variability unexplained by the predictors of the initial fall 6th-grade exposure to peer drinkers and by the predictors of the increase in exposure to peer drinkers. The initial fall 6th-grade exposure to peer drinkers was predicted only by gender while the increase in exposure to peer drinkers was predicted by both gender and the initial fall 6th-grade measure of positive alcohol expectations.

The R^2 values for this final Model 2 are presented in Table 4-28 on page 116. In this model, the initial value of positive alcohol expectations was predicted by both gender and the initial value of exposure to peer drinkers. These two variables therefore explained 47% of the variance of this variable. The initial value of positive exposure to peer drinkers was predicted only by gender. Gender therefore explained about 1% of the variance of exposure to peer drinkers. The slope of positive alcohol expectations had two predictors in this model, the initial value of positive alcohol expectations and the slope of exposure to peer drinkers. These two predictors explained 62% of the variance of the slope of positive alcohol expectations. The slope of exposure to peer drinkers was predicted in this by both the initial value of positive alcohol expectations and gender. These two variables made up about 7% of the variance of the increase in exposure to peer drinkers.

Figure 4-7: Final Latent Curve Model of the Parallel Process Relationships of Increase in Positive Alcohol Expectations (PAE) and Exposure to Peer Drinkers (EPD) with Significant Model Estimates and (Standard Errors) Fall 6th-grade to Fall 8th-grade[+]



[+] 6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

* The error or residuals of positive alcohol expectations and exposure to peer drinkers were significantly correlated at the Spring 6th-grade (.89, *SE* = .14, $p < .01$), Spring 7th grade (.76, *SE* = .14, $p < .01$) and Fall 8th grade (.55, *SE* = .22, $p < .01$) measurement points.

Table 4-28: Final Model 2 R^2 Values

Latent Variable	R^2 Value
Positive Alcohol Expectation Intercept (Fall 6th-grade positive alcohol expectations)	.47
Positive Alcohol Expectation Slope	.62
Exposure to Peer Drinkers Intercept (Fall 6th-grade exposure to peer drinkers)	.01
Exposure to Peer Drinkers Slope	.07

Research Question V

VI. Does the increase in alcohol use indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

To answer Research Question V, a latent growth model of the parallel processes of increase in exposure to peer drinkers, increase in positive alcohol expectations and increase in alcohol use was examined. The hypothesized linear model was examined first. The overall fit indices of this model (*CFI* = .86, *SRMR* = .08) did not indicate a close fit to the data per the two index cutoff criteria of Hu and Bentler (1999).

Because the hypothesized model did not fit the data and based on the model fit results for Model 1 and Model 2, two other more complex models were then examined to determine if a better model could be found. Table 4-29 on page 117 presents the results of the models examined to answer Research Question V. Appendix D presents further discussion of the more complex models examined. The only model that per the criteria recommended by Hu and Bentler provided a reasonable fit to the data was one in which the errors or residuals associated with each observed variables were allowed to correlate

across variables within a given time period (*CFI* = .97, *SRMR* = .05). The fact that this model with correlated errors across variables within time adequately fits the data suggests that there is a third variable or variables at each time point that when added to the model allows for adequate fit to with the data.

Because some of the hypothesized paths in this model were nonsignificant, this model was then examined with all of the nonsignificant paths fixed at 0 to confirm that such a model was suitable for the observed data. The Lagrange multiplier tests (Bentler, 1986) were also used to modify the model as needed to confirm a model that was suitable for the observed data. The model fit statistics and path estimates of this model with nonsignificant paths fixed at 0 did indicate the final Model 3 was a plausible model for this data (*CFI* = .97, *SRMR* = .06) and all of the remaining free paths were significant.

Table 4-29: Models Examined to Analyze Research Question V with Model Fit Data

Brief name of model	χ^2	*df*	*p* <	*CFI**	*SRMR***
Hypothesized Model 3	382.16	58	.01	.86	.08
Hypothesized Model 3 with Correlated errors within	362.48	49	.01	.87	.07
Hypothesized Model 3 with Correlated errors across	108.25	46	.01	.97	.05
Final Model					
Hypothesized Model 3 with Correlated errors across & Nonsignificant Paths fixed at Zero	129.43	54	.01	.97	.06

*Comparative Fit Index (CFI)
** Standardized Root Mean Square Residual

Figure 4-8 on page 120 presents the final Model 3 with estimates and standard errors for all significant paths. As hypothesized by the original model, a significant path was found from the intercept representing the fall 6th-grade alcohol use to the intercept representing the fall 6th-grade exposure to peer drinkers (2.79, *SE* = .48, $p < .01$). In

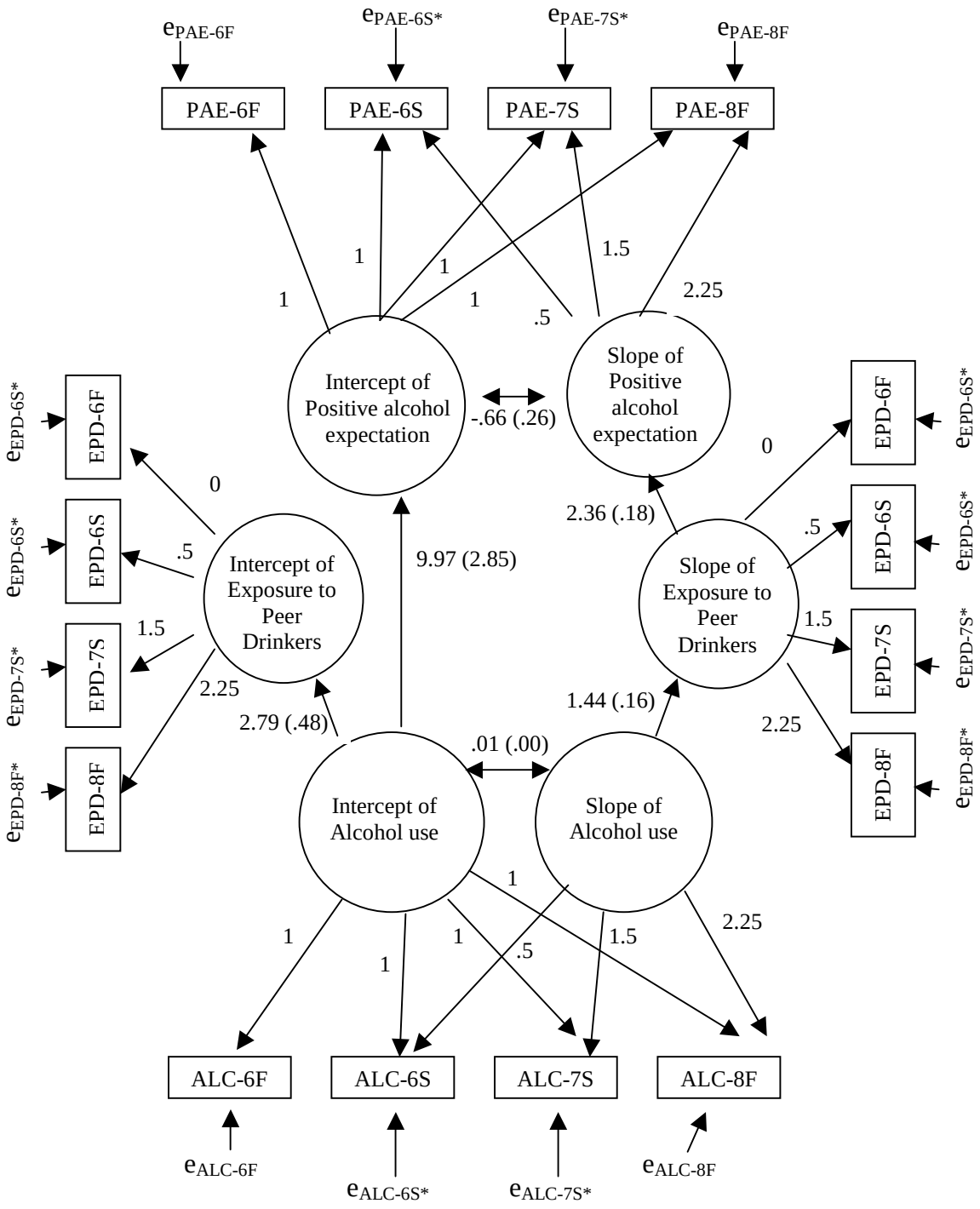
addition, a significant path from the intercept or initial value of alcohol use to the intercept or initial value of positive alcohol expectancies was also found (9.97, *SE* = .2.85, $p < .01$). A significant path however, was not found from the intercept or initial value of exposure to peer drinkers to the intercept or initial value of positive alcohol expectancies. Significant covariances were found between the intercept representing the fall 6th-grade alcohol use and the slope of alcohol use (.01, *SE* = .00, $p = .03$) as well as between the intercept representing the fall 6th-grade positive alcohol expectations and the slope or increase in positive alcohol expectations (-.66, *SE* = .23, $p = .01$). The path from the slope of alcohol use to the slope of exposure to peer drinkers (1.44, *SE* = .16, $p < .01$) as well as the path from the slope of exposure to peer drinkers to the slope of positive alcohol expectations (2.36, *SE* = .18, $p < .01$) were also found to be significant. A significant path was not found from the increase in alcohol use to the increase in positive alcohol expectations. The error correlations were significant for all of the variables at the 6th-grade spring and 7th-grade spring measurements. None of the error correlations were significant for the 6th or 8th-grade fall measurements. Table 4-30 on page 121 presents these correlation coefficients.

In this final Model 3, the variance of both the alcohol use intercept representing the fall 6th-grade alcohol use (.02, *SE* = .10, $p = .02$) and the alcohol use slope (.07, *SE* = .01, $p < .01$) were significant. This indicates that there is significant individual variability in the initial value and increase of alcohol use for this population. The residual variance of both the positive alcohol expectations intercept representing the fall 6th-grade positive alcohol expectations (2.87, *SE* = .60, $p < .01$) and slope (.88, *SE* = .23, $p < .01$) were found to be significant. This indicates significant individual variability unexplained by

the predictors of positive alcohol expectations at the beginning of the 6th-grade and by the predictors of the increase of positive alcohol expectations. The predictor of the initial level of positive alcohol expectations was the initial level of alcohol use. The only predictor of the increase in positive alcohol expectations was the increase in exposure to peer drinkers. The residual variance of both the exposure to peer drinkers intercept representing the fall 6th-grade exposure to peer drinkers (.05, SE = .02, p < .01) and the exposure to peer drinkers slope (.12, SE = .02, p < .01) were also significant. This indicates significant individual variability unexplained by the predictors of the initial exposure to peer drinkers and the increase in exposure to peer drinkers. The initial level of alcohol use was the only predictor of the initial level of exposure to peer drinkers. Similarly, the slope of alcohol use was the only predictor of the increase in exposure to peer drinkers.

The R^2 values for this final Model 3 are presented in Table 4-31 on page 121. In this model the intercept or initial value of positive alcohol expectations was predicted by the intercept or initial value of alcohol use. Therefore alcohol use explains 44% of the variance of this intercept. The intercept or initial value of exposure to peer drinkers was predicted by the intercept or initial value of personal alcohol use and therefore alcohol use explains 77% of the variance of this intercept. The slope of positive alcohol expectations was predicted by the slope of exposure to peer drinkers. This slope of exposure to peer drinkers therefore explains 63% of the variance of the slope of positive alcohol expectations. Finally, the slope of exposure to peer drinkers was predicted in the model by the slope of alcohol use. Alcohol use therefore explains 56% of the variance of this slope.

Figure 4-8: Final Latent Curve Model of the Parallel Process Relationships of Increase in Positive Alcohol Expectations (PAE), Exposure to Peer Drinkers (EPD) and Alcohol Use (ALC) with Significant Model Estimates and (Standard Errors) Fall 6th-grade to Fall 8th+



+6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

* The error or residuals of positive alcohol expectations, exposure to peer drinkers, and alcohol use were significantly correlated at the Spring 6th-grade, Spring 7th grade, and Fall 8th grade measurement points.

Table 4-30: Model 3 Error Correlation Coefficients

Measurement Point	Variables Correlated								
	Positive Alcohol Expectations and Alcohol Use			Positive Alcohol Expectations and Exposure to Peer Drinkers			Exposure to Peer Drinkers and Alcohol Use		
	r	***SE***	***p* <**	***r***	***SE***	***p* <**	***r***	***SE***	***p* <**
Fall 6th-grade	.00	.00	.01	.00	.00	.01	.00	.00	.01
Spring 6th-grade	.37	.07	.01	.97	.14	.01	.17	.03	.01
Spring 7th-grade	.39	.08	.01	.93	.14	.01	.17	.04	.01
Fall 8th-grade	.00	.00	.01	.00	.00	.01	.00	.00	.01

Table 4-31: Final Model 3 R^2 Values

Latent Variable	R^2 Value
Positive Alcohol Expectation Intercept (Fall 6th-grade positive alcohol expectations)	.44
Positive Alcohol Expectation Slope	.63
Exposure to Peer Drinkers Intercept (Fall 6th-grade exposure to peer drinkers)	.77
Exposure to Peer Drinkers Slope	.56

Three-time-point Models

Introduction

After further examination of the sample statistics and examination of the model results, the hypothesized models were again examined, this time using only the data from the last three measurement points. The decision to examine the models for only the last three-time-points was made for several reasons. First, it was noted in examining the descriptive statistics that both the skewness and kurtosis of the first measurement point, the fall 6th-grade measurement point, were much higher for both alcohol use (*skew*(ALC_{6f}) = 5.89, *kurt*(ALC_{6f}) = 49.01) and exposure to peer drinkers (*skew*(EPD_{6f}) = 4.33, *kurt*(EPD_{6f}) = 21.07) than the other measurement points. Also noted in the descriptive statistics was the extremely low variance of this first measurement of alcohol use (s^2 = .08). Additionally, an examination of the standard deviations in relation to the means of both the fall 6^{th}-grade and spring 6^{th}-grade measurement of positive alcohol expectations, suggests a potential floor effect for these measurement points.

When the three main study variables were correlated with each other at each time point, once again this first time point stood out as different than the others and potentially problematic. The correlation coefficients at this time point were much lower, about half of the coefficients of the other time points. All of the correlations between the fall 6th-grade variables and the other main study variables at each time point were less than .41 some as low as .09. In fact, all but three of these correlation coefficients were less than .3. In addition, in each of the models in which the errors were allowed to correlate across constructs within each time period, the residuals of the fall 6th-grade measurement were consistently not significantly correlated. The errors at each of the other measurement

points were however significantly correlated minus the fall 8th-grade measurement point in Model 1. Because of the importance of correlations in theorizing model paths, these low correlation coefficients were of concern.

Because of the above findings, the original hypothesized models were examined for just the final three-time-points – spring 6th-grade through fall 8th-grade. The results of these analyses are presented below.

Research Question I

Model 1 when examined using only these last three-time-points, provided an adequate fit to the data (χ^2 = 36.98, *df* = 10, CFI = .98, and SRMR = .02). Because some of the hypothesized paths in this model were nonsignificant, this model was then examined with all of the nonsignificant paths fixed at zero to confirm that such a model was suitable for the observed data. The model fit statistics and path estimates of this model with nonsignificant paths fixed at zero did indicate this three-time-point final Model 1 was a plausible model for this data (χ^2 = 50.26, *df* = 14, CFI = .97, SRMR = .04) and all of the remaining free paths were significant.

