RISK AND RESILIENCE: A PROSPECTIVE ANALYSIS OF THE COMPLEX EFFECTS OF INTERNALIZING PROBLEMS ON ALCOHOL USE IN ADOLESCENCE

Thesis
Submitted to
The College of Arts and Sciences of the UNIVERSITY OF DAYTON

In Partial Fulfillment of the Requirements for
The Degree of
Master of Arts in Psychology

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UNIVERSITY OF DAYTON
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December, 2015
RISK AND RESILIENCE: A PROSPECTIVE ANALYSIS OF THE COMPLEX EFFECTS OF INTERNALIZING PROBLEMS ON ALCOHOL USE IN ADOLESCENCE

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ABSTRACT

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Previous research suggests that there exist both risk and protective mechanisms for the relationship between internalizing problems and alcohol use outcomes. The present study aimed to determine whether low deviant peer affiliations and risk aversion were two protective mediating mechanisms of this relationship. A risk mechanism of high negative emotionality, consistent with the tension reduction hypothesis, was also investigated. For exploratory purposes, the mediators were tested on three separate alcohol use outcomes: frequency of use, frequency of heavy use, and problematic use. Data from age cohorts 9, 12, and 15 (N=2,318) of the Project on Human Development in Chicago Neighborhoods’ (PHDCN) Longitudinal Cohort Study were utilized. Path analyses for all models revealed that internalizing problems were associated with high negative emotionality and low impulsivity. Also, high peer deviance was found to increase adolescents’ risk for all alcohol use outcomes, implying a possible target for intervention. Contrary to predictions,
high negative emotionality significantly negatively mediated the relationship between internalizing problems and alcohol use frequency.
ACKNOWLEDGEMENTS

I would like to extend my deepest gratitude to my kind and patient advisor, Dr. Jackson Goodnight. His constant support, guidance, and intellectual contributions were invaluable throughout this process. I would also like to thank my committee members, Dr. Catherine Lutz-Zois and Dr. Mary Fuhs, for their thoughtful insights to better this project. My appreciation also goes to the University of Dayton for providing me with a Graduate Student Summer Fellowship to support this project. Finally, I wish to thank the primary investigators of the Project on Human Development in Chicago Neighborhoods for granting me access to their data, and to all the participants who took part in this study.
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CHAPTER 1
INTRODUCTION

Substance use disorders are a growing problem throughout the United States. The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) reports that the 12-month prevalence of alcohol use disorder is 4.6% for adolescents between 12 and 17 years of age and 8.5% for adults 18 and older. A substantial amount of research has examined potential developmental pathways leading to alcohol use disorder in an attempt to understand how alcohol problems develop. Alcohol problems can occur alone, but are often found to co-occur with other mental disorders. Two categories of disorders that are often found to co-occur with heavy alcohol use are internalizing and externalizing disorders. Internalizing disorders are characterized by symptoms of anxiety, depression, and their respective somatic representations. Affectively, people within this spectrum can experience a variety of persistent negative emotions, such as worry, fear, hopelessness, apathy, or avolition. Cognitively, individuals with these disorders are often high in effortful control, which signals a greater ability to regulate attention and behavior (Tandon, Cardeli, & Luby, 2009). As a result, people with anxiety and depression tend to be behaviorally inhibited and present with more internal distress. In contrast, disorders that are classified as externalizing typically involve disturbances in impulse-control, conduct problems, and
antisocial behavior. Although externalizing problems have been consistently shown to increase risk for future alcohol problems, the effects of internalizing problems on future alcohol problems are not as consistent or as well understood.

**Internalizing and Externalizing Problems and Alcohol Use**

Research finds a strong positive association between externalizing problems and alcohol use in adolescence. One longitudinal study found that having high levels of externalizing symptoms at age 16 increased odds for alcohol use (Englund & Siebenbruner, 2012). Similarly, another longitudinal study found that age-14 substance use was predicted by the presence of an externalizing disorder at age 11 (King, Iacono, & McGue, 2004).

The conclusions that can be made regarding associations between internalizing disorders and alcohol use are more complicated. Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) showed that the twelve-month prevalence of a DSM-IV mood or anxiety disorder co-occurring with alcohol use disorder for individuals 18 and older ranged from 13.02% to 18.85% (Grant et al., 2004). Though anxiety disorders, depression, and alcohol use disorder are commonly found to be comorbid, research on internalizing disorders sometimes finds conflicting results. For example, King et al. (2004) found that girls with internalizing disorders at age 11 did not have significantly greater odds of substance use by age 14. Another study looking at 14-17 year olds found no association between negative affect, a shared component of anxiety and depression, and alcohol problems (Goldstein, Vilhena-Churchill, Stewart, & Wekerle, 2012).
Though studies often attempt to address internalizing and externalizing problems separately, these problems are strongly associated, meaning that an association found between alcohol problems and either internalizing or externalizing problems could reflect the influence of internalizing problems, externalizing problems, or their combination. Some studies have investigated their effects simultaneously in an effort to identify their unique and combined effects. Utilizing a complex confirmatory factor model proposed by Keiley et al. (2003), Colder and colleagues (2012) were able to separate out symptoms that only occur in internalizing disorders and externalizing disorders, as well as those that co-occur between the two. Consistent with previous research, their results showed that “pure” externalizing symptoms were associated with increased levels of alcohol use two years later. Pure internalizing symptoms, on the other hand, were negatively associated with tobacco and marijuana use, but were not significantly associated with alcohol use. In addition, they found that co-occurring internalizing and externalizing problems at age 12 were positively associated with alcohol use at age 14, but this association was not as strong as pure externalizing. Colder and colleagues (2012) concluded that internalizing problems, when co-occurring with externalizing problems, may serve as a protective factor to decrease the risk for substance use normally associated with externalizing problems.

Further complicating understanding of the association between internalizing problems and alcohol use are findings showing inverse associations between the two when externalizing problems are statistically controlled. For example, Fite et al. (2006) found that after controlling for co-occurring externalizing problems, internalizing
problems were found to reduce risk for future alcohol use in early adolescence. Similarly, Maggs et al. (2008) found that internalizing problems predicted reduced frequency in alcohol use in adolescence for boys, but not for girls.

Overall, findings regarding the relationship between internalizing disorders and the development of alcohol use problems point to the conclusion that there is no association between the two, or possibly that they have an inverse association, when the effects of co-occurring externalizing problems are controlled. In addition, these findings would suggest that alcohol use disorders are found to be comorbid with anxiety disorders and depression because individuals with anxiety and depression are at increased risk for externalizing problems.

In contrast to these conclusions, the self-medication or tension reduction hypothesis posits that individuals with anxiety and depression use alcohol in order to reduce or avoid the negative emotions characteristic of these disorders, suggesting that there should be a positive association observed between internalizing problems and alcohol use. One potential explanation for the discrepancy between the self-medication hypothesis and the finding that internalizing problems and alcohol use are unrelated or inversely related is that the self-medication hypothesis is invalid. Another possibility is that internalizing problems could have varying effects on risk for alcohol use, and that the risk mechanism attributable to self-medication is disguised by other, perhaps more influential, mechanisms that protect adolescents with internalizing problems from developing alcohol problems. This possibility is consistent with Cloninger and colleagues’ (1996) Type I alcoholism, which is characterized by personality traits
indicative of anxiety. This could explain why researchers repeatedly find no association between internalizing problems and alcohol use. It is possible that only once protective mechanisms of internalizing disorders are specified will it be possible to observe the increased risk of alcohol use attributable to factors such as tension reduction.

**Involvement with Deviant Peers**

The social groups with which one affiliates can have a major influence on behavior. Social learning theory, as described by Akers and colleagues (1979), explains this influential power through operant conditioning, behavioral models, and normative definitions of behavior. They hypothesized that peer interactions provide models of behavior to imitate, as well as information regarding whether certain behaviors are normatively good or bad. Consequently, when an individual performs social behaviors, their group provides them with either reinforcement or punishment, which in turn shapes their future behavior. In support of social learning theory, Akers and colleagues found that social learning theory variables accounted for 55% of the variance in drinking behavior in a sample of adolescents, with peer associations being the single most explanatory variable. These findings lend support to the theory that adolescents learn about and make decisions regarding alcohol use through the influence of their social groups, especially peers. Therefore, when an adolescent associates with peers who endorse alcohol use, they are more likely to drink.