Figure 4-9 on page 126 presents the three-time-point final Model 1 with estimates and standard errors for all significant paths As hypothesized, a significant path was found from the intercept or spring 6th-grade positive alcohol expectations, to the intercept or spring 6th-grade alcohol use (.11, *SE = .01*, $p < .01$). In addition, a significant path was found from the intercept or spring 6th-grade alcohol use to the slope or increase in positive alcohol expectations (-.83, *SE = .25*, $p < .01$). The path from the slope or increase in positive alcohol expectations to the slope or increase in alcohol use was also

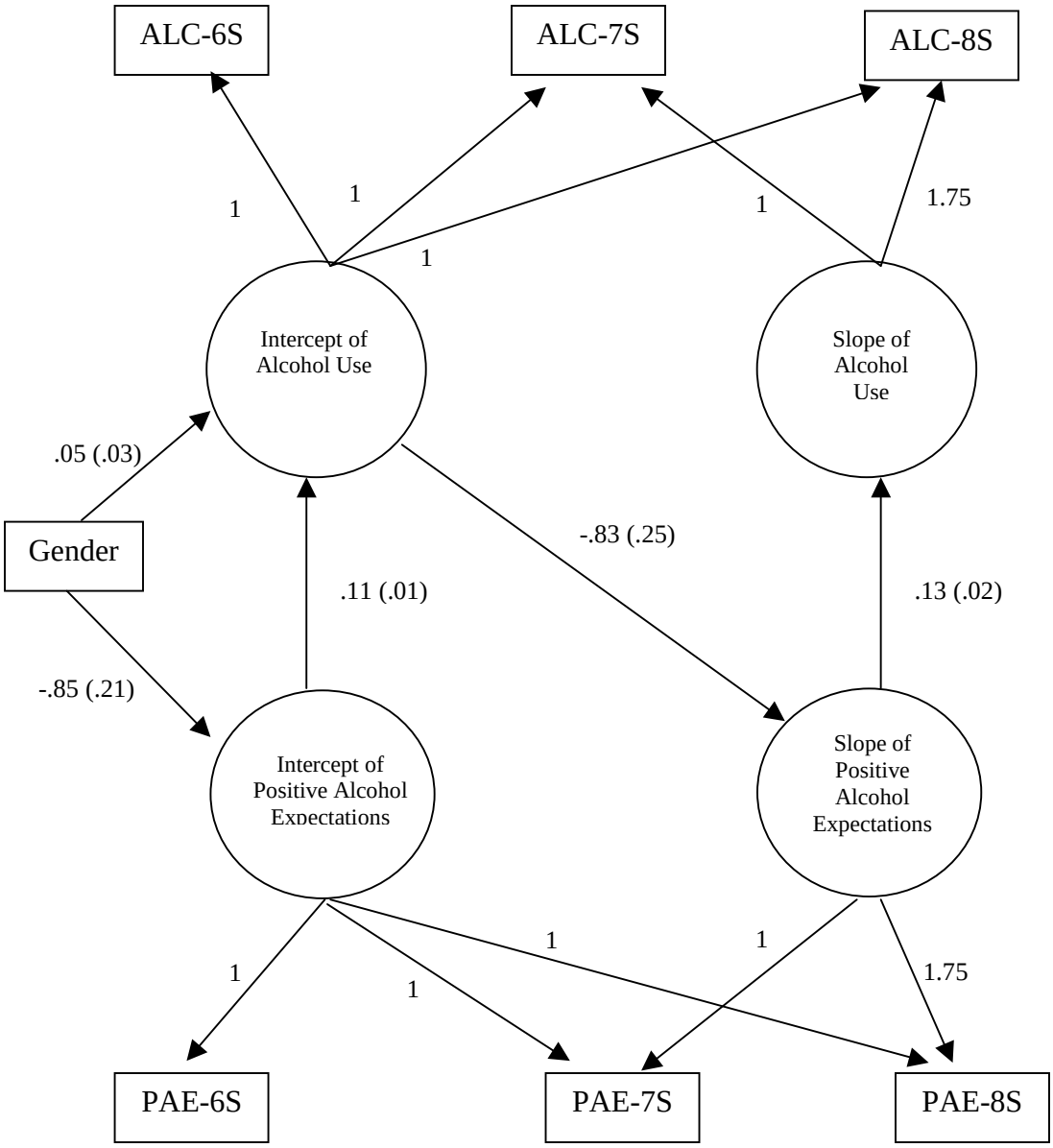
found to be significant (0.13, *SE* = *.02*, $p < .01$). A significant path however was not found from the spring 6th-grade alcohol use to the increase or slope of alcohol use. The path from the spring 6th-grade positive alcohol expectations to the slope of alcohol use was also a non-significant path. The covariate of gender which was included in this model had two significant paths. One path was from gender to the intercept or spring 6th-grade positive alcohol expectations (-.85, *SE* = .21, $p < .01$) and the other was from gender to the intercept or spring 6th-grade alcohol use (.05, *SE* = .03, $p = .03$).

The residual variance of both the positive alcohol expectations intercept or spring 6th-grade positive alcohol expectations (8.37, *SE* = .67, $p < .01$) and the positive alcohol expectation slope (2.84, *SE* = .30, $p < .01$) was found to be significant. This indicates significant individual variability unexplained by the predictors of positive alcohol expectations at the end of the 6th-grade and by the predictors of the increase of positive alcohol expectations. The only predictor of positive alcohol expectations at the end of the 6th-grade was gender. The only predictor of the increase of positive alcohol expectations was alcohol use at the end of the 6th-grade. The residual variance of both the spring 6th-grade alcohol use (.07, *SE* = .02, $p < .01$) and the alcohol use slope (.04, *SE* = .01, $p < .01$) were also significant again indicating significant individual variability unexplained by the predictors of the alcohol use intercept (fall 6th-grade alcohol use) and the alcohol use slope. The predictors of the spring 6th-grade alcohol use were gender and the spring 6th-grade positive alcohol expectations. The only predictor of the increase of alcohol use was the increase of positive alcohol expectations.

The R^2 values for the intercepts and slopes provide the proportion of the variance explained by its respective predictors for each such outcome variable. The R^2 values for

this three-time-point final Model 1 are presented in Table 4-32 on page 127. In this model, the intercept or spring 6th-grade alcohol use was predicted by gender and the intercept or spring 6th-grade positive alcohol expectations. These two predictors therefore explain 60% of the variance of the alcohol use intercept or spring 6th-grade alcohol use. The intercept or spring 6th-grade positive alcohol expectations had only one predictor in this model, gender. Gender therefore explained 2% of the variance of spring 6th-grade positive alcohol expectations. The slope of alcohol use was predicted by the slope of positive alcohol expectations in this model. This predictor explained 55% of the variance of the slope of alcohol use. The slope of positive alcohol expectations was predicted in this model by the alcohol use intercept or spring 6th-grade alcohol use. The intercept of alcohol use, the spring 6th-grade alcohol use, therefore made up about 4% of the variance of the increase in positive alcohol expectations.

Figure 4-9: Latent Curve Analyses of the Parallel Process Relationships of Increase in Alcohol Use (ALC) and Positive Alcohol Expectations (PAE) with Significant Model Estimates and (Standard Errors) Spring 6th-grade to Fall 8th-grade Only[+]



[+]6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

Table 4-32: 3-Time Points Final Model 1 R^2 Values

Latent Variable	R^2 Value
Alcohol Use Intercept (Spring 6th-grade alcohol use)	.60
Alcohol Use Slope	.55
Positive Alcohol Expectation Intercept (Spring 6th-grade positive alcohol expectations)	.02
Positive Alcohol Expectation Slope	.04

Research Questions II, III, and IV

The three-time-point hypothesized Model 2 overall fit indices indicated a close fit to the data per the two index cutoff criteria suggested by Hu and Bentler (1999) (χ^2 = 76.50, *df* = 10, CFI = 96, and SRMR = .03). Because some of the hypothesized paths in this model were not significant however, this model was then examined with all of the non-significant paths fixed at zero to confirm that such a model was suitable for this data. The model fit statistics and path estimates of this model with non-significant paths fixed at zero did indicate this final three-time-point Model 2 as a plausible model for this data (χ^2 = 97.82, *df* = 16, CFI = .96, SRMR = .05).

Figure 4-10 on page 129 presents significant path estimates of this three-time-point final Model 2 of the parallel processes of increase in positive alcohol expectations and increase in exposure to peer drinkers from the spring of the 6th-grade to the fall of the 8th-grade. Only three of the hypothesized relationships were significant. A significant path was found from the intercept or spring 6th-grade value of exposure to peer drinkers to the intercept or spring 6th-grade value of positive alcohol expectations (2.87, *SE* = .17, $p < .01$). In addition, a significant path was found between the slope or increase in

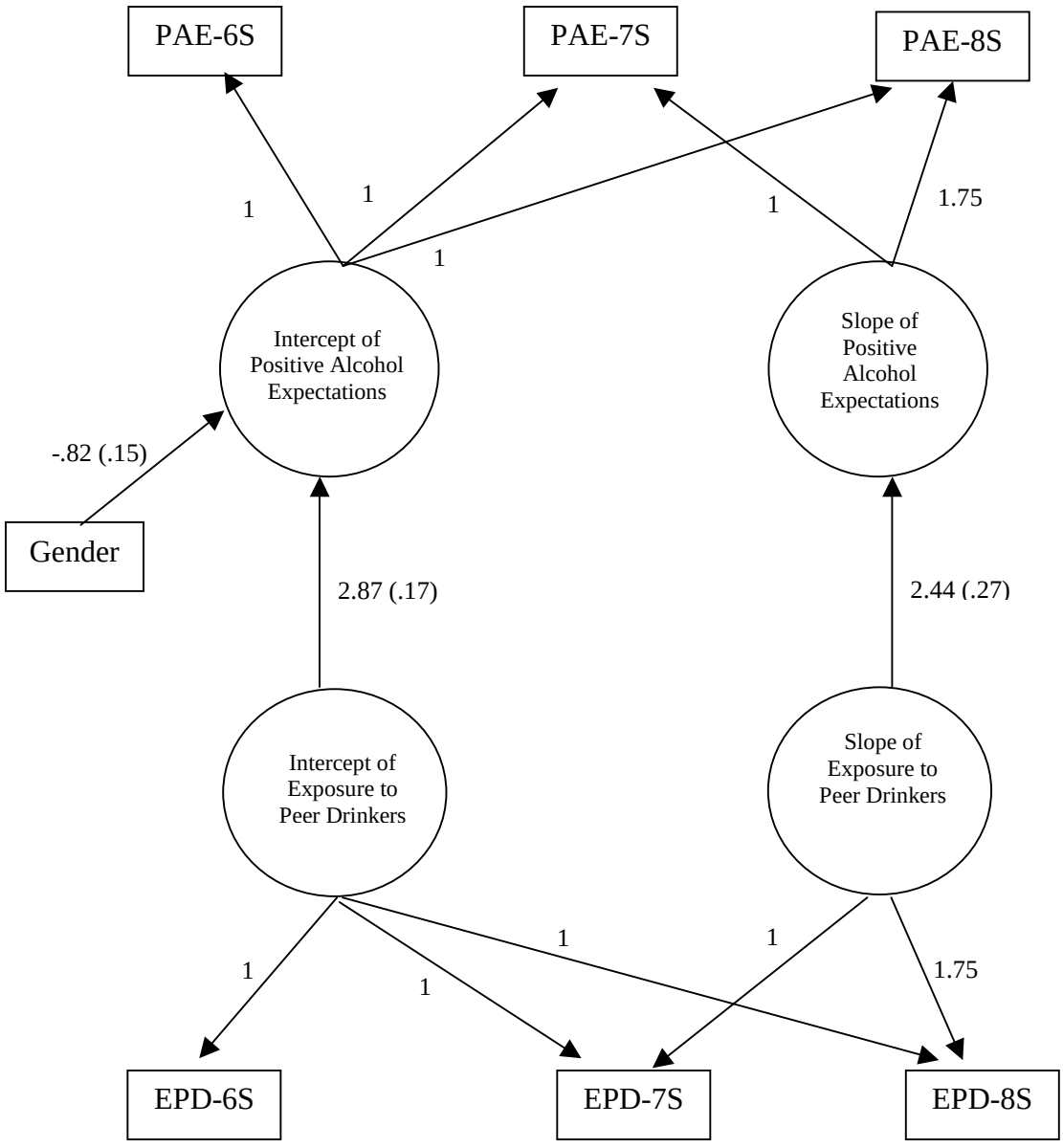
exposure to peer drinkers and the increase in positive alcohol expectations (2.44, *SE* = *.27, p* < .01). The third significant path was between gender and the intercept of positive alcohol expectations or the spring 6th-grade positive alcohol expectations (-.82, *SE* = *.15, p* < .01). None of the other hypothesized paths were significant.

The residual variance of the positive alcohol expectations intercept or spring 6th-grade positive alcohol expectations (2.14, *SE* = *.41, p* < .01) was found to be significant. This indicates significant individual variability unexplained by the predictors of positive alcohol expectations at the end of the 6th-grade. These two predictors included gender and the exposure to peer drinkers at the end of the 6th-grade. The residual variance of the slope of positive alcohol expectations was not significant. The residual variance of the exposure to peer drinkers intercept or spring 6th-grade exposure to peer drinkers (.71, *SE* = .08, *p* < .01) and the exposure to peer drinkers slope (.35, *SE* = .04, *p* < .01) was found to be significant. This indicates significant individual variability unexplained by the predictors of spring 6th-grade exposure to peer drinkers and by the predictors of the slope of the exposure to peer drinkers. There were no significant predictors of either the spring 6th-grade exposure to peer drinkers or the increase in exposure to peer drinkers.

The R^2 values for this three-time-point, final Model 2 are presented in Table 4-33 on page 130. In this model, the intercept of positive alcohol expectations or spring 6th-grade positive alcohol expectations was predicted by both gender and spring 6th-grade exposure to peer drinkers. These two predictors therefore explained about 74% of the variance of the spring 6th-grade positive alcohol expectations. The slope of positive alcohol expectations was predicted by the slope of the exposure to peer drinkers in this

model. This predictor explained 86% of the variance of the slope of positive alcohol expectations.

Figure 4-10: Latent Curve Analyses of the Parallel Process Relationships of Increase in Positive Alcohol Expectations (PAE) and Increase in Exposure to Peer Drinkers (EPD) with Significant Model Estimates and (Standard Errors) Spring 6th-grade to Fall 8th-grade Only[+]



[+]6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

Table 4-33: 3-Time Points Final Model 2 R^2 Values

Latent Variable	R^2 Value
Positive Alcohol Expectation Intercept (Spring 6th-grade positive alcohol expectations)	.74
Positive Alcohol Expectation Slope	.86
Exposure to Peer Drinkers Intercept (Spring 6th-grade exposure to peer drinkers)	.00
Exposure to Peer Drinkers Slope	.00

Research Question V

As with models 1 and 2, when the hypothesized Model 3 examining the parallel processes of increase in positive alcohol expectations, increase in exposure to peer drinkers and increase in alcohol use was examined for only the final three measurement points model fit statistics revealed a good fit to the data (χ^2 = 129.86, *df* = 25, CFI = 95, SRMR = .04). Because some of the hypothesized paths in this model were nonsignificant, this model was then examined with all of the nonsignificant paths fixed at zero to confirm that such a model was suitable for the observed data. The Lagrange multiplier tests (Bentler, 1986) were also used to modify the model as needed to confirm a model that was suitable for the observed data. The model fit statistics and path estimates of a model with nonsignificant paths fixed at zero did indicate this three-time-point final Model 3 was a plausible model for this data (χ^2 = 130.70, *df* = 27, CFI = .95, SRMR = .04) and all of the remaining free paths were significant.

Figure 4-11 on page 133 presents this three-time-point Model 3 with estimates and standard errors. Four of the hypothesized relationships were significant. A significant

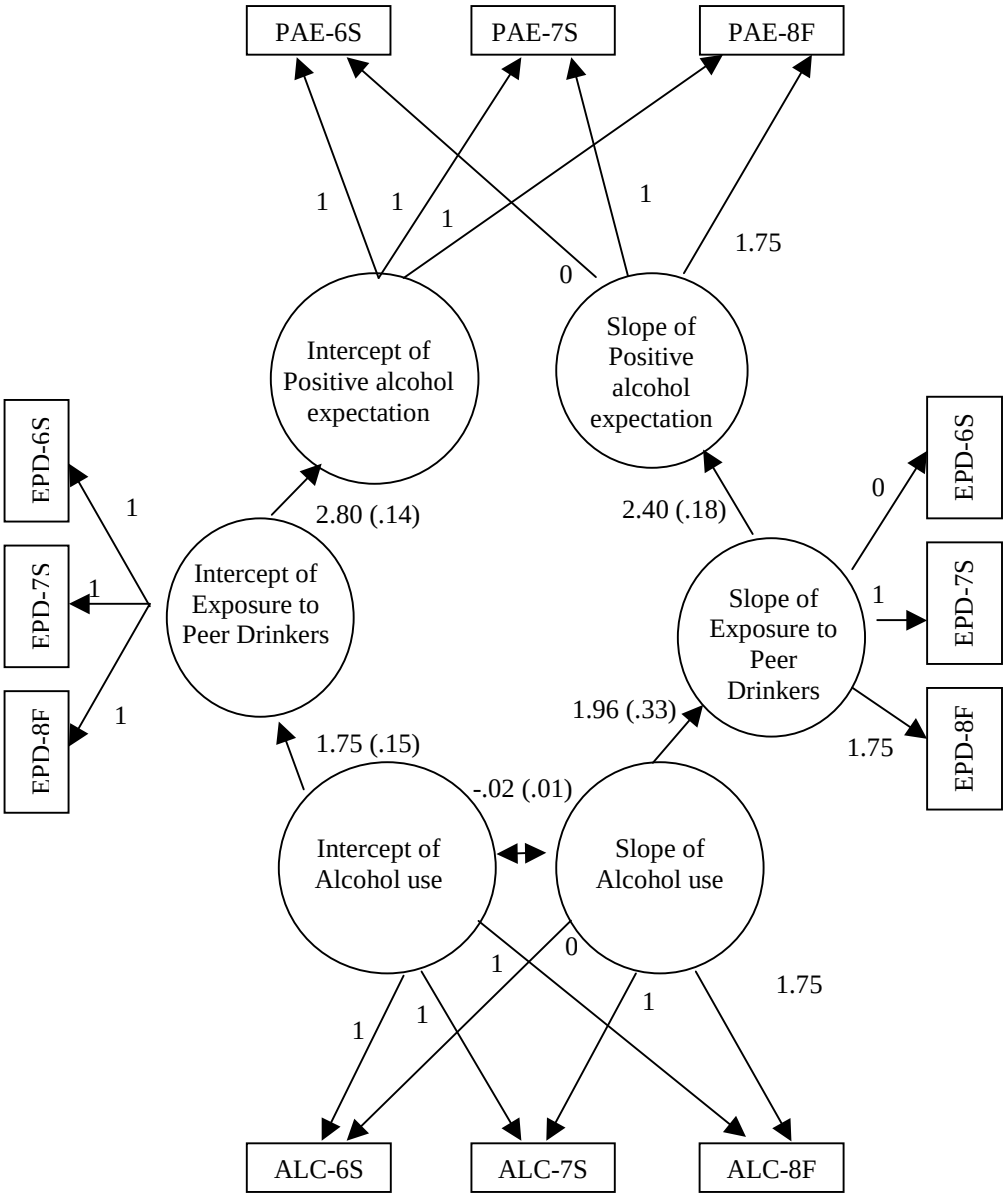
path was found from the intercept or spring 6th-grade of alcohol use to the intercept or spring 6th-grade of exposure to peer drinkers, (1.75, *SE* = .15, $p < .01$). In addition, a significant path was found from the intercept or spring 6th-grade exposure to peer drinkers to the intercept or spring 6th-grade positive alcohol expectations (2.80, *SE* = .14, $p < .01$). The path from the slope or increase in alcohol use to the slope of exposure to peer drinkers was also significant (1.96, *SE* = .33, $p < .01$). Finally, the path from the slope of exposure to peer drinkers to the slope of positive alcohol expectations was also significant (2.40, *SE* = .18, $p < .01$). None of the other originally hypothesized paths were significant.

In this model, the variance of both the alcohol use intercept or spring 6th-grade alcohol use (.18, *SE* = .03, $p < .01$) and the alcohol use slope (.09, *SE* = .02, $p < .01$) was significant. This indicates that there is significant individual variability in the spring 6th-grade alcohol use and in the increase of alcohol use for this population. The residual variance of the positive alcohol expectations intercept, the spring 6th-grade measurement of positive alcohol expectations (3.38, *SE* = .83, $p < .01$) was found to be significant. In addition, the slope of this factor was also found to be significant (.94, *SE* = .46, $p = .04$). This indicates significant individual variability unexplained by the predictors of positive alcohol expectations at the spring 6th-grade measurement as well as significant individual variability unexplained by the predictors of the increase in positive alcohol expectations. The only predictor of positive alcohol expectations at the spring 6th-grade measurement was the spring 6th-grade measurement of exposure to peer drinkers. The predictor of increase in positive alcohol expectations was increase in exposure to peer drinkers. The residual variance of the exposure to peer drinkers intercept, the spring 6th-grade exposure

to peer drinkers (.21, *SE* = .04, $p < .01$) was also significant. This indicates significant individual variability unexplained by the predictors of the exposure to peer drinkers at the spring 6th-grade measurement. The predictor of the exposure to peer drinkers at the spring 6th-grade measurement was the spring 6th-grade measurement of alcohol use. The residual variance of the slope of exposure to peer drinkers was not significant.

The R^2 values for the intercepts and slopes provide the proportion of the variance explained by its respective predictors for each such outcome variable. The R^2 values for this three-time-point final Model 3 are presented in Table 4-34 on page 134. The intercept or initial value of positive alcohol expectations was predicted by the intercept or initial value of exposure to peer drinkers. This factor explained 64% of the variance of the intercept or initial value of positive alcohol expectations. The intercept or initial value of exposure to peer drinkers was predicted by the intercept or initial value of alcohol use which explained 72% of the variance of this initial exposure to peer drinkers. The slope of positive alcohol expectations was predicted by the slope of exposure to peer drinkers. The increase in exposure to peer drinkers therefore explained 71% of variance in the increase in positive alcohol expectations. Finally, the slope of exposure to peer drinkers was predicted by the slope of alcohol use which therefore explains 83% of the variance in the exposure to peer drinkers slope factor.

Figure 4-11: Latent Curve Analyses of the Parallel Process Relationships of Increase in Positive Alcohol Expectations (PAE), Exposure to Peer Drinkers (EPD) and Alcohol Use (ALC) with Significant Model Estimates and (Standard Errors) Spring 6th-Grade to Fall 8th-Grade Only[+]



[+]6F = fall of the 6th grade; 6S = spring of the 6th grade; 7S = spring of the 7th grade; and 8F = fall of the 8th grade

Table 4-34: 3-Time Points Final Model 3 R^2 Values

Latent Variable	R^2 Value
Positive Alcohol Expectation Intercept (Spring 6th-grade positive alcohol expectations)	.64
Positive Alcohol Expectation Slope	.71
Exposure to Peer Drinkers Intercept (Spring 6th-grade exposure to peer drinkers)	.72
Exposure to Peer Drinkers Slope	.83

Chapter Five: Discussion

Introduction

The importance of positive alcohol expectations on the initiation and use of alcohol is well accepted. However, what causes these expectations to develop and change during adolescence has been examined in relatively few studies. The influence of the exposure to peer drinkers on the development and change of these expectations has been suggested by many researchers, though this influence remains poorly understood. In an effort to increase the current understanding of this influence and because alcohol use is a particular health concern for an adolescent population, this study examined the influence that exposure to peer drinkers has on the development and change of positive alcohol expectations in an early adolescent population. The analyses in this study strove first to confirm the influence of the increase in positive alcohol expectations on the increase of alcohol use. The analyses then examined the influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations. In addition, these analyses examined if increase in alcohol use indirectly influences the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents. A discussion of the major findings of all analyses is presented below. However, these results should be interpreted or generalized with caution, because the early adolescent sample in this study may differ from other early adolescent populations both on specific demographic characteristics and in terms of behavioral cultural norms.

Major Findings

A discussion of the results presented in Chapter Four follows. First, the results of the preliminary analyses will be discussed. This will be followed by a discussion of the findings related to each of the five study research questions.

Preliminary Analyses

Several preliminary analyses were conducted in an effort to inform the analysis of the main study research questions. These preliminary analyses included a description of the sample in terms of select demographic characteristics, examining variable associations and preliminarily assessing the relationships being examined to answer the study research questions.

Sample Description

This sample of middle school early adolescents was mostly white with fairly well-educated mothers (almost half, 46%, had at least some college education). The majority of this sample did not participate in the Free and Reduced Meal (FARM) program. While no specific measure of socioeconomic status was included in this study, these results suggest that the early adolescents in this population would most likely belong to families in the middle class. Very few early adolescents in this population reported smoking cigarettes or using marijuana although the use of both of these substances increased significantly between each measurement point supporting the well accepted knowledge that the use of substances increases during adolescents.

Although the majority of the early adolescents in this population did not drink alcohol throughout the time period of the study, the prevalence of alcohol use was much higher than for either cigarette or marijuana use. In addition, the number of times that those who did drink alcohol in the thirty days prior to measurement increased significantly between each measurement point. By the end of the 8th-grade, over 25% of these students reported having recently drunk some alcohol.

This group of early adolescents reported moderate levels of positive alcohol expectations. At the earliest measurement point, the average positive alcohol expectation scale score was 8.02 (*SD* = 3.48) on a scale from 5 to 20 with a higher score representing more positive alcohol expectations. Of concern, though also as expected, the positive alcohol expectations increased significantly at each measurement point with a final average score at the 8th-grade measurement of 9.99 (*SD* = 4.32). This represents a 25% increase in mean positive alcohol expectations. The preliminary analyses also showed that there are significant gender differences in this sample in positive alcohol expectations with males having a significantly higher mean positive alcohol expectation scores throughout the study period. This gender difference is the largest at the fall 6th-grade measurement point and smallest at the spring 7th-grade measurement point.

Also expected yet alarming, this population reported significant increases in the number of close friends who drink over the four measurement points. At the first measurement point only 12% reported close friends who drink while at the final measurement point almost half reported at least one close friend who drinks. While this study does not link close friends with respondents, the respondents' perception of peers who drink compared to those who actually reported drinking are noteworthy. While

almost half of the students reported having a close friend who drinks by the 8th-grade, only about 25% of the entire study population reported having drunk alcohol in the last 30 days. Even though the respondents' report of their close friends alcohol use might not be accurate, the literature has shown that these perceptions, especially the overestimation of peer alcohol use, can be a key predictor of future alcohol use, particularly among non-alcohol using adolescents (Graham, Marks, & Hansen, 1991).

Relationships Among the Main Study Variables

In addition to the description of the sample, the preliminary analyses included examining the associations among the main study variables and between these variables and potential confounding variables. The correlational analyses among the main study variables indicated that there is a relationship between the variables as suggested by the hypotheses of this study. While the main study variable correlations were relatively low at the first measurement point, especially for alcohol use, the remaining correlation coefficients suggest strong associations between the variables. The correlation coefficients for the main study variables at each time point beyond this first measurement point ranged from .44 to .60. The strength of these associations, as shown by the correlation coefficients, increased between measurement points or as the study population aged. The correlation between exposure to peer drinkers and positive alcohol expectations, the main thrust of this research study, was as strong and at the last two measurement points stronger than correlations between either the exposure to peer drinkers with alcohol use or alcohol use and positive alcohol expectations. These results further support the hypotheses of this study.

In addition to examining the correlations between the main study variables, additional correlational analyses were conducted between the main study variables and three parental variables. These parental variables were examined to see if they potentially might have confounding effects on relationships in the main hypotheses of the study. All of the correlation coefficients between each parental variable and each main study variable were negative suggesting an inverse relationship between the parental variables and the main study variables. For example, the negative correlation coefficient for spring 7th-grade parental expectations and positive alcohol expectations suggests that a higher value of parental expectations, the more upset the parents would be if they found out the student drank, the lower the reported positive alcohol expectations. The negative correlation coefficients between all the parental variables suggest a potential protective influence of parental variables (parental expectations, parental monitoring and parental involvement) on alcohol use, positive alcohol expectations and exposure to peer drinkers.

Additional associational analyses were conducted to determine if there were any significant differences in the main study variables among potential confounding variable groups. First, independent-samples *t*-tests were conducted to examine differences between males and females on the main study variables. These analyses showed that males had significantly higher mean positive alcohol expectations than females did at each measurement point. These results reinforce similar results found in the literature (Kraus, Smith, & Ratner, 1994; Loveday, Oei, & Young, 1997). Interestingly, males did not differ significantly from females in their reported 30-day alcohol use or their exposure to peer drinkers. This was true at all four measurement points. This would suggest that males and females differ in the influence that positive alcohol expectations

have on actual drinking and further support the inclusion of gender as a time invariant variable in the models used to answer the main research questions of this study.

One-way ANOVA analyses were conducted to examine for any significant differences in the main study variables between ethnic groups, groups based on FARM participation, and school groups. These analyses did not result in any consistently significant differences. Significant differences in positive alcohol expectations and exposure to peer drinkers were found between ethnic groups at only the first measurement point. A significant difference in positive alcohol expectations was found between those who participated in the FARM program and those who didn't only in the last measurement point. Significant differences in exposure to peer drinkers between these program participants and non-participants were also found for only the spring 6^{th}-grade and spring 7^{th}-grade measurement points. The results suggest that the ethnic groups examined in this sample do not consistently differ significantly in their alcohol use, their positive alcohol expectations or their exposure to peer drinkers. Similarly, the results suggest that those in this sample who participate in the FARM program do not consistently differ from those that do not participate in the program on these main study variables. These results suggest that these variables would not act as confounding variables influencing the main research questions. Similarly while omnibus *F* tests examining the differences between school groups on the main study variables showed consistently significant *F* values at the last three measurement points, the post hoc analyses did not support these consistent significant differences. The post hoc analyses suggested only one significant contrast at one time point between the seven schools on positive alcohol expectations. These analyses also suggest only three significant

contrasts at one time point between the seven schools on both alcohol use and exposure to peer drinkers. Over the four-time periods, the inconsistency of these results suggest that school group would not act as a confounding variable influencing the main research questions.

Preliminary Assessment of Relationships

The final preliminary analyses conducted in an effort to inform the analysis of the main research questions included a series of regression analyses examining the predictive value of exposure to peer drinkers on positive alcohol expectations. The first regression conducted was a cross-sectional regression using only fall 6th-grade measurements. This regression suggested that at this time point, exposure to peer drinkers was a significant predictor of positive alcohol expectations. The R^2 of this regression model was only .08, suggesting that exposure to peer drinking at this time point accounted for 8% of the variance in the positive alcohol expectations. When each of the potential confounding variables was entered into the model the results suggested that exposure to peer drinkers was still a predictor of positive alcohol expectations even when controlling for these variables. The variables entered into these models included the parental variables, alcohol use itself, and gender. Each of these variables was also a significant predictor of positive alcohol expectations at this time point with *t* values ranging from 2.15 to -11.93.

Following this cross-sectional regression, three regression analyses were conducted. In each of these analyses, positive alcohol expectations were predicted by the exposure to peer drinkers at the previous measurement point. These analyses were also conducted with and without potential confounding variables included in the model. As in the cross-

sectional regression analysis, exposure to peer drinkers was a significant predictor of positive alcohol expectations with and without controlling for the potential confounding variables. The R^2 values of the models without the potentially confounding variables increased at each time point, suggesting that the amount of variance in positive alcohol expectations accounted for by exposure to peer drinking increased over time. That is, the predictive value of exposure to peer drinking increased over time. Additionally, in each of the models where the potential confounding variables were included in the model, exposure to peer drinkers had progressively higher *t* values from the first regression analysis to the last. This result also suggests an increase during the middle school years in the importance of exposure to peer drinking on positive alcohol expectations. It suggests that this time period is very important in the prevention of alcohol initiation and use. Interestingly, the *t* values for parental expectations which start high at the first time point become increasingly lower at each successive time point. This suggests a decrease over time in the influence of parental expectations on the students' positive alcohol expectations. The influence of peers increasing and the influence of parents decreasing during this early adolescent time period is supported by the literature (Berndt, 1979; Irwin & Igra, 1994). However, this does not suggest that parents' expectations do not play a crucial preventive role in alcohol initiation and use, as the literature is also full of research supporting parents influence on a variety of adolescent behaviors (Glynn, 1981). Further, even though the *t* values of parental expectations decrease in these regression analyses suggesting a decrease in importance, the values still suggest that parental expectations remain a strong predictor of positive alcohol expectations over the study time period.