Decreased involvement with deviant peers is one potential factor that may protect adolescents with internalizing disorders from developing alcohol use disorders. A longitudinal study conducted by Fanti and Henrich (2010) assessed the connection
between internalizing and externalizing problems and deviant behavior at age 12. Results of their study showed that adolescents with pure internalizing problems (i.e., without co-occurring externalizing problems) were less likely than other youths to associate with deviant peers. Reduced exposure to deviant peers would reduce exposure to social situations in which alcohol is available and reinforced, perhaps explaining in part why pure internalizing problems have been found to be associated with reduced alcohol consumption.

Other studies have tested this protective mechanism directly, investigating deviant peer affiliation as a mediator between internalizing problems and reduced risk for alcohol use. Fite, Colder, and O’Connor (2006) tested whether low levels of affiliation with delinquent peers would mediate the inverse association between internalizing problems and initiation of alcohol use. This two-year longitudinal study was conducted with children from 9-12 years of age. Controlling for co-occurring externalizing problems, high levels of internalizing problems at time one decreased the likelihood of alcohol use initiation at time two. Mediation analysis revealed that reduced exposure to delinquent peers accounted for internalizing’s protective effect on initiation of alcohol use. The authors concluded internalizing problems are inversely associated with alcohol use initiation because internalizing problems reduce likelihood of affiliation with delinquent peers who would be likely to provide opportunities and support for use. Though Fite et al. (2006) identified this mediation effect, there are still many unanswered questions related to the association between internalizing problems and alcohol use. Their study only looked at the effects of peer delinquency on initiation of alcohol use in children.
averaging 11 years of age. It would be beneficial, therefore, to see if low involvement with deviant peers continues to be a protective mechanism for older adolescents, and if it prevents higher frequency, quantity, and problematic drinking, in addition to initiation of drinking.

**Impulsivity, Risk Aversion, and Sensation Seeking**

The inverse association between internalizing problems and alcohol use may be explained by reasons beyond reduced exposure to substance using peers, as adolescents are likely to be exposed to opportunities for alcohol use regardless of the deviancy levels of their close friends. Tomlinson and Brown (2012) examined alcohol consumption of socially anxious eighth graders, and found that they consumed alcohol less frequently than non-socially anxious adolescents, especially at parties. An explanation as to why they might choose against the use of alcohol could be their tendency to avoid risk, stemming from a broader dispositional trait.

Throughout the literature, the construct of disinhibition, which includes traits such as impulsivity, sensation seeking, and risk taking propensity is consistently linked with increased or problematic alcohol use (Gunn, Finn, Endres, Gerst, & Spinola, 2013; Mâsse & Tremblay, 1997; Quinn & Harden, 2013; Stautz & Cooper, 2013). Conversely, when paired with low novelty seeking, an inverse association between risk aversion and alcohol use has been found (Galen, Henderson, & Whitman, 1997). When examining which traits individuals with internalizing problems generally exhibit, research has found that adults with major depression and/or anxiety disorders are more risk averse and seek novelty less in comparison to other adults (Lorian, Mahoney, & Grisham, 2012; Öngür, Farabaugh,
Iosifescu, Perlis, & Fava, 2005). Researchers have also found internalizing behaviors to be associated with lower impulsivity in comparison to controls, and a longitudinal study showed that low impulsivity actually predicted an increase in internalizing behaviors in childhood (Eisenberg et al., 2001; Eisenberg et al., 2009).

Taken together, these findings indicate that adolescents with only internalizing problems have a natural tendency to be less impulsive, more avoidant of potential risk, and therefore less likely to engage in the possibly harmful activity of underage drinking. Further research into the dispositional trait of risk aversion’s protective nature on subsequent alcohol use in anxious and depressed adolescents is needed to formally test the prediction that risk aversion would serve to protect youths with internalizing problems from becoming heavy drinkers.

**Self-Medication, Tension Reduction, and Expectancies**

Internalizing problems manifest in multiples ways. There are internal experiences of negative emotions (e.g., nervousness, loneliness, guilt), cognitive features (e.g., worry, difficulty concentrating), somatic symptoms (e.g., stomachaches, poor sleep), as well as social consequences (e.g., withdrawing from others). While negative emotionality is considered to be the central feature of internalizing problems, it is just one component of these problems. Therefore, it is possible for people with internalizing problems to differ in the extent to which they are affected by negative emotionality. In contrast to the factors described above that are hypothesized to protect adolescents with internalizing problems from using alcohol, it is possible that the need to reduce the severity of these negative
mood states might *increase* risk for drinking, thus explaining why there are mixed findings regarding the association between internalizing problems and alcohol use.