Analysis to Answer Research Questions

Overall, the preliminary analyses lend support to the hypotheses for each of the five main research questions. In the next section therefore, is a discussion of the results found from the latent curve analyses conducted to answer the main research questions of this study. The first research question sets the stage for the main thrust of the study. Research questions two through five address the main hypothesis of the study, the influence of exposure to peer drinkers on positive alcohol expectations.

Four-Time-Point Models

Model 1 was used to answer research question 1. An adequate fit of the data to the hypothesized Model 1, per the criteria suggested by Hu and Bentler (1999), was not found. Further analysis suggests that the measures of alcohol use and positive alcohol expectations were not simple expression of two separate underlying constructs as was hypothesized. When the hypothesized Model 1 was modified to include correlated errors across constructs at each time point, adequate fit of the data to the model was found. In this modified Model 1, three of the originally hypothesized gender paths and the path from the intercept of alcohol use to the slope of alcohol use were not found to be significant. The other five original Model 1 hypothesized paths were found to be significant.

Model 2 was used to answer research questions II, III, and IV. Model 3 was used to answer research question V. As in Model 1, an adequate fit of the data to both the hypothesized Model 2 and hypothesized Model 3 were not found. When these

hypothesized models were modified to include correlated errors across constructs at each time point, adequate fit of the data to the model was found suggesting that some potential measurement or conceptual issue was occurring at each time point that was not specified in the original models. In the modified Model 2, one of the originally hypothesized gender paths and the path from the intercept of exposure to peer drinker to the slope of positive alcohol expectations were not found to be significant. The other seven original Model 2 hypothesized paths were found to be significant. In the modified Model 3, of the six hypothesized paths, two were found to not be significant. These include the path from the intercept of exposure to peer drinkers to the intercept of positive alcohol expectations and the path from the slope of alcohol use to the slope of positive alcohol expectation. The remaining four hypothesized paths were found to be significant.

The only models that included all four-time-points and that the data suited adequately were those that allowed for the inclusion of correlated errors across constructs at each time point. This suggests that only when an additional variable or variables not included in the hypothesized models is added to the model at each time point does the model allow for an adequate fit with this data. Hence, considerable caution must be exercised in the interpretation of these results. Nonetheless, a discussion of the relationships within each of these models as they relate to the study research questions follows.

Research Question I

I. Does the rate of change in positive alcohol expectations directly influence the increase in alcohol use?

Hypothesis: It is hypothesized that the rate of change in positive alcohol expectations will directly influence the increase in alcohol use.

When we allowed in Model 1 for the inclusion of a third variable or variables at each time point by including the correlated errors across constructs at each time point, our results support our hypothesis that the rate of change in positive alcohol expectations directly influences the increase or rate of change in alcohol use. That is, results suggest that an increasing rate of change in positive alcohol expectations over time predicts an increasing rate of change in alcohol use over time. In addition to the significant path from the positive alcohol expectation slope factor to the alcohol use slope factor, a significant path was found from the initial measurements of positive alcohol expectations to the initial measurement of alcohol use. That is, reporting higher initial levels of positive alcohol expectations was predictive of reporting a higher initial level of alcohol use. Further, the R^2 values suggest the importance of the influence of positive alcohol expectations on alcohol use. The R^2 values suggest that the initial level of positive alcohol expectations explains 38% of the variance of initial alcohol use and that the initial level and increase of positive alcohol expectations together explain the majority of the variability of the increase in alcohol use (51%). These findings reinforce the importance of examining the remaining research questions in an effort to more fully understand the development of alcohol expectations during adolescence. This needs to be accomplished in order to increase the knowledge and tools necessary to create successful alcohol use prevention strategies.

In addition to supporting our main hypothesis for research question I, results also support many of the other hypothesized paths. For example, a significant path was found between the fall 6th-grade positive alcohol expectations and the increase in alcohol use. This is indicative that those adolescents who initially reported higher positive alcohol expectations tended to have a greater rate of increase in their alcohol use over time. This further supports findings from the literature (Christiansen et al., (1989). The initial measurement of positive alcohol expectations was taken at the beginning of the sixth grade; therefore, these findings support the need to provide prevention efforts as early as possible in the adolescent's life. These findings suggest that already at the beginning of the sixth grade these adolescents' positive alcohol expectations have the potential to influence the rate their drinking will increase over time. Targeting children as early as possible with age appropriate alcohol prevention messages is therefore suggested to prevent future alcohol use.

While the path from the fall 6th-grade alcohol use to the increase of positive alcohol expectations is significant, the coefficient is negative, suggesting an inverse relationship between the two. This finding would suggest that the higher a student's fall 6th-grade alcohol use the lower the rate of increase in positive alcohol expectations over time. That is, a student who reports higher initial alcohol use will likely have a slower rate of increase in alcohol expectations over time. Or conversely a student reporting lower initial alcohol use will likely have a higher rate of increase in alcohol expectations over time. This result is possibly due to personal experience with alcohol use. Adolescents beginning with lower reported alcohol use or no use therefore have little or no personal experience with alcohol in comparison to those reporting higher initial levels of alcohol

use. According to social learning theory and social cognitive theory, previous personal experience plays a role in how expectancies are developed (Bandura, 1986). Therefore, if an adolescent's initial personal experience with alcohol is a positive experience, that in turn directly influences the adolescent's positive alcohol expectations, then the relationship exhibited in this model between initial alcohol use and increase in positive alcohol expectations follows. That is, those students who report lower alcohol use initially don't have much personal experience with alcohol. If over time they increase their experience with alcohol and these experiences are positive, they are more likely to have greater increases in positive alcohol expectations than those who already have had personal alcohol experiences at the initial measurement time point.

The last significant path in this model was the path from the time invariant covariate of gender to the initial level of positive alcohol expectations. This path suggests that positive alcohol expectations were significantly lower for girls compared with boys at the fall 6th-grade measurement. These results support other similar results found in the literature (Kraus, Smith & Ratner, 1994; Loveday, Oei, & Young, 1997). No other gender differences were supported by the results of this model.

Research Question II

II. What are the developmental trajectories of positive alcohol expectations among early adolescents?

Hypothesis: While linear, exponential and other more complex models will be examined, it is hypothesized that the developmental trajectories of positive alcohol expectations will best be fit by a linear model.

When we allowed in Model 2 for the inclusion of a third variable or variables at each time point by including the correlated errors across constructs at each time point, our results support the hypothesized linear trajectory of positive alcohol expectations. This hypothesized linear trajectory is within the context of this model which includes the influence of both gender and exposure to peer drinkers. The fact that a linear trajectory is supported by this data in this model with these other variables lends confidence to this linear trajectory. The estimated mean of the positive alcohol expectations slope was .89 suggesting that the mean level of positive alcohol expectations in this sample increased .89 between each measurement point on our positive alcohol expectation scale which ranged from 5 to 20.

The residual variance of this positive alcohol expectation slope was significant (.73, SE = .15, $p < .01$) indicating that significant individual variability exists in the increase of positive alcohol expectation above and beyond that variability explained by the predictors of this slope in this model. The predictors of the alcohol expectation slope were the slope of exposure to peer drinkers and the initial level of positive alcohol expectations. Therefore, these results suggest that there was significant variability among individuals in the increase of alcohol expectations beyond the variability explained by these two predictors.

This model had a significant path between the initial positive alcohol expectations and the increase in positive alcohol expectations. This path coefficient is negative suggesting that the higher the level of initially reported positive alcohol expectations, the lower the increase in positive alcohol expectations over time. Similarly, this negative path coefficient suggests that those who reported lower initial positive alcohol

expectations were more likely to have greater rates of increase in positive alcohol expectations over time. It is theorized that this result is because those who start at a lower positive alcohol expectation level also start at a lower level of alcohol use as shown in Model 1. As discussed previously, according to social learning theory and social cognitive theory, this previous personal experience plays a critical role in how expectancies are developed (Bandura, 1986). If, as demonstrated by the result of Model 1, those students who report at the initial measurement low positive alcohol expectations are also those with little or no personal experience with alcohol, it could be theorized that these students' alcohol expectations are only being developed from vicarious learning instead of the combination of vicarious learning and personal experience. As these adolescents increase their personal experience with alcohol, it is speculated that they add this potential additional source of influence on positive alcohol expectations over time resulting in a higher rate of increase over time. Those students who report higher initial positive alcohol expectations already have both sources of influence on positive alcohol expectation development in their repertoires and therefore the rate of increase in positive expectations is lower.

Research Question III

III. Does the rate of change in exposure to peer drinkers directly influence the increase in positive alcohol expectations among early adolescents?

Hypothesis: It is hypothesized that the increase in exposure to peer drinkers will directly influence the increase in positive alcohol expectations.

When we allowed in Model 2 for the inclusion of a third variable or variables at each time point by including the correlated errors across constructs at each time point, our results support our hypothesis that the rate of change in exposure to peer drinkers directly influences the increase or rate of change in positive alcohol expectations. That is, the increasing rate of change in exposure to peer drinkers over time, predicts an increasing rate of change in positive alcohol expectations over time. In addition, a significant path was found between the initial measurements of exposure to peer drinkers and positive alcohol expectations. That is, those students who reported higher levels of initial exposure to peer drinkers also reported higher levels of initial positive alcohol expectations. Further, the R^2 values suggest the importance of the influence of exposure to peer drinkers on positive alcohol expectations. The R^2 values suggest that the initial level of exposure to peer drinkers along with gender explain almost half (47%) of the variance of initial level of positive alcohol expectations. The results from Model 1 suggest that gender only explains 4% of the variance in the initial level of positive alcohol expectations. This result suggests that the majority of the 47% variance of the initial level of positive alcohol expectations is explained by the initial level of exposure to peer drinkers. The R^2 values for Model 2 also suggest that the initial level of exposure to peer drinkers and the increase of peer drinkers explain the majority (62%) of the variance of the increase in positive alcohol expectations. These findings support the main hypotheses of this study and suggest that exposure to peer drinkers plays a potentially important role in the development of positive alcohol expectations.

In addition, the path between the initial measurement of positive alcohol expectations and the increase of exposure to peer drinking was significant. This result suggests that

those adolescents who reported higher levels of positive alcohol expectations at the initial measurement as compared to those who reported initially lower levels of positive alcohol expectations, also reported higher levels of increase in exposure to peer drinkers over time. In other words those students who report a higher level of positive alcohol expectations in the fall of the 6th-grade were more likely to also report a greater increase in the number of their close friends who drink than those with lower levels of positive alcohol expectations in the fall of the 6th-grade. Those students who have initially higher levels of positive alcohol expectations as shown in Model 1 are also more likely to report having higher initial levels of alcohol use. The results of this significant path suggest that these students are also more likely to increase the number friends who drink at higher rates than those students with lower initial positive alcohol expectations. This relationship is therefore suggestive of a peer selection effect. The path between the initial level of exposure to peer drinkers and the increase in positive alcohol expectations was not significant.

Research Question IV

IV. How does gender affect 1) the increase of positive alcohol expectancy and, 2) the influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations among early adolescents?

Hypothesis 1: It is hypothesized that the trajectories of positive alcohol expectations for males and females will differ with males having higher positive expectations and higher rates of increase in positive expectations than females.

Hypothesis 2: It is hypothesized that the increase in exposure of peer drinkers will continue to directly influence the increase in positive alcohol expectations even after controlling for gender.

When we allowed in Model 2 for the inclusion of a third variable or variables at each time point by including the correlated errors across constructs at each time point, the hypothesized path between gender and the increase in positive alcohol expectations was not significant. Therefore, no support was found for the hypothesis that the trajectories of positive alcohol expectations are different for males and females. Interestingly however, significant paths were found between gender and both the initial level of positive alcohol expectations and the initial level of exposure to peer drinkers. Even though no gender differences were supported in the increase in positive alcohol expectations, a gender difference was found in the fall of the 6th-grade measurements of positive alcohol expectations and exposure to peer drinkers. Males were more likely to have higher scores on the positive alcohol expectations scale and were more likely to report having more close friends who drink than females at this time point. Preliminary analyses showed that this gender difference between positive alcohol expectations in the fall of the 6th-grade continued at each separate measurement point. That is, males consistently had more positive alcohol expectations than females. While this difference exists, both genders according to these results increase their expectations at approximately the same rate. The results of this model and the preliminary analyses support one another in that according to the preliminary analyses the gender difference in exposure to peer drinkers unlike the difference in positive alcohol expectations only exist in the fall of the 6th-grade. That is there are no differences between males' and females' exposure to peer

drinkers in the spring of the 6th-grade, the spring of the 7th-grade, or the fall of the 8th-grade. Nor was there any gender difference in the rate of increase in exposure to peer drinkers.

Based on the model design, each of the significant paths discussed under research question III were found while controlling for gender. Therefore each of the results previously discussed were all found while controlling for gender. These results include the significant paths from the fall 6th-grade measurement of exposure to peer drinkers to the fall 6th-grade measurement of positive alcohol expectations; from the slope of exposure to peer drinkers to the slope of positive alcohol expectations; and, from the fall 6^{th} grade measurement of alcohol expectations to the slope of exposure to peer drinkers. Therefore, the results of this model support research question IV, hypothesis 2 that increase in exposure to peer drinkers directly influences the increase in positive alcohol expectations when controlling for gender.

Research Question V

V. Does the increase in alcohol use indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

   Hypothesis: It is hypothesized that the increase in alcohol use will indirectly influence the increase of positive alcohol expectations through the increase in exposure to peer drinkers among early adolescents?

When we allowed in Model 2 for the inclusion of a third variable or variables at each time point by including the correlated errors across constructs at each time point, our results support our hypothesis that the increase in alcohol use indirectly influences the increase of positive alcohol expectations through the increase in exposure to peer drinkers. Significant paths were found between the slope of alcohol use and the slope of exposure to peer drinkers (1.44, *SE* = .16, $p < .01$) as well as the slope of exposure to peer drinkers and the slope of positive alcohol expectations (2.36, *SE* = .18, $p < .01$) resulting in an indirect effect equal to 3.40 (1.44 x 2.36). This indirect effect was found to be statistically significant (3.40, *SE* = .44, $p < .01$). This model does not support a direct influence of the increase in alcohol use on the increase in positive alcohol expectations.

While this model suggests an indirect path between the slopes of the three main study variables, this same indirect path was not found between the initial values of the main study variables. That is, those student with a higher level of alcohol use in the fall of the 6th-grade were also those students who reported more close friends who drink at this same time point (2.79, *SE* = .48, $p < .01$). However, the next segment in the hypothesized indirect path was not significant. That is, there was no significant path between the initial number of close friends who drink and the initial level of positive alcohol expectations. While the results do not suggest an indirect influence of alcohol on the initial level of positive alcohol expectations at the fall 6th-grade measurement point, they do support a direct effect of alcohol on positive alcohol expectations at this one time point. This direct effect is represented by the significant path found between the fall 6th-grade level of alcohol use and the fall 6th-grade level of positive alcohol expectations (9.97, *SE* = 2.85, $p < .01$). While it is recognized that many other variables not examined

in this model might play into these relationships, the results of this model would suggest that while alcohol use is indeed important in the development of positive alcohol expectations, the effect on the increase in alcohol use is only through the increase in exposure to peer drinkers. That is, an increasing rate of change in alcohol use over time, predicted an increasing rate of change in the number of close friends who drink over time. It is this increase in exposure to more close-friend drinkers that in turn predicts increased increase in positive alcohol expectations. The results also suggest that at one point in time, the fall of the 6th-grade, alcohol use is only directly related to positive alcohol expectations. The indirect influence of alcohol use through exposure to peer drinkers at this time point is no longer supported.