Various theories have been proposed to explain alcohol use motivations. Cox and Klinger (1988) developed the motivational theory, which states that people decide whether or not to drink based on if expected positive affective consequences outweigh those they would experience if they chose not to drink. More recently, the self-medication/tension reduction hypothesis was proposed, which posits that alcohol is utilized with the expectancy that it will reduce stress and help achieve emotional stability from psychological states of pain, depression, and anxiety (Cooper, Frone, Russell, & Mudar, 1995; Khantzian, 1997, 2003). This coping strategy was assessed through self-report of 18-24 year olds with anxiety symptoms in a nationally representative survey (Crum et al., 2013). The data revealed that nearly 33% of the persistent cases of alcohol dependence could potentially be explained through their use to relieve or cope with their symptoms. Similarly, a cross-sectional study conducted with 18-25 year old college drinkers with at least minimal depressive symptoms found that depression was positively associated with drinking to cope with negative affect, and this kind of drinking was positively associated with alcohol problems (Gonzalez, Reynolds, & Skewes, 2011). Overall, research suggests that the need to reduce negative mood states would increase the likelihood of alcohol use among individuals with internalizing problems (Hussong, Jones, Baucom, Boeding, & Stein, 2011; Stone, Becker, Huber, & Catalano, 2012).

Researchers have also begun to examine links between internalizing problems, tension reduction motivation, and alcohol use in adolescents. A longitudinal study by
Newcomb, Chou, Bentler, and Huba (1988) assessed reasons for drug use in 10th-12th graders and their subsequent alcohol use changes one year later. They found that one of the most common motivations for alcohol use was to reduce negative affect, and the stronger their motivations were held, the more likely they were to have increased levels of alcohol use a year later. Research on 13-19 year olds has also been conducted in order to test a motivational model of alcohol use (Cooper, Frone, Russell, & Mudar, 1995). Results showed that coping drinkers (as opposed to enhancement drinkers) were significantly more depressed, held stronger tension reduction expectancies, and reported more drinking problems. Consistent with the tension reduction hypothesis, these findings suggest that people who experience overwhelming periods of negative emotionality, such as those with significant anxiety and/or depression, may be inclined to use alcohol to reduce distress.

**The Present Study**

Thus far, research findings on the effects of internalizing problems on alcohol use have been mixed, with some studies showing positive associations, others showing inverse associations, and others yet showing no significant association. In an effort to enhance understanding of the complex relation between internalizing problems and alcohol use, the current study seeks to identify and distinguish factors that protect against and/or promote alcohol use among adolescents with internalizing problems. This will be done while statistically controlling for any effects of externalizing problems. For exploratory purposes, three alcohol use outcomes will be tested: frequency of use, frequency of heavy use, and alcohol abuse.
**Hypotheses.** Based on mixed findings from previous studies, no hypothesis is made regarding the direction and magnitude of the bivariate relationship between internalizing problems and alcohol use, as the protective factor(s) associated with internalizing problems may offset the effects of the risk factors.

Two hypotheses are made related to the anticipated protective effects of internalizing problems on alcohol use. The first hypothesized protective effect is characterized by a decreased likelihood for adolescents with internalizing problems to associate with deviant peers. Research reviewed above has found that young adolescents with internalizing disorders associate less with deviant peers, and has even shown peer delinquency to mediate the inverse association between internalizing problems and the initiation of alcohol use. Up until this point, however, no analysis has examined if peer deviance continues to mediate this relationship throughout adolescence, or whether this effect applies to amount of use in the way that it has been found to apply to initiation of use. The current study hypothesizes that individuals high in internalizing symptoms will have low deviant peer affiliations, which in turn will be associated with decreased risk for alcohol use outcomes.

The second protective effect to be investigated is related to high levels of risk aversion among adolescents with internalizing problems. Thus far, research has looked at anxious children and their drinking patterns in a cross-sectional manner. In addition, studies have found links between internalizing problems and risk aversion, and links between risk aversion and alcohol use. Therefore, the current study seeks to explore prospective links between internalizing problems, risk aversion, and future alcohol use.
Based on the previous research, the current study hypothesizes that individuals high in internalizing behaviors will be more risk averse, which in turn will be associated with decreased risk for alcohol use outcomes.