In interpreting the above main findings for each research question, it is important to keep in mind that these findings occur when we allow for the inclusion of a third variable or variables at each time point as in the models allowing correlated errors across factors. Since we do not know what these third variables are, it makes it difficult to interpret these results and without these third variables, the models do not fit the data well. Therefore, caution should be used in the interpretation of these findings.

Three-time-point Models

Because of the limitations on the four-time-point models that require the addition of a third variable or variables at each time point by allowing the errors of each observed variable to correlate across constructs at each time point and after further examination of the sample statistics and four-time-point model results, the hypothesized models were

again examined. However, they were fit to the data using only the data from the last three measurement points.

Model 1 was used to answer research question I. An adequate fit of the data to the hypothesized Model 1, per the criteria suggested by Hu and Bentler (1999), was found. In this three-time-point Model 1, two of the originally hypothesized gender paths, the path from the intercept of alcohol use to the slope of alcohol use, and the path from the intercept of positive alcohol expectation to the slope of alcohol use were not found to be significant. The other five original Model 1 hypothesized paths were found to be significant.

Model 2 was used to answer research questions II, III, and IV. Model 3 was used to answer research question V. As in Model 1, an adequate fit of the data to both the three-time-point Model 2 and the three-time-point Model 3 were found. In the three-time-point Model 2, only three of the hypothesized paths were found to be significant. The remaining six hypothesized paths were not found to be significant. In the three-time-point Model 3, both the path from the intercept of alcohol use to the intercept of positive alcohol expectations and the path from the slope of alcohol use to the slope of positive alcohol expectations were found to not be significant. The remaining four hypothesized paths were found to be significant. These main findings from the examination of each of these models and the differences between the three-time-point and four-time-point models are discussed below by research question.

Research Question I

The results of the three-time-point Model 1 further support the hypothesis that the rate of change in positive alcohol expectations directly influences the increase in alcohol use. That is, similar to the four-time-point model, the results of the three-time-point model suggest that an increasing rate of change in positive alcohol expectations over time predicts an increasing rate of change in alcohol use over time. Also similar to the four-time-point model, a significant path was also found from the spring 6th-grade measurement of positive alcohol expectations to the spring 6th-grade measurement of alcohol use. This result suggest that cross-sectionally, reporting higher levels of positive alcohol expectations was predictive of reporting higher levels of alcohol use.

The R^2 values even more so in this three-time-point model than in the four-time-point model reinforce the influence of positive alcohol expectations on alcohol use. The R^2 values in this three-time-point model suggest that the spring 6th-grade level of positive alcohol expectations in addition to gender explains 60% of the variance of the spring 6th-grade alcohol use. The increase of positive alcohol expectations alone explains even more of the variability of the increase in alcohol use (55%) in this model than the increase of positive alcohol expectations together with the fall 6th-grade measurement of positive alcohol expectations did in the four-time-point models (51%). These findings reinforce the importance of examining the remaining research questions in an effort to more fully understand the development of alcohol expectations during adolescence.

This three-time-point model also included two of the other three hypothesized paths that were supported by the four-time-point models. These two hypothesized paths include the path from the initial measurement of alcohol use to the slope of positive

alcohol expectations and the path from gender to the initial level of positive alcohol expectations. The path between the initial level of positive alcohol expectations and the slope of alcohol use is not supported in this model as it was in the four-time-point model.

As with the four-time-point model, the coefficient associated with the path from the initial measurement of alcohol use to the slope of positive alcohol expectations is negative suggesting an inverse relationship between the two. Specifically this negative coefficient suggests that the higher the spring 6th-grade alcohol use the lower the rate of increase of positive alcohol expectations over time. A student reporting higher initial alcohol use will likely report a slower rate of increase in alcohol expectations over time in comparison to a student who reports lower initial alcohol use.

The time invariant covariate of gender showed significant paths not only with the initial level of positive alcohol expectations as was found in the four-time-point model, but also with the initial level of alcohol use. These paths suggest that in this model both alcohol use and positive alcohol expectations were significantly lower for girls compared with boys at the spring 6th-grade measurement. These results support other results found in the literature (Kraus, Smith & Ratner, 1994; Loveday, Oei, & Young, 1997; Moon, Jackson, & Hecht, 2000). While gender differences are supported by the literature, the idea that being female is a protective factor for substance use has recently been changing as statistics show that the gender differences for alcohol use have narrowed in recent years (Jenson, Howard, & Jaffe, 1995; Johnston, O'Malley, & Bachman, 1995; Substance Abuse and Mental Health Services Administration (SAMHSA), 2000). As with the four-time-point model, no gender differences in the increase in either alcohol use or positive alcohol expectations were supported by the results of this model. Nonetheless, there is

support for gender differences at each time point and therefore prevention programmers need to consider gender-specific, prevention programming.

Research Question II

The results of this three-time-point Model 2 lend further support to the hypothesized linear trajectory of positive alcohol expectations. As with the four-time-point model, this hypothesized linear trajectory is within the context of this model which includes the influence of both gender and exposure to peer drinkers. The fact that a linear trajectory is supported by the data in this model including these latter variables lends confidence to this linear trajectory. The estimated mean of the positive alcohol expectations slope in this three-time-point model (.88) was very similar to the estimated mean in the four-time-point model (.89) supporting the mean level of increase of positive alcohol expectations in this sample between each time point of just under one full point on our positive alcohol expectation scale ranging from 5 to 20. The fact that the estimated mean of the positive alcohol expectations slope in both the three-time-point and four-time-point models were very similar suggest the potential that the time between the fall 6th-grade measurement and the spring 6th-grade measurement was too short to observe a change in expectations. The difference between the mean of the positive alcohol expectation scale measured in the fall of the 6th-grade and then in the spring of the 6th-grade was only .38, further supporting the potential for the time between measurements to have been too short to observe a change in expectations.

Both the four-time-point and three-time-point models indicated that significant individual variability exists in the increase of positive alcohol expectations above and

beyond that variability explained by the predictors of this slope in the models. The predictors of the increase in positive alcohol expectations in the four-time-point model were both the initial level of positive alcohol expectations and the increase in exposure to peer drinkers. The only significant predictor of the slope of positive alcohol expectations in the three-time-point model was the slope of exposure to peer drinkers. These results indicate significant individual differences in the rates of change of positive alcohol expectations. That is, the adolescents in this study differ from each other significantly in how their positive alcohol expectations change over time.

Research Question III

The results of this three-time-point model provide further support for the hypothesis that the increase in exposure to peer drinkers directly influences the increase in positive alcohol expectations. As with the four-time-point model, both the path from the slope of exposure to peer drinkers to the slope of positive alcohol expectations and the path from the initial measure of exposure to peer drinker to the initial measure of positive alcohol expectations were significant in this three-time-point model. These significant paths indicate first, that a greater initial level of exposure to peer drinkers predicts a greater initial level of positive alcohol expectations and second, that an increasing rate of change in exposure to peer drinkers over time predicts an increasing rate of change in positive alcohol expectations over time. These findings support the main hypothesis of this study, and in conjunction with the results of the four-time-point model further indicate that exposure to peer drinkers plays a significant role in the development of positive alcohol expectations.

The R^2 values even more so in this three-time-point model than in the four-time-point model reinforce the influence of exposure to peer drinkers on positive alcohol expectations. The R^2 values in this three-time-point model suggest that the initial level of exposure to peer drinkers in addition to gender explain almost three quarters (74%) of the variability of the spring 6th-grade positive alcohol expectations. Therefore, this model suggests an increase of 27% over the four-time-point model in the explanation of the variance of the initial level of positive alcohol expectations by these two predictors. Per the three-time-points Model 1 results, gender only explains 2% of the variability of the spring 6th-grade positive alcohol expectations suggesting that the majority of the 74% of the variability of the spring 6th-grade positive alcohol expectations explained by these predictors in this three-time-point model is explained by the spring 6th-grade exposure to peer drinkers.

As with the four-time-point model, the increase of exposure to peer drinkers in this three-time-point model alone explains a large proportion of the variability of the increase in positive alcohol expectations (86%). This R^2 value represents an increase in variability of the increase in positive alcohol expectations explained by this model over the four-time-point model of 24%. These three-time-point model findings further reinforce the support found in the four-time-point model for this hypothesis.

Neither the path from the spring 6th-grade positive alcohol expectations to either the slope of exposure to peer drinkers or to the slope of positive alcohol expectations were significant in this three-time-point model as they were in the four-time-point model. The fact that these paths were not significant in this model suggests the need for even further

caution to be used in the interpretation of the results found in the four-time-point model for these two paths.

Research Question IV

This three-time-point model led no support, nor did the four-time-point model that allowed the errors of each observed variable to be correlated across construct at each time point discussed above, for the hypothesis that gender differences exist in the increase in positive alcohol expectations. While in the four-time-point model, three of the hypothesized paths including gender were significant. The only hypothesized path including gender that was significant in this three-time-point model was the path between gender and the initial (spring 6th-grade) positive alcohol expectations measurement. This result reinforces the differences between males and females on cross-sectional positive alcohol expectation scores, with males having higher positive alcohol expectations than females. As mentioned in the discussion of the four-time-point models, these results support similar results found in the literature (Kraus, Smith & Ratner, 1994; Loveday, Oei, & Young, 1997).

Based on the model design, each of the significant paths that included the influence of gender on at least one of the variables in the path, was found to be significant while controlling for gender. Therefore the results previously discussed were found while controlling for gender. That is, the results suggesting that the greater the exposure to peer drinkers at the spring 6^{th}-grade measurement, the greater the positive alcohol expectations at the spring 6^{th}-grade measurement were found while controlling for gender.

Research Question V

As with the four-time-point Model 3, the results found in the three-time-point Model 3 support our hypothesis that the increase in alcohol use indirectly influences the increase of positive alcohol expectations through the increase in exposure to peer drinkers. Significant paths were found between the slope of alcohol use and the slope of exposure to peer drinkers (1.96, *SE* = .33, $p < .01$) as well as the slope of exposure to peer drinkers and the slope of positive alcohol expectations (2.40, *SE* = .18, $p < .01$) resulting in an indirect effect equal to 4.7 (1.96 x 2.40). This indirect effect was found to be statistically significant (4.7, *SE* = .83, $p < .01$). Both the three-time-point and four-time-point models do not support a direct influence of the increase in alcohol use on the increase in positive alcohol expectations. The fact that both models do not support this direct influence lends added support to the implication of this finding.

Unlike the four-time-point model, this three-time-point model also supports the indirect influence of alcohol use on positive alcohol expectations through the exposure to peer drinkers cross-sectionally; That is, the indirect influence is supported cross-sectionally during the spring of the 6th-grade. Significant paths were found from the spring 6th-grade measurement of alcohol use to the spring 6th-grade measurement of exposure to peer drinkers (1.75, *SE* = .15, $p < .01$) and from the spring 6th-grade measurement of exposure to peer drinkers to the spring 6th-grade measurement of positive alcohol expectations (2.80, *SE* = .14, $p < .01$) resulting in an indirect effect equal to 4.9 (1.75 x 2.80). This indirect effect was again found to be statistically significant (4.9, *SE* = .43, $p < .01$). A significant path was not found between the spring 6th-grade measurement of alcohol use and the spring 6th-grade measurement of positive alcohol

expectations. This result suggests that there was no cross-sectional support for the direct influence of alcohol use on positive alcohol expectations.

The R^2 results of both the four-time-point model and this three-time-point model suggest that the influence of the increase in exposure to peer drinkers explains the majority of the variability in the increase of positive alcohol expectations (71%). The R^2 value for the increase in exposure to peer drinkers also suggests that a very large portion of the variability in this increase is explained by the adolescents' reported alcohol use (84%). These R^2 results reinforce the importance of both the increase of alcohol use on the increase of exposure to peer drinkers and the increase of exposure to peer drinkers on the increase of positive alcohol expectations. However, because the R^2 values are as high as they are, it suggests the possibility that the main constructs, as they were measured in this study, are potentially not distinctly different from each other as was hypothesized. That is, these results suggest caution in interpretation due to possible issues with the construct validity of the measures used in this study.

These results taken together lend support to the hypothesis that while alcohol use is indeed important in the development of positive alcohol expectations, the importance of this influence of alcohol use is indicated by the results to be through the exposure to peer drinkers. The more an adolescent drinks, the more their close friends drink and it is the exposure to more close friends that in turn predicts increased positive alcohol expectations. This model suggests that this influence is true cross-sectionally and when examining increase over time.

Theoretical Findings

Though many theories exist and have been used in an effort to explain and understand adolescent alcohol use, the Social Cognitive theory, with its focus on vicarious learning provided the best framework for this study. The concept of outcome expectations is not extensively developed in the social cognitive theory though the importance of the concept in adolescent alcohol use is well accepted. Thus, this research provides preliminary evidence and understanding about the development of the concept of outcome expectations in adolescents.

Bandura in his social cognitive theory suggests that expectations are developed primarily from previous personal experience and vicarious experience (Bandura, 1986). Bandura suggested that psychological theories have traditionally focused on the influence of performing a behavior on learning. While Bandura asserted that direct experience with the behavior or situation is important in the development of expectations, he also asserted that the social environment plays an important role in the creation of expectations. In fact, Bandura asserts that, "virtually all learning phenomena, resulting from direct experience, can occur vicariously by observing other peoples' behavior and it's consequences for them" (Bandura, 1986, p 19). Bandura asserts that it is the interplay of both personal experience and external sources of influence that determine our behavior. However, he also asserts that vicarious experience is actually a superior influence due to its fewer attentional demands. Those directly involved in the performance of a behavior must give some of their attention to creating, selecting and acting out the behavior itself. Observers, however, do not have to split their attention between the behavior and the

results of the behavior. Therefore it is easier for an observer to construct an expectation of a behavior than the person performing that behavior.

The results of both Models 2 and 3, provide preliminary support for Bandura's suggestion that expectations are developed primarily from previous personal experience and vicarious experience. Vicarious experience, also called observational learning, can be defined as behavioral acquisition that occurs by watching the actions and outcomes of others' behavior (Perry, Baranowski, & Parcel, 1990). In this study, exposure to peer drinkers, a measure of the number of close friends these early adolescents perceive as drinkers, provided a measure of vicarious experience. Results from Model 2 provide support for the importance of vicarious experience in the development of expectations. This importance is true both cross-sectionally and over time. In this model, paths were found directly from both the initial measure and the slope of exposure to peer drinkers to the initial measure and slope of positive alcohol expectations. That is, paths were found directly from both the initial measure and the slope of these adolescents' vicarious experience to their initial measure and slope of expectations. The fact that both of these paths are true in both the original four-time-point Model 2 where the addition of a third variable or variables at each time point was allowed and in the three-time-point Model 2 provides substantiation of the importance of vicarious experience in the development of expectations.

The results demonstrated in Model 3 also provide preliminary evidence and understanding about the development of the concept of outcome expectation in adolescents. The four-time-point Model 3, which allows for the addition of a third variable or variables at each time point suggests that for this sample, during the fall of the

6th-grade, personal experience was a predictor of expectations. No support was shown for the direct influence of vicarious experience at this time point. This time point in this model, was the only place in this study where a direct influence of personal experience was supported. Because of the addition of the third variable or variables in this model, caution should be used in the interpretation of this finding.

The relationship between previous experience and vicarious experience when examined over time suggests that the change in personal experience over time only influences the development of expectations indirectly through vicarious experience. That is, the increase in personal experience or personal alcohol use over time only effects an increase in expectations over time through the influence of the increase of exposure to peer drinkers over time. The results of the three-time-point Model 3 further substantiate this indirect influence of personal experience through vicarious experience on expectations. In the three-time-point Model 3, evidence for this indirect influence is found in both the cross-sectional paths and the paths representing change over time. While Bandura suggested the influence of both vicarious experience and personal experience, these results provide preliminary evidence of how these two types of experience interact to create expectations. These results suggest that personal experience works through vicarious experience to create expectations.

In addition, the results of the analyses conducted in this study provide evidence about the importance of vicarious learning through a specific social influence, an individual's peers. That is, the significant paths discussed above provide evidence about the influence of vicarious learning through peers. While this study does provide evidence about the importance of vicarious learning through peers, it does not provide evidence about the

importance of vicarious learning through peers in comparison to other social influences. The importance of peers during this developmental time period is well established (Irwin & Igra, 1994) and therefore the importance of vicarious learning through peers for this group is not surprising.

Overall the results of this study suggest the importance of vicarious learning in the development of expectations. It specifically suggests the importance of vicarious learning on expectations through peers. In addition, the results of this study provide initial evidence that while personal experience is also an important influence on the development of expectations that this influence is only indirect through vicarious experience.

Summary

As expected from the review of the literature (Goldman, Brown, & Christiansen, 1987), the results of this study support the main hypothesis for research question I. That is, as hypothesized, the results reinforced the influence that positive alcohol expectations have on actual alcohol use.

In addition, the results of this study support all but one of the main hypotheses for the remaining four research questions. Specifically, the results support the hypothesis that the developmental trajectory of positive alcohol expectations among early adolescents fits a linear model. While the result of the four-time-point Model 2 suggest this linear trajectory, caution must be used in the interpretation of the model because of the addition of the third variable or variables at each time period. The results of the three-time-point Model 2, similarly show that the developmental trajectory of positive alcohol

expectations among early adolescents fits a linear model, therefore substantiating the support for this hypothesis.

The results of this study also provide support for the hypothesis related to the main research question, research question III, suggesting the direct influence of the increase in exposure to peer drinkers on the increase in positive alcohol expectations. The support for this hypothesis comes from both the four-time-point Model 2 and the three-time-point Model 2. Not only is the direct influence of the exposure to peer drinkers on the positive alcohol expectations found in the paths representing increase in both constructs, but this direct influence is also supported cross-sectionally at the initial measurement point in each model. These results provide evidence for the influence of vicarious experience on the development of expectations.

Further, as hypothesized for research question IV, the results suggest that this direct influence of exposure to peer drinkers on positive alcohol expectations occurs even when gender is controlled for in the models. While a gender influence was demonstrated consistently on the initial levels of positive alcohol expectations, contrary to hypothesis 1 for research question IV, no gender influence was demonstrated by the results on the increase of positive alcohol expectations. While the models showed consistently that at the initial measurement of positive alcohol expectations males reported higher levels of positive alcohol expectations than females, a gender influence on the increase in positive alcohol expectations was not supported. No gender difference in the trajectory of positive alcohol expectations was supported.

In an effort to examine what role if any, actual alcohol use had on the hypothesized relationship between exposure to peer drinkers and positive alcohol expectations, a third

model examining an indirect influence of alcohol use through exposure to peer drinkers was examined to answer research question V. The results of both the four-time-point Model 3 and the three-time-point Model 3 support this hypothesized indirect influence of alcohol use. These results reinforce the influence of actual behavior on expectations, but suggest that actual behavior is influential only through the influence of vicarious experience, in this case, the exposure to peer drinkers. A direct influence of alcohol use on positive alcohol expectations was not supported by the results of this study.

Utility of Latent Curve Analysis

The use of Latent Curve Analysis (LCA) to answer the main research questions of this study provided information that if other statistical methods had been used would have been missed. As discussed in Chapter 3, there were many advantages of using LCA. One advantage was the method's ability to describe data at both the individual level and the group level. Using this technique in this study allowed us to be able to examine our hypotheses at the individual level as well as the group level. For example, the majority of the residual variances of the main study variables in each model indicated that there was significant individual variability unexplained by the predictors in the model. In addition to this information, using LCA allowed us to examine the path estimates and R^2 values of the models to provide insight into the variable relationships at the group level.

Another advantage of using LCA was that the models represent continuous change across all time points instead of at distinct times as in other longitudinal analysis techniques such as an auto-regressive cross-lagged panel model (Curran, 2000; Ferrar, &

McArdle, 2003). Therefore in this study, we were able to examine change in our variables and the associations between our variables continuously from time one to time four and not just at four separate time points.

A final advantage of using LCA over other longitudinal techniques for this study was how this technique handled clustering of data. Researchers have struggled with how to handle clustered data because more traditional analytical methods are limited in their handling of the technical difficulties posed by clustering. LCA however actually offered the possibility of making use of within-cluster differences in parameter estimates, by treating these differences as a meaningful source of variance rather than as within-group error (Duncan, et al, 1999). While clustering affects the resulting parameter estimates in LCA it does not affect whether or not the variables in question are related (K. O'Grady, August 2, 2004). Since the research questions in this study were simply asking about relationships between key research variables, and given the fact that the individuals examined in this study were clustered within schools, how LCA handles clustered data was one more reason why this technique was the most appropriate and advantageous for use in this study.

Contribution of the Study

The expectations that exist about the effects of using alcohol have been shown in the literature to have a great influence on the initiation of alcohol use during adolescence and the continuation of alcohol use across the ages (Goldman, Brown, & Christiansen, 1987). While the importance of these expectations on alcohol use is well accepted, few studies have examined how these expectations develop and change during adolescence. The

influence of the exposure of peer drinkers on the development and change of expectations has been suggested by many researchers (Scheier & Botvin, 1997; Cumsille, Sayer, & Graham, 2000; Simons-Morton, et al, 1999) though few have examined this influence. This study therefore provides preliminary evidence of the influence of the exposure of peer drinkers on the development and change of expectations suggested in the literature.

To date, the few prevention efforts that have attempted to change alcohol expectancies have had varying success (Darkes & Goldman, 1993; Fromme, Kivlahan, & Marlatt, 1986; Kraus, Smith, & Ratner, 1994; Trudeau, Spoth, Lillehoj, Redmond & Wickrama, 2003). The current study provides information to help those who are working specifically with early adolescents to prevent alcohol use and abuse. It provides information needed to help them plan and implement successful prevention programs. Specifically it provides information about the role that exposure to peer drinkers has on the development of positive alcohol expectations. These expectations act as predisposing factors, in the language of the PRECEDE-PROCEED model for program planning (Greene & Krueter, 1999), for the behavior of alcohol use. By gaining a greater understanding of this predisposing factor, positive alcohol expectations, prevention programmers have additional information about an initial target that can then be attacked with such strategies as direct communications to the target population and indirect communications through parents, teachers, clergy, community leaders, employers, and especially peers. Specifically, the results of this study support the need for prevention planners to target the reduction of positive alcohol expectations or the reduction of the increase over time of positive alcohol expectations in order to increase the success of alcohol use prevention efforts. The results of this study suggest that in order to increase

the success of alcohol use prevention efforts, interventions focusing on the influence that the exposure to peer drinkers has on positive alcohol expectations need to be further implemented and studied. Because of the influence that the exposure to peer drinkers has on the development of positive alcohol expectations and therefore on actual alcohol use, the importance of limiting the exposure of adolescents to other adolescents that drink is crucial. The results of this study therefore support interventions that attempt to limit this exposure. Examples of such interventions could be PTA and other adult planned graduation or prom night parties. An additional potential strategy might be using peers to communicate prevention messages directly to adolescents.

The results of this study indicating an indirect influence of alcohol use through exposure to peer drinkers on positive alcohol expectations suggest the importance for prevention programmers to not only focus on the influence that the exposure to peer drinkers has on positive alcohol expectations, but in conjunction with that, focus on the influence that actual alcohol use has on peer alcohol use. The relationship indicated by this study between alcohol use and exposure to peer drinkers is suggestive of peer selection or the tendency of adolescents to associate with peers who are similar to them in their attitudes and behaviors (Simons-Morton, Chen, Abroms, & Haynie, 2003). The need for interventions that work to prevent this adolescent tendency of peer selection therefore need to be further examined. Additionally, the results of this study suggest that interventions need to focus on both the relationship between alcohol use and exposure to peer drinkers and the relationship between exposure to peer drinkers and positive alcohol expectations in order to maximize the success of the intervention. Therefore, interventions that target a reduction of this peer selection in conjunction with those

focusing on the influence of the exposure of peer drinkers on reducing positive alcohol expectations are encouraged. In addition, the results of this study provide some evidence that prevention programmers need to consider gender specific needs in their development of such prevention programs.

Study Limitations

While the findings of this study provide new insights into the development of positive alcohol expectations over time, limitations to the study do exist. First, generalization of the findings of this study is limited by the sample itself. The subjects were taken mainly from four schools within one suburban school district. The majority of these subjects reported being of white ethnicity and of moderate socioeconomic status (using the proxy measure of FARM participation). Therefore generalization to adolescents from more urban or rural settings, different ethnicities or different socioeconomic statuses should be cautioned. In addition, the final sample used in this study was created by limiting the full sample (N = 1,660) of subjects in the control group to those who responded to all five of the questions making up the alcohol expectation scale, the study dependent variable, at three or more measurement points (n = 1,060). In comparing this final sample to the full sample, it was found that the final sample was more likely to have reported lower positive alcohol expectations at the fall 6th-grade measurement point and to be of white ethnicity. Because of this potential bias of the sample reflecting white subjects and those with lower alcohol expectations, further caution should be used in generalizing the results of the study to the general early adolescent population.

A second limitation of the study is the use of self-report data. The use of self-report data introduces the potential chance of the sample to respond in socially desirable ways. Having the sample respond in socially desirable ways in turn, can cause for less variability in the dependent variables to be explained. Encouraging truthful responses from students was addressed through the use of a cover page that included name, survey identification number, birth date, and homeroom teacher's name that was separate from the actual questionnaire. The actual questionnaire only had a numerical identifier that matched the one on the cover page. In addition, the questionnaire was administered by Going Places staff and classroom teachers while present in the room were instructed to not circulate around the room or otherwise be involved in the conduct of the survey.

Another possible limitation of the study results from possible limitations of the positive alcohol expectation scale. While the most well known alcohol expectation scales are much larger than the five item scale developed for use in the Going Places project, project planners felt that these more common measures would be inappropriate for this young population of early adolescents, most with no direct personal drinking experience (B. Simons-Morton, April 2, 2004). Even though the scale used in this study is limited by the number of questions it includes, the questions developed for this study to measure outcome expectations are similar to the questions used in the larger more well known measurement tools. As with the other measures used in the literature, the outcome expectation measure used in this study captures the idea of alcohol promoting an enjoyable experience, alcohol affecting social status and alcohol creating problems. The Going Places construct, however, does not measure alcohol's affect on sexuality. Neither does it directly measure alcohol's ability to promote relaxation or tension reduction as do

some other measurement constructs found in the literature. In order to examine the reliability of this expectation scale, Cronbach's alpha was computed. This Cronbach's alpha measured the inter-item consistency and therefore, the reliability of the scale. Cronbach's alpha was computed for the total control group sample, and each gender sample. Results of these analyses showed that the positive alcohol expectation scale used in this study was reliable. While the positive alcohol expectation scale used in this study was found to be reliable, another concern about the scale could be the negative wording of several of the scale questions. Four of the five questions were worded as negative expectations. An example was the question, "I would get in trouble." In this study, a lower negative expectation was treated as a positive expectation. Responding, for example, with "very unlikely" to the question about getting in trouble was treated as a higher positive expectation while responding as "very likely" was treated as a lower positive expectation. Treating the lack of negative expectations as positive expectations could be considered another limitation of this scale and therefore this study.

This study focused solely on positive alcohol expectations. While much of the research on alcohol expectations focuses on the importance of positive expectations, research also shows that both negative and positive alcohol expectations have important influences on alcohol use (Lee, Greely, & Oei, 1999). Therefore, focusing solely on the positive alcohol expectations can be seen as an additional limitation of this study.

In addition to the potential limitations of the positive alcohol expectations scale, additional limitations can be found in the measure of vicarious experience. Vicarious experience in this study was measured by the exposure to peer drinkers. That is, the number of close friends an adolescent perceives as drinkers. Because the question used

to measure exposure to peer drinkers asks about the perception of the number of close friends who drink, this measure could also be seen as a measure of perceived norms and not actual vicarious experience.

An additional limitation of the measure of exposure to peer drinkers is the fact that there is no measure of the number of close friends an adolescents has overall. If an adolescent only has two close friends and both of them are perceived as drinkers the influence of those close friends might be greater than an adolescent with many close friends and only two that are perceived as drinkers. Other authors have addressed this issue by creating a proportion score. For example, La Greca, Prinstein and Fetter (2001) created a standardized proportion score by taking the number of friends who engaged in particular behaviors and divided that number by the total number of close friends. This proportion was then standardized and z scores were obtained and used as the proportion of close friends who participated in particular behaviors. The fact that a standardized proportion score such as this was not calculated in this study could be seen as an additional limitation.

The study sample, and in particular the disproportionate loss to follow-up of males compared to females might also be a limitation to the findings reported in answering research question IV. This question asked about gender's influence on the relationship between the increase in exposure to peer drinkers and the increase in positive alcohol expectations. While at the fall 6th grade measurement of positive alcohol expectations, 46.5 percent of the sample was males, at the fall 8th grade measurement only 44.9 percent were males. This represents a percent decrease of 3.4. In comparison, 53.5 percent of the sample were females at the fall 6th grade measurement while 55.1 percent were

female at the fall 8th grade measurement. This represents an increase of 3%. This suggests a disproportionate number of males lost to follow-up in comparison to the number of females lost to follow-up. Not finding a significant difference in the increase in positive alcohol expectations over time between genders might therefore be due to this disproportionate loss to follow-up.

The last potential limitation of this study is that the analyses of the four-time-point Model 1 suggest that the measures of alcohol use and positive alcohol expectations were not simple expressions of two separate underlying constructs as was anticipated. The results presented for each of the four-time-point models included the correlations of the residuals of each observed variable of each construct for each time period allowing for the inclusion in each model of a third variable or variables at each time period. Therefore caution must be used in the interpretation of the results of these models. Because of the concerns of these four-time-point models and specific concerns about the fall 6th-grade measurements, models using only three-time-points were also examined. The results of these models do suggest that as was anticipated, the measures of alcohol use and positive alcohol expectations were expressions of two separate underlying constructs. The results of these three-time-point models not only provide evidence regarding our research hypotheses, but help to ameliorate some of the concern brought by the four-time-point models.

Next Steps in Research

While the findings of this study provide new insights into the development of positive alcohol expectations over time, future research is needed to further explore the

development of this important construct in adolescent use of alcohol. Effort should be made to replicate the findings of a direct influence of exposure to peer drinkers on positive alcohol expectations. The cross-sectional influences as well as the influence of the increase of exposure to peer drinkers on the increase of positive alcohol expectations should be replicated. In an effort to address the generalizability limitations of this study, similar research questions should be examined in samples that represent a wider variety of cultures, socio-economic status and living environments.

In addition, future research should focus on furthering the understanding of the social cognitive theory construct of outcome expectations. While this study provides preliminary evidence about the direct influence of vicarious experience and the indirect influence of personal experience, further study needs to be conducted to verify the current results. Additionally, this study focused on one specific type of vicarious experience, the vicarious experience as learned from peers. Further study examining the role of vicarious experience on the development of expectations needs to be conducted with other sources of vicarious experiences. Examples might include the influence of vicarious experience as learned from parents and other adult role models, and the influence of vicarious experience as learned from the media.

While this study only examines the indirect effect of personal experience on expectations through vicarious experience, it is possible that the reverse relationship also exists. That is, that vicarious experience influences expectations indirectly through personal experience. This relationship should also be examined in future research to further the understanding of this theoretical construct accepted as being so important in the issue of alcohol use. Further, there was no way within this study to connect the

responses of an individual with the responses of the close friends they refer to in the questionnaires. Future studies that are able to connect the responses should be conducted so that further understanding of the relationships between the constructs can be uncovered.

The results of this study provide information for prevention programmers working to create successful early adolescent alcohol use prevention programs. Specifically, the results suggest a prevention focus not only on positive alcohol expectations, but on the influence of exposure to peer drinkers on the development of positive alcohol expectations. In addition, the results suggest combining the above prevention focus with a focus on reducing the peer selection. Rigorous intervention studies that examine the effect of interventions focusing solely on the reduction of positive alcohol expectations need to be conducted to further inform prevention programmers. Additionally, further intervention studies need to be conducted that examine the combined prevention effort discussed above.