In addition to the two proposed protective effects of internalizing problems on alcohol use outcomes, a risk effect will be investigated relating to high levels of negative emotionality among adolescents with internalizing problems. To date, research has found that children with internalizing problems tend to have higher levels of negative emotionality. Negative emotionality has also been linked to increased alcohol use when the individual holds high levels of tension reduction expectancies for their use. Furthermore, in both adolescent and adult samples, internalizing problems have shown to be related to holding tension reduction expectancies and for those motivations to be positively associated with alcohol use. Consequently, consistent with the tension reduction/self-medication theory, the proposed study hypothesizes that individuals with internalizing problems will have greater negative emotionality, which in turn will be associated with increased risk for alcohol use.

By identifying protective effects of internalizing problems on subsequent alcohol use in adolescence, the current study could shed light on specific factors aiding in the reduction or prevention of alcohol use among adolescents with internalizing problems. In addition, if a risk effect through negative emotionality is found, findings from the present study results would suggest that interventions aimed at 1) changing the way adolescents with internalizing problems view alcohol and 2) supporting alternative coping responses could help further reduce the risk of future alcohol abuse and addiction.
CHAPTER 2

METHOD

Participants and Procedures

The present study will use data collected from the Longitudinal Cohort Study, which was part of the larger interdisciplinary Project on Human Development in Chicago Neighborhoods (PHDCN). The PHDCN identified 343 neighborhood clusters (NCs) in Chicago. A stratified probability sample of 80 NCs was selected for inclusion in the longitudinal study. The 80 NCs were racially, ethnically, and socioeconomically diverse, together providing a representative sample of the Chicago population. In-person screening was conducted throughout randomly selected block groups within the 80 NCs resulting in over 6,000 study participants. These participants were categorized according to seven age cohorts (birth, 3, 6, 9, 12, 15, and 18 years) based on each child’s age at study initiation.

The Longitudinal Cohort Study’s purpose was to examine various developmental influences on antisocial behavioral outcomes. A variety of measures were administered on topics including substance use, delinquency, family environment, mental health, peers, and school influences. Participants and their primary caregiver completed surveys at three times points (referred to as waves 1, 2, and 3), each occurring roughly two years apart.

The current study included individuals from age cohorts 9, 12, and 15 (N=2,318), with 819, 813, and 686 participants from each cohort, respectively. The sample composition was 50.3% male, 46.1% Hispanic, 35.6% African American, 14.4% Caucasian, and 3.9% of other ethnicities. A trichotomous variable was created to determine socioeconomic status utilizing data on poverty, public assistance, income and education from the 1990 Census (Sampson, Raudenbush, & Earls, 1997). This classification placed 37.2% in the lower class, 39% of the sample in the middle class, and 23.8% in the upper class.

In order to determine the participant’s level of internalizing symptoms and temperamental dispositions, data from wave 1 were utilized. Measures on peer deviance were obtained from wave 2. Finally, information on the participants’ substance use outcomes was obtained from wave 3 reports. See Table 1 for the list of measures used and the approximate ages of the cohorts when assessed. Sample sizes for the path analyses varied according to outcome. The sample sizes were 1433 for frequency of alcohol use, 1422 for frequency of heavy alcohol use, and 1377 for alcohol abuse.

**Measures**

**Internalizing symptoms.** The Child Behavior Checklist (CBCL; Achenbach, 1991) for ages 4-18 was completed by the primary caregiver for all cohorts during wave 1 of data collection. The CBCL is a 112-item questionnaire used to identify emotional and behavioral problems broadly classified as internalizing or externalizing. The primary
caregivers were instructed to rate items about their child’s behavior within the past six months on a three-point Likert scale, with 0 = not true, 1 = somewhat true, and 2 = very true. Internalizing behaviors are measured by the sum of the Withdrawn, Somatic Complaints, and Anxious/Depression subscale scores. The Withdrawn subscale includes items such as “would rather be alone than with others,” “stares blankly,” and “shy or timid.” Examples of the Somatic Complaints subscale are “feels dizzy” and “overtired.” The Anxious/Depressed subscale includes items such as “cries a lot,” “fears he/she might think or do something bad,” and “feels too guilty.” The CBCL is a widely utilized measure with a wealth of support for its reliability and validity (Achenbach, 1991).

**Negative emotionality and risk aversion.** A 40-item version of the Emotionality, Activity, Sociability, and Impulsivity (EASI) Temperament Survey (Buss & Plomin, 1984) was completed by the participants’ primary caregiver at wave 1. The EASI assesses four dimensions of temperament: sociability, activity, emotionality, and impulsivity. Primary caregivers were instructed to rate on a 5-point Likert scale how accurate certain descriptions were of their child, with 1 = uncharacteristic, 2 = somewhat uncharacteristic, 3 = neither, 4 = somewhat characteristic, and 5 = characteristic. The mean score of various responses will be computed in order to obtain subscale scores for Emotionality and Impulsivity. The Impulsivity scale is composed of 20 items assessing inhibitory control (e.g. “has trouble resisting temptation”), decision time (e.g. “often acts on the spur of the moment”), sensation seeking (e.g. “tends to get bored easily”), and persistence (e.g. “tends to hop from one interest to another quickly”). The Emotionality scale is composed of five items such as “cries easily,” “gets upset easily,” and “reacts
intensely when upset.” The Impulsivity (reverse scored) and Emotionality scales were used as measures of risk aversion and negative emotionality, respectively.

**Peer deviance.** A shortened version of the 36-item Deviance of Peers (Huizinga, Esbenson, & Weihr, 1991) self-report questionnaire was completed during wave 2 data collection. Participants reported how many of their peers have engaged in certain behaviors over the past twelve months using the scale, 1 = none of them, 2 = some of them, 3 = most of them, and 4 = all of them. Examples of items include “gotten into trouble at school,” “have been generally honest and told the truth” (reverse scored), and “purposefully damaged or destroyed property that did not belong to them.” Questions regarding alcohol/drug use of friends and perceived peer pressure to use were also included. Items assessing prosocial behaviors will be reverse scored, and the sum of all items will provide a total measure of peer deviance, with higher scores indicating more peer deviance.

**Alcohol use.** From wave 3, a substance use interview adapted from the National Household Survey on Drug Abuse (National Institute on Drug Abuse, 1991) obtained information regarding lifetime, past year, and past month use of alcohol and other drugs. The participants’ responses to alcohol use in the past year were the focus for the present study. In order to determine the frequency of use, participants were asked “not including sips and tastes, how many days” they had alcohol to drink in the past 12 months. This was assessed on a 9-point scale, ranging from 1 = never to 9 = 200 or more days. Frequency of heavy alcohol use was assessed by asking, “during the past 12 months, about how many days have you gotten drunk or very high on alcoholic beverages?”
Information on participants’ tolerance, time spent getting or using, problems resulting from use, and withdraw over the past twelve months were also included. For cohorts 9 and 12, this information was obtained through the substance use interview. For cohort 15, they reported this information during an alcohol use follow-up survey adapted from the Diagnostic Interview Schedule Alcohol Module (Robins, Cottler, Bucholz & Compton, 1995). Participants responded either “yes” or “no” to questions such as “have you had a period of a month or more when you spent a great deal of time getting over the effects of alcohol,” “have you used alcohol much more often or in larger amounts than you intended to,” “have you experienced tolerance for alcohol, so that using the same amount of it had less effect than before,” “have you often been under the effects or after-effects of alcohol in situations where your physical safety was threatened,” “did your use of alcohol cause you to have emotional problems, or to have problems with your family or friends, work, school, or with the police,” “have you wanted to cut down or stop using alcohol,” and “were you able to stop your use of alcohol every time you wanted to?” (reverse scored). A measure of problematic alcohol use was obtained by summing the participants’ “yes” responses, with higher scores indicating more problematic use.

Table 1

Approximate Age of Cohort by Measures Administered

<table>
<thead>
<tr>
<th>Measure</th>
<th>Wave</th>
<th>Cohort 9</th>
<th>Cohort 12</th>
<th>Cohort 15</th>
</tr>
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<tbody>
<tr>
<td>CBCL</td>
<td>1</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>EASI</td>
<td>1</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>DOP</td>
<td>2</td>
<td>11</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>AU</td>
<td>3</td>
<td>13</td>
<td>16</td>
<td>19</td>
</tr>
</tbody>
</table>

*Note. CBCL = Child Behavior Checklist; EASI = Emotionality, Activity, Sociability, Impulsivity Temperament Survey; DOP = Deviance of Peers; AU = Alcohol Use Interview and Follow-Up Survey.*
CHAPTER 3

RESULTS

Preliminary Analyses

Means, standard deviations, and ranges were calculated for the following variables of interest: internalizing problems, externalizing problems, impulsivity, negative emotionality, deviance of peers, alcohol frequency, frequency of heavy drinking, and alcohol abuse. The results are presented in Table 2. The bivariate correlations of these variables can be seen in Table 3.

Table 2

Descriptive Statistics of Study Variables

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min-Max</th>
<th>Percent Missing</th>
</tr>
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<tbody>
<tr>
<td>Internalizing Score</td>
<td>8.24</td>
<td>7.23</td>
<td>0-52</td>
<td>0.91</td>
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<tr>
<td>Externalizing Score</td>
<td>11.03</td>
<td>9.11</td>
<td>0-66</td>
<td>0.91</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>2.68</td>
<td>0.60</td>
<td>1.20-4.85</td>
<td>0.60</td>
</tr>
<tr>
<td>Negative Emotionality</td>
<td>2.76</td>
<td>1.11</td>
<td>1-5</td>
<td>0.60</td>
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<tr>
<td>Deviance of Peers</td>
<td>1.71</td>
<td>0.51</td>
<td>1-3.91</td>
<td>20.32</td>
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<tr>
<td>Alcohol Frequency</td>
<td>2.18</td>
<td>1.82</td>
<td>1-9</td>
<td>29.94</td>
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<tr>
<td>Frequency of Heavy Use</td>
<td>2.46</td>
<td>10.47</td>
<td>0-150</td>
<td>30.54</td>
</tr>
<tr>
<td>Alcohol Abuse</td>
<td>0.06</td>
<td>0.17</td>
<td>0-1</td>
<td>33.13</td>
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</table>
### Table 3

**Bivariate Correlations among Study Variables**

<table>
<thead>
<tr>
<th></th>
<th>INT</th>
<th>EXT</th>
<th>IMP</th>
<th>NE</th>
<th>DOP</th>
<th>FAU</th>
<th>FHAU</th>
<th>ABU</th>
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<tr>
<td>INT</td>
<td>--</td>
<td>.626</td>
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<td>EXT</td>
<td>--</td>
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<td>.022</td>
<td>-.066</td>
<td>-.004</td>
<td>-.067</td>
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<tr>
<td>DOP</td>
<td>--</td>
<td>.471</td>
<td>.275</td>
<td>.336</td>
<td></td>
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<tr>
<td>FAU</td>
<td>--</td>
<td>.261</td>
<td>.705</td>
<td></td>
<td></td>
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<tr>
<td>FHAU</td>
<td>--</td>
<td>.559</td>
<td></td>
<td></td>
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<tr>
<td>ABU</td>
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</tbody>
</table>

*Note.  *p < .05; **p < .01; ***p < .001; ****p < .0001. INT = Internalizing score; EXT = Externalizing score; IMP = Impulsivity; NE = Negative Emotionality; DOP = Delinquency of Peers; FAU = Frequency of Alcohol Use; FHAU = Frequency of Heavy Alcohol Use; ABU = Alcohol Abuse.*

### Primary Analyses

Results of the current study will be presented in four major sections: 1) the associations between internalizing problems and the three proposed mediators, 2) the associations between the proposed mediators and the three alcohol use outcomes, 3) tests of mediation, and 4) supplementary analyses. Each alcohol use outcome (frequency of alcohol use, frequency of heavy alcohol use, and alcohol abuse symptoms) was tested in a separate model. The results are reported separately, as sample sizes varied across the three models.

Predicted associations between internalizing problems and the proposed mediators, and between the proposed mediators and the three alcohol use outcomes, were assessed using path analysis. To test for mediation, the data were analyzed using a bootstrapping procedure with multiple mediators. This method utilizes repeated
resampling of the data, without normality assumptions, in order to produce a percentile-based confidence interval. When zero is not included in this interval, mediation is considered to be significant (Preachers & Hayes, 2008). Externalizing problems, race, yearly family income, and gender were controlled for both the hypothesized mediating variables and the alcohol use outcome variables in the models. Associations between the control variables and each alcohol use outcome are presented in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Control Variable</th>
<th>Frequency</th>
<th>Heavy Use</th>
<th>Abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Externalizing</td>
<td>.014*</td>
<td>.003</td>
<td>.002*</td>
</tr>
<tr>
<td>African American</td>
<td>-.250**</td>
<td>-.617</td>
<td>-.030**</td>
</tr>
<tr>
<td>Caucasian</td>
<td>.409***</td>
<td>.924</td>
<td>-.005</td>
</tr>
<tr>
<td>Other Race</td>
<td>-.065</td>
<td>-.376</td>
<td>-.003</td>
</tr>
<tr>
<td>Income</td>
<td>.097****</td>
<td>.277</td>
<td>.008***</td>
</tr>
<tr>
<td>Sex</td>
<td>-.188*</td>
<td>-1.410**</td>
<td>-.025**</td>
</tr>
</tbody>
</table>

Note. * p < .05; ** p < .01; *** p < .001; **** p < .0001. Unstandardized beta estimates are reported.

**Associations between internalizing problems and proposed mediators.** Three hypotheses were made regarding the bivariate associations between internalizing problems and the proposed mediators. The first stated that internalizing problems would be negatively associated with the deviancy level of peers. The second was that internalizing problems would be negatively associated with impulsivity. Thirdly, internalizing problems were hypothesized to be positively associated with negative emotionality.
**Frequency of alcohol use model.** Inconsistent with the first hypothesis, analyses revealed that internalizing problems were not significantly associated \((b = .004, p = .075)\) with deviance of peers. In contrast, hypotheses regarding impulsivity and negative emotionality were supported by the results. Internalizing problems were significantly negatively associated \((b = -.006, p = .009)\) with impulsivity, such that as internalizing symptoms increase impulsivity decreases. A significant positive association \((b = .044, p < .001)\) between internalizing problem and negative emotionality was found, such that as internalizing symptoms increase negative emotionality increases.

**Frequency of heavy alcohol use model.** Analyses showed that internalizing problems were not significantly associated \((b = .005, p = .064)\) with deviance of peers. Results for impulsivity and negative emotionality were consistent with the proposed hypotheses. Internalizing problems were significantly negatively associated \((b = -.006, p = .009)\) with impulsivity, such that as internalizing symptoms increase impulsivity decreases. A significant positive association \((b = .044, p < .001)\) between internalizing problem and negative emotionality was found, such that as internalizing symptoms increase negative emotionality increases.

**Alcohol abuse symptoms model.** Contrary to what was hypothesized, results revealed that internalizing problems were not significantly associated \((b = .003, p = .245)\) with deviance of peers. Hypotheses regarding impulsivity and negative emotionality were supported by the results. Internalizing problems were significantly negatively associated \((b = -.006, p = .008)\) with impulsivity, such that as internalizing symptoms increase impulsivity decreases. Additionally, internalizing problems were significantly positively
associated ($b = .044, p < .001$) with negative emotionality, such that as internalizing symptoms increase negative emotionality increases.

**Associations between proposed mediators and alcohol use outcomes.** It was hypothesized that deviance of peers, impulsivity, and negative emotionality would each be positively associated with all alcohol use outcomes.

**Frequency of alcohol use model.** Results revealed that deviance of peers was significantly positively associated ($b = 1.675, p < .001$) with frequency of alcohol use, such that as peer deviancy levels increases, so does the frequency of drinking. Contrary to the proposed hypothesis, negative emotionality was significantly negatively associated ($b = -.091, p = .041$) with frequency of alcohol use, such that as negative emotionality increases frequency of drinking decreases. Furthermore, impulsivity was negatively associated at trend level ($b = -.166, p = .058$) with alcohol use frequency.

**Frequency of heavy alcohol use model.** Results revealed that deviance of peers was significantly positively associated ($b = 5.693, p < .001$) with frequency of heavy alcohol use, such that as peer deviance increases frequency of heavy drinking increases. Impulsivity ($b = -.534, p = .341$) and negative emotionality ($b = .089, p = .753$) were not significantly associated with frequency of heavy alcohol use.

**Alcohol abuse symptoms model.** Path analysis showed that peer deviance was significantly positively associated ($b = .115, p < .001$) with symptoms of alcohol abuse, such that as levels of peer deviance increases alcohol abuse increases. Impulsivity was significantly negatively associated ($b = -.021, p = .022$) with alcohol abuse, such that as impulsivity increases symptoms of alcohol abuse decrease. This contradicts the
hypothesis that greater impulsivity would increase alcohol abuse symptoms. Negative emotionality