Appendix A: University of Maryland IRB Approval

UNIVERSITY OF MARYLAND
INSTITUTIONAL REVIEW BOARD

2100 Lee Building
College Park, Maryland 207
301.405.4212 TEL 301.314.1

September 24, 2004

INSTITUTIONAL REVIEW BOARD APPROVAL NOTIFICATION

TO: **Dr. Bradley Boekeloo**
Ms. Michele DeBarthe Sadler
Department of Public and Community Health

PROJECT TITLE:
"Growth in Exposure to Peer Drinkers as a Predictor of Growth in Positive Alcohol Expectations in Early Adolescents"

IRB/HSR PROTOCOL IDENTIFICATION NUMBER: 04-0425

EXEMPTION STATUS AND APPROVAL EXPIRATION DATE:
Exempt; September 30, 2007

The Institutional Review Board (IRB) Co-Chairpersons concur with the departmental Human Subjects Review (HSR) Committee's recommendation to approve the application to conduct the above referenced project. The IRB has approved the application and the research involving human subjects described therein, subject to any requests which may have been made by the IRB to revise the application. We ask that any future communications with our office regarding this research reference the protocol identification number indicated above.

We also ask that you not make any changes to the approved protocol without first notifying and obtaining the approval of the IRB. Also, please report any deviations from the approved protocol to the Chairperson of your departmental HSRC. If you have any questions or concerns, please do not hesitate to contact either of us at irb@deans.umd.edu. Thank you.

ADDITIONAL INFORMATION REGARDING IRB/HSRC APPROVALS

EXPIRATION OF IRB APPROVAL—Approval of non-exempt projects expires one year after the official date of IRB approval; approval of exempt projects expires three years after that date. If you expect to be collecting or analyzing data after the expiration of IRB approval, please contact the HSRC Chairperson in your department about submitting a renewal application. **(PLEASE NOTE: If you are not collecting data from human subjects and any on-going data analysis does not increase the risk to subjects, a renewal application would not be necessary.)**

STUDENT RESEARCHERS—Unless otherwise requested, the IRB will send copies of approval paperwork to the supervising faculty researcher (or advisor) of a project. We ask that such persons pass on that paperwork or a copy to any student researchers working on that project. That paperwork may be needed by students in order to apply for graduation. **PLEASE BE ADVISED THAT THE IRB MAY NOT BE ABLE TO PROVIDE COPIES OF THAT PAPERWORK, particularly if several years have passed since the date of the original approval.**

Enclosures (where appropriate), will include stamped copy of informed consent forms included in application and any copies of the application not needed by the IRB; copies of this memorandum and any consent forms to be sent to the Chairperson of the Human Subjects Review Committee

Appendix B: Going Places Questionnaire

Grade 8 Survey OMB Number: 0925-0436

Expiration Date:

Print your name here: _____
(Last name, First name, M.I.)

Print your birth date here:
Month Day Year

Print your school here: _____

Print your homebase teacher's last name here: _____

Print your language arts teacher's last name here: _____

Write the period you have language arts here: _____

This page will be removed from the rest of this survey. Your name will not appear on the survey. No one at school or at home will see your answers.

WINTER 2000 CHARLES COUNTY STUDENT HEALTH SURVEY

This survey asks you about your health behaviors and attitudes. It is being given to young people in Charles County. Your honesty in answering these questions is appreciated. The information you give will be used to develop better programs for young people like you.

DO NOT write your name anywhere on this survey. The questions about your background will only be used to describe the types of students completing this survey. No names will ever be reported.

Completing the survey is voluntary. Whether or not you answer the questions will not affect your grade in any class.

A valid OMB number is located in the heading of this document in accordance with the Paperwork Reduction Act of 1995. Failure to display a valid OMB number permits a respondent to raise the affirmative legal defense provided by the "public protection" provision.

Charles County OMB Number: 0925-0436

Student Health Survey

Expiration Date:

Winter 2000

IMPORTANT: Directions for this survey.

- **Use a pencil.**
- **Choose only one answer for each question.**
- **Fill in each circle completely. If you erase, do so completely.**
- **You may choose not to answer any question.**
- **There are no right or wrong answers — choose answers that best describe <u>you</u>.**

SECTION A. Choose the one answer that best describes you.

---

1. Print your homebase teacher's last name here:

2. What school do you attend?

   ① Hanson ② Henson ③ Piccowaxen

   ④ Smallwood ⑤ Mattawoman ⑥ Stoddert ⑦ Somers

3. What high school will you be attending next year?

   ① LaPlata ② West Lake ③ M.J. McDonough

   ④ Thomas Stone ⑤ Lackey ⑥ Other _____

4. How old are you?

   ① 10 ② 11 ③ 12 ④ 13 ⑤ 14 ⑥ Other

5. Print your birthday here: _____ _____
Month Day

6. Are you a male or a female? ① Male ② Female

7. How do you describe your ethnicity?

① Hispanic or Latino
② Not Hispanic or Latino

8. How would you describe your race?

① White
② Black or African-American
③ Native Hawaiian or Other Pacific Islander
④ American Indian or Alaskan Native
⑤ Asian
⑥ Other (write in here): _____

9. How many different middle schools, *including this one*, have you attended?

○ One ① Two ② Three or more

10. How many times have you moved **in the last 12 months**?

○ Zero ① One ② Two ③ Three or more

11. Do you qualify for free or reduced lunch? ○ No ① Yes ② I don't know

SECTION B. Choose the one answer that best describes you.

12. How often do you use your seat belt when riding in a car?

① Never ② Some of the time ③ Most of the time ④Always

13. Have you participated in a practice, game, or other activity on an organized youth sports team **during the last 30 days**?

O No ① Yes

14. Have you participated in an organized club or group for youth outside of school (such as scouts) **during the last 30 days**?

O No ① Yes

15. Have you participated in a school club or supervised school activity (such as glider club, drama club, poms, Bible club, OM) outside of class **during the last 30 days**?

O No ① Yes

16. On a school day, how much time do you usually spend in the following activities?

	NONE	½ hour	1 hour	1½ hours	2+ hours
a. Watching TV	O	①	②	③	④
b. Playing video games	O	①	②	③	④
c. Doing homework	O	①	②	③	④
d. Reading	O	①	②	③	④
e. Doing chores at home	O	①	②	③	④
f. Working for pay (e.g., babysitting, mowing lawns)	O	①	②	③	④

17. How many times have you smoked a cigarette, even a puff...

a. in the last 30 days? ○ Zero ① 1-2 ② 3-9 ③ 10-19 ④ 20+

b. in the last 12 months? ○ Zero ① 1-2 ② 3-9 ③ 10-19 ④ 20+

18. How many cigarettes have you smoked **in the last 30 days**?
○ Zero ① 1-2 ② 3-9 ③ 10-19 ④ 20+

19. On a regular day, how many cigarettes do you smoke?
○ Zero ① 1-2 ② 3-5 ③ 6-10 ④ 11+

20. How many times have you had alcoholic beverages (beer, wine, liquor) to drink other than for religious purposes...

a. in the last 30 days? ○ Zero ① 1-2 ② 3-9 ③ 10-19 ④ 20+

b. in the last 12 months? ○ Zero ① 1-2 ② 3-9 ③ 10-19 ④ 20+

21. How many times did you have 5 or more alcoholic drinks (beer, wine, liquor) within a few hours **in the last 12 months**?

○ None ① 1-2 ② 3-9 ③10-19 ④ 20+

22. How many times have you used marijuana (sometimes called grass, weed, or pot)…

c. in the last 30 days? ○ None ① 1-2 ② 3-9 ③ 10-19 ④ 20+

b. in the last 12 months? ○ None ① 1-2 ② 3-9 ③ 10-19 ④ 20+

23. How many times have you used chewing tobacco or snuff **in the last 12 months**?

○ None ① 1-2 ② 3-9 ③ 10-19 ④ 20+

24. How many times have you sniffed model glue, or breathed the contents of aerosol spray cans, or inhaled any other gases or sprays in order to get high **in the last 12 months**?

○ None ① 1-2 ② 3-9 ③ 10-19 ④ 20+

25. How many times have you used cocaine or crack **in the last 12 months**?

○ None ① 1-2 ② 3-9 ③ 10-19 ④ 20+

26. How many times have you used other illegal drugs (e.g., LSD/acid, PCP, heroin, stimulants/speed/uppers, barbiturates/downers) **in the last 12 months**?

○ None ① 1-2 ② 3-9 ③ 10-19 ④ 20+

27. How often do you think you might do the following things while in **high school**?

	Never	Once or twice	Three or more times
a. Smoke cigarettes	○	①	②
b. Drink alcohol	○	①	②
c. Use marijuana	○	①	②
d. Cut a day of school without permission	○	①	②

Directions:

- **Some kids find certain things harder to do than other kids.**
- **Read each statement and mark whether the activity is much harder, a little harder, a little easier, or much easier <u>for you</u> than it is for other kids in your grade.**
- **Choose the one best answer for you.**

Sample item: If you think that keeping a clean locker is much harder for you than it is for other kids in your grade, then you would mark the item like this:

	Much harder	A little harder	A little easier	Much easier
Keeping my locker clean is	●	②	③	④

Think about yourself compared with other kids.

	For me…	Much Harder	A little harder	A little easier	Much easier
b	doing well on school work is	①	②	③	④
c	making really close friends is	①	②	③	④
d	getting homework done on time is	①	②	③	④
e	staying out of trouble at school is	①	②	③	④
f	making friends at school is	①	②	③	④
g	following rules is	①	②	③	④
h	Getting along with classmates is	①	②	③	④
i	Paying attention in class is	①	②	③	④
j	Getting along with teachers is	①	②	③	④
k	Doing what is right is	①	②	③	④
a	Keeping up with my school work is	①	②	③	④

SECTION C. Choose the one answer that best describes you.

29. If you were to smoke cigarettes, how likely would each of the following be?

		Very unlikely	Somewhat unlikely	Somewhat likely	Very likely
a	I would get in trouble.	①	②	③	④
b	Some of my friends would not approve.	①	②	③	④
c	I would enjoy it.	①	②	③	④
d	Someone would try to stop me.	①	②	③	④
e	I would feel badly about it.	①	②	③	④

30. If you were to drink alcohol, how likely would each of the following be?

		Very unlikely	Somewhat unlikely	Somewhat likely	Very likely
a	I would get in trouble.	①	②	③	④
b	Some of my friends would not approve.	①	②	③	④
c	I would enjoy it.	①	②	③	④
d	Someone would try to stop me.	①	②	③	④
e	I would feel badly about it.	①	②	③	④

31. How upset would your parents or guardians be if they found out you did the following things?

		Not at all upset	A little upset	Somewhat upset	Extremely upset
a	Smoked cigarettes	①	②	③	④
b	Drank alcohol	①	②	③	④
c	Were sent to the office for misbehaving in class	①	②	③	④
d	Did poorly on a test	①	②	③	④
e	Were disrespectful to a teacher or other adult	①	②	③	④
f	Got in a physical fight at school	①	②	③	④

32. How many students in the following grades do you think smoke?

		Almost none	Less than half	About half	More than half
a	8th grade **boys**	①	②	③	④
b	8th grade **girls**	①	②	③	④
c	12th grade **boys**	①	②	③	④
d	12th grade **girls**	①	②	③	④

33. How many students in the following grades do you think drink alcohol?

		Almost none	Less than half	About half	More than half
a	8th grade **boys**	①	②	③	④
b	8th grade **girls**	①	②	③	④
c	12th grade **boys**	①	②	③	④
d	12th grade **girls**	①	②	③	④

The next group of questions asks about what middle school students do and what you think about these things.

34. How many of **your 5 closest friends** do the following things:

		Zero	One	Two	Three	Four	Five
a	Smoke cigarettes?	○	①	②	③	④	⑤
b	Drink alcohol (beer, wine, liquor)?	○	①	②	③	④	⑤
c	Bully/pick on other kids?	○	①	②	③	④	⑤
d	Talk or act disrespectfully to teachers?	○	①	②	③	④	⑤
e	Get into physical fights with other kids?	○	①	②	③	④	⑤
f	Lie to their parents or guardians about where they are or whom they are with?	○	①	②	③	④	⑤
g	Mark with graffiti (tag) or damage something that does not belong to them?	○	①	②	③	④	⑤

35. **In the past 12 months** has a friend ever tried to get you to do the following things:

		Never	Sometimes	Often
a	Smoke cigarettes?	○	①	②
b	Drink alcohol (beer, wine, liquor)?	○	①	②
c	Cheat on a school test?	○	①	②
d	Bully/pick on other kids?	○	①	②
e	Talk or act disrespectfully to teachers?	○	①	②
f	Steal something from a person or a store?	○	①	②

35. (Continued)

		Never	Sometimes	Often
g	Lie to their parents or guardians about where they are or whom they are with?	○	①	②
h	Mark with graffiti (tag) or damage something that does not belong to them?	○	①	②

SECTION D. Choose the one answer that best describes you.

Think about how much your parents or guardians with whom you live most of the time know about the following topics.

36. My parents/guardians know …

		Almost nothing	A little	A lot
a	about how I spend my time after school and on weekends.	①	②	③
b	about who my friends are.	①	②	③
c	about my activities (e.g., sports, clubs, hobbies).	①	②	③
d	about my health habits, such as how much sleep I get, what I eat, how much I exercise.	①	②	③
e	about how I am doing in school.	①	②	③
f	about my school life such as who my teachers are, when I am having problems, my homework, my grades.	①	②	③

SECTION E. Choose the one answer that best describes you.

You often think about yourself differently from the way others think about you. Think about how true each of the following is for you.

		Really true	Sort of true	Sort of false	Really false
37	I solve my problems by thinking through the options.	①	②	③	④
38	I communicate my thoughts and feelings clearly.	①	②	③	④
39	I resolve conflicts with other people without fighting or yelling.	①	②	③	④
40	I resist dares from other kids.	①	②	③	④
41	I keep from getting too angry or upset.	①	②	③	④
42	I speak calmly, even when I'm angry.	①	②	③	④
43	I hold back saying things that can make an argument worse.	①	②	③	④
44	I resist pressure to do things I shouldn't do.	①	②	③	④

SECTION F. Choose the one answer that best describes you.

Think about the past 12 months.

45. How many times **in the last 12 months** have you …

		Zero	1-2	3-5	6 or more
a	been in a physical fight (slapping, hitting, or shoving) in which you tried to hurt another kid but did not?	○	①	②	③
b	been in a physical fight in which you knocked down or hurt someone?	○	①	②	③
c	bullied or picked on someone younger, smaller, or weaker (not including your brothers and sisters)?	○	①	②	③
d	lied to your parents or guardian about where you were or whom you were with?	○	①	②	③
e	stayed out late at night when your parent or guardian said to be home?	○	①	②	③
f	marked with graffiti (tagged) or damaged property that did not belong to you?	○	①	②	③
g	gone someplace dangerous or off-limits?	○	①	②	③
h	Cut or skipped a day of school without permission?	○	①	②	③
i	Stolen something from a person or a store?	○	①	②	③
j	carried a knife or other weapon at school?	○	①	②	③

Think back over this school year.

46. How many times in THIS SCHOOL YEAR. . .

		Zero	1-2	3-5	6 or more
a	have you been sent to the guidance counselor for misconduct?	○	①	②	③
b	have you been sent to the principal or vice principal for misconduct?	○	①	②	③
c	have you been disciplined at school by the principal or vice principal?	○	①	②	③
d	have your parents been called by a teacher or school administrator about your misbehavior?	○	①	②	③

47. While at school or on a school bus, how many times did someone …

		Zero	1-2	3-5	6 or more
a	take something from you by using force or by threatening to hurt you	○	①	②	③
b	make you do something you did not want to do?	○	①	②	③
c	threaten to hurt you physically but not actually hurt you?	○	①	②	③
d	actually hurt you physically?	○	①	②	③

48. In THIS SCHOOL YEAR, while outside of school, how many times did someone …

		Zero	1-2	3-5	6 or more
a	take something from you by using force or by threatening to hurt you	○	①	②	③
b	make you do something you did not want to do?	○	①	②	③

48. (Continued)

		Zero	1-2	3-5	6 or more
c	threaten to hurt you physically but not actually hurt you?	○	①	②	③
d	actually hurt you physically?	○	①	②	③

49. In THIS SCHOOL YEAR . . .

		Zero	1-2	3-5	6 or more
a	how many times have you felt unsafe when you were at school?	○	①	②	③
b	how many times have you felt unsafe going to or from school?	○	①	②	③

50. Since the beginning of THIS SCHOOL YEAR, which one of these statements best describes the way you **most often spend your time after school**?
Mark ONLY ONE.

① At home
② In an after-school program or at an after-school activity (sports, poms, club meetings)
③ At a friend's house
④ At a neighbor's or relative's house
⑤ Hanging out with friends
⑥ At an after-school job (babysitting, yard work, paper route, etc.)
⑦ Other _____

51. An adult is present where you are after school. ○ Never ① Sometimes ② Always

52. Do you think it is OK for kids your age to do the following?

		No	Maybe	Yes
a	Take school seriously	○	①	②
b	Smoke cigarettes	○	①	②

52. (Continued)

		No	Maybe	Yes
c	Drink alcohol (beer, wine, liquor)	○	①	②
d	Use illegal drugs	○	①	②
e	Participate in school activities	○	①	②
f	Cheat on school tests	○	①	②
g	Bully/pick on other kids	○	①	②
h	Lie to their parents or guardian about where they were or whom they were with	○	①	②
i	Disrupt class	○	①	②
j	Go places that are dangerous or off-limits	○	①	②

53. If you wanted to, how difficult or easy would it be for you to get:

		Very difficult	Difficult	Easy	Very easy
a	Cigarettes?	①	②	③	④
b	Alcohol?	①	②	③	④
c	Marijuana	①	②	③	④
d	Other illegal drugs (cocaine, crack, LSD, etc.)?	①	②	③	④
e	A gun?	①	②	③	④

54. Do any of the adults who live in your home smoke cigarettes? ○ No ① Yes

SECTION G. Choose the one answer that best describes you.

Think about whether you could do what is described, and then pick the answer that fits you best.

55. How sure are you that you could …

		Very sure	Somewhat sure	Somewhat unsure	Very unsure
a	solve a problem by trying out several solutions and then picking the one that works best?	①	②	③	④
b	participate in most classes by raising your hand, asking questions, and volunteering answers?	①	②	③	④
c	calmly tell someone how you feel when he or she does something that upsets you?	①	②	③	④
d	help two other students talk about a problem instead of fighting about it?	①	②	③	④
e	ask a question during class when you don't understand something?	①	②	③	④
f	ask an adult for help in a respectful manner?	①	②	③	④
g	get yourself out of a bad mood by relaxing, doing something you like to do, or thinking about something pleasant or funny?	①	②	③	④
h	control your temper when you get mad at a student you don't like at school?	①	②	③	④
i	ask a teacher to give you extra help in a class in order to help you reach a goal?	①	②	③	④

55. (Continued)

		Very sure	Somewhat sure	Somewhat unsure	Very unsure
j	talk about something you are upset about without losing control of your temper?	①	②	③	④
k	control your temper when a teacher or another adult at school does something you don't like?	①	②	③	④
l	speak calmly, even when you are angry or upset?	①	②	③	④
m	keep yourself from saying something that can make an argument worse?	①	②	③	④
n	listen, talk, and compromise to resolve problems between you and your friends?	①	②	③	④
o	before deciding to do something, think ahead to what might happen?	①	②	③	④
p	help two other students talk about and resolve a disagreement?	①	②	③	④

SECTION H. Choose the one answer that best describes you.

Think about your parents and guardians as you read each of the following statements. Decide if any <u>one</u> of your parents or guardians is like the statement. For example, your mom might be easy to talk to and your stepfather might be interested in what you are learning at school.

56. I have a parent or guardian who …

		<u>Strongly agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
a	Helps me with things.	①	②	③	④
b	Likes me the way I am.	①	②	③	④
c	Is hard for me to get along with.	①	②	③	④
d	Would find out if I misbehaved.	①	②	③	④
e	Gives me a lot of care and attention.	①	②	③	④
f	Respects my opinions	①	②	③	④
g	Often makes me angry.	①	②	③	④
h	Checks up to see whether I have done what he/she told me to do.	①	②	③	④
i	Enjoys doing things with me.	①	②	③	④
j	Takes my ideas seriously.	①	②	③	④
k	Gives reasons for the rules and decisions that involve me.	①	②	③	④
l	Gets angry at me almost every day.	①	②	③	④
m	Expects me to work hard at school.	①	②	③	④
n	Praises me for doing a good job on things.	①	②	③	④
o	Really listens to what I have to say.	①	②	③	④
p	Easily loses his/her temper with me.	①	②	③	④

56. (Continued)

		Strongly agree	Agree	Disagree	Strongly Disagree
q	Is easy to talk to.	①	②	③	④
r	Believes in having rules and sticking to them.	①	②	③	④
s	Encourages me to speak up for myself.	①	②	③	④
t	Agrees with me a lot of the time.	①	②	③	④

Section I. Choose the one answer that best describes you.

Think about your middle school.

57. How much do you agree or disagree with each of the following statements **about your middle school?**

		Strongly agree	Agree	Disagree	Strongly Disagree
a	The teachers are fair.	①	②	③	④
b	My teachers do not expect very much from me.	①	②	③	④
c	I pay attention in class.	①	②	③	④
d	At least one of my teachers would help me if I had a problem or were upset.	①	②	③	④
e	There is a clear set of rules for students to follow.	①	②	③	④
f	Teachers provide students with a lot of support.	①	②	③	④
g	My teachers know the kinds of things I do well.	①	②	③	④
h	There is an adult at this school who cares about me.	①	②	③	④

57. (Continued)

		Strongly agree	Agree	Disagree	Strongly Disagree
i	The rules are enforced unfairly.	①	②	③	④
j	I take school seriously.	①	②	③	④
k	A teacher or adult at this school treats me like a person who matters.	①	②	③	④
l	There are kids I like in most of my classes.	①	②	③	④
m	Overall, this is a good school.	①	②	③	④
n	Students respect each other.	①	②	③	④
o	My teachers would care if I did poorly in their classes.	①	②	③	④
p	I am proud to be a student at this school.	①	②	③	④
q	My teachers know when students try hard and when they don't.	①	②	③	④
r	I want to do well at this school.	①	②	③	④
s	Most days, I am happy when I am at school.	①	②	③	④
t	My teachers don't really care if students pay attention in class.	①	②	③	④

58. What grade did you get on your last report card for the last quarter in the following subjects?

a	Math	① A	② B	③ C	④ D	⑤ F
b	Science	① A	② B	③ C	④ D	⑤ F
c	Language Arts	① A	② B	③ C	④ D	⑤ F
d	Social Studies	① A	② B	③ C	④ D	⑤ F

59. Have you ever been suspended from any school (including in-school retention, ISR)?

〇 No
① Yes, once
② Yes, more than once

60. Have you ever been in trouble with the police or juvenile authorities?

〇 No
① Yes, once
② Yes, more than once

61. How many times have you been in a physical fight in which you knocked down or hurt someone **in the last 12 months**?

〇 Zero ① 1-2 ② 3-5 ③ 6 or more

62. How many times have you smoked a cigarette, even a puff, **in the last 30 days**?

〇 Zero ① 1-2 ② 3-9 ③ 10-19 ④ 20+

SECTION J. Choose the one answer that best describes you.

The following statements relate to how often you think or act in a certain way. We want to know what is usual for you both at home and at school even if it hasn't happened in the past couple of days or weeks. After you read each sentence carefully, please mark how often it is true for you.

		Never	Some of the time	Most of the time	Always
63	People who make me angry better watch out.	○	①	②	③

		Never	Some of the time	Most of the time	Always
64	I feel so down and unhappy that nothing makes me feel much better.	○	①	②	③
65	I do thinks I know really aren't right.	○	①	②	③
66	I feel that others don't care about me the way I want them to.	○	①	②	③
67	I usually don't let things upset me too much.	○	①	②	③
68	If someone tries to hurt me, I make sure I get even.	○	①	②	③
69	I lose my temper and "let people have it" when I am angry.	○	①	②	③
70	When I'm doing something fun (for example, acting silly, joking around), I tend to get carried away and go too far.	○	①	②	③
71	I feel sad or unhappy.	○	①	②	③
72	I worry too much about things that are not that important.	○	①	②	③
73	I become "out of control" and do things other people might not like.	○	①	②	③

74	I often feel like not trying any more because I can't seem to make things better.	○	①	②	③
75	I worry about things that might go wrong.	○	①	②	③
76	I get into such a bad mood that I feel like just sitting around and doing nothing.	○	①	②	③
77	When I get upset or angry, I lose control.	○	①	②	③
78	I feel lonely.	○	①	②	③

Appendix C: Discussion of Complex Models Examined to Answer Research Questions II, III, and IV

Because the hypothesized Model 2 did not fit the data, other more complex models were then examined to determine if a better model could be found. As shown in Table B-1, following the hypothesized Model 2, two models for which growth was hypothesized to be exponential rather than linear were examined. One of these models was with base equal to *e* and the other was with base equal to ten. That is, base *e* and base 10 antilogs of the original slope coefficients representing linear growth (.5, 1.5, and 2.25) were calculated and used in these two exponential models respectively. Had either of these exponential models fit the data, it would have suggested that the growth in the positive alcohol expectations and exposure to peer drinker variables increased at an exponential rate over time rather than in a linear fashion. For example, the rate of change in exposure to peer drinkers and positive alcohol expectations of this early adolescent population would have increase dramatically as the children grew older if either of these two models had fit the data.

Table C-1: Models Examined to Analyze Research Questions II, III and IV With Model Fit Data

Brief name of model	χ^2	***df***	***P <***	***CFI****	***SRMR***
1. Hypothesized Model 2	219.94	27	.01	.91	.06
2. Exponential Model 2 – Base e	378.46	27	.01	.83	.09
3. Exponential Model 2– Base 10	566.17	27	.01	.74	.12
4. Hypothesized Model 2 with Correlated errors within	201.91	21	.01	.91	.05
5. Hypothesized Model 2 with Correlated errors across	75.40	23	.01	.98	.04
6. Hypothesized Model 2 with Correlated errors across and all parental variables and alcohol use as covariates	318.37	119	.01	.94	.05

*Comparative Fit Index (CFI)
** Standardized Root Mean Square Residual

Given the results of the previously examined models, the next step in the analysis process was to attempt to determine if the examined models were not being supported by the data due to potential measurement or conceptual issues at each specific time point or over time. Therefore, the next model examined was a model that included the correlated errors within each construct across time. That is, in addition to the paths described in Model 2, the residuals associated with each observed variable were freed, thus allowing correlations between each adjacent time point within each construct. For example, the correlation between the residual of positive alcohol expectations at the first measurement point and the residual of positive alcohol expectations at the second measurement point was added to the model. Adding these correlations to the model allows for the addition of a third variable or variables into the model for each construct across time points. If this model had fit the data it would have suggested either a measurement and/or conceptual problem. For example, if this model had adequately fit the observed data, it could have suggested a possible carryover effect of testing. That is, that answering the Going Places questions at one time point had some effect on the students' responses at the subsequent time point. However, this model did not adequately explain the observed data suggesting that the reason that the previously examined models were not being supported by the data was not due to a measurement or conceptual issue that occurred over time.

Following the model with errors correlated within each construct across time, a model was examined that included correlated errors across constructs within each time period. That is, in addition to the paths described in Model 2, correlations were added between the residuals of the observed variables at each measurement point. For example, the

correlation between the residual of positive alcohol expectations at the first measurement point and the residual of exposure to peer drinkers at the first time point was added to the model. These correlations were added to the model to determine if, as with the correlated errors within variables across time model, the previously examined models were not being supported by the data due to a potential measurement or conceptual issue. However, allowing for the errors of measurement to correlate across constructs within time, in contrast to allowing for the errors of measurement to correlate within constructs across time, allows for the examination of a common cause or causes operating within the model at each time point that was not specified in the model itself. Specifically, adding these correlations to the model allows for the addition of a third variable or variables into the model at each time point. The fact that this model adequately fits the data suggests that there is a third variable or variables at each time point that when added to the model allows for adequate fit with this data.

Because this model with correlated errors across constructs within each time period fit the data, the next step in the analysis process was to add covariates into this model in an effort to determine the role if any that these covariates had on the model. No role for these covariates was hypothesized. This step was completed in an effort to examine what if any role these covariates had on the model. These covariates were chosen based on the results of the preliminary analyses and the potential confounding role that the preliminary analyses suggested might exist. These preliminary analyses suggested that alcohol use and the three parental variables might play a confounding role on the model. Therefore, alcohol use and these three parental variables, parental expectations, parental monitoring and parental involvement were added to the correlated errors across constructs within

each time period model. The addition of these variables to the model allowed for the effects of alcohol use and these parental variables on the adolescents positive alcohol expectations at each measurement point to be partialed out or controlled for. In addition, it allowed for the effect of alcohol use and these parental variables on exposure to peer drinkers at each measurement point to be partialed out or controlled for. The addition of these variables to the model does not partial out or control for the effects of alcohol use or the parental variables on either of the intercepts or slopes, only on the observed variables. The fact that the model with the covariates added does not fit the data well, suggests that alcohol use and the parental variables do not play a significant role in the hypothesized model.

Appendix D: Discussion of Complex Models Examined to Answer Research Question V

Because the hypothesized Model 3 did not fit the data, other more complex models were then examined to determine if a better model could be found. Table C-1 presents the models examined to analyze research question V along with the model fit data.

Table D-1: Models Examined to Analyze Research Question V with Model Fit Data

Brief name of model	χ^2	*df*	*p* <	*CFI**	*SRMR***
Hypothesized Model 3	382.16	58	.01	.86	.08
Hypothesized Model 3 with Correlated errors within	362.48	49	.01	.87	.07
Hypothesized Model 3 with Correlated errors across	108.25	46	.01	.97	.05

*Comparative Fit Index (CFI)
** Standardized Root Mean Square Residual

As shown in Table C-1 and given the results of the hypothesized Model 3 and previously examined Models 1 and 2, the next step in the analysis process was to attempt to determine if the hypothesized model was not being supported by the data due to potential measurement or conceptual issues at each specific time point or over time. Therefore, the next model examined was a model that included the correlated errors within each construct across time. That is, in addition to the paths described in Model 3, the residuals associated with each observed variable were freed, thus allowing correlations between each adjacent time point within each construct. For example, the correlation between the residual of positive alcohol expectations at the first measurement point and the residual of positive alcohol expectations at the second measurement point was added to the model. Adding these correlations to the model allows for the addition of a third variable or variables into the model for each construct across time points. If

this model had fit the data, it would have suggested either a measurement and/or conceptual problem. For example, if this model had adequately fit the observed data, it would have suggested a possible carryover effect of testing. It would have suggested that answering the Going Places questions at one time point had some effect on the students' responses at the subsequent time point. However, this model did not adequately explain the observed data, suggesting that the reason that the hypothesized model was not being supported by the data was not due to a measurement or conceptual issue that occurred over time.

Following the model with errors correlated within each construct across time, a model was examined that included correlated errors across constructs within each time period. That is, in addition to the paths described in Model 3, correlations were added between the residuals of each of the observed variables at each measurement point. For example, the correlation between the residual of positive alcohol expectations at the first time point and the residual of exposure to peer drinkers at the first time point was added to the model. These correlations were added to the model to determine if, as with the correlated errors within variables across time model, the hypothesized model was not being supported by the data due to a potential measurement or conceptual issue. However, allowing for the errors of measurement to correlate across constructs within time, in contrast to allowing for the errors of measurement to correlate within constructs across time, allows for the examination of a common cause or causes operating within the model at each time point that was not specified in the model itself. Specifically, adding these correlations to the model allows for the addition of a third variable or variables into the model at each time point. The fact that this model adequately fits the data suggests that

there is a third variable or variables at each time point that when added to the model allows for adequate fit with this data.

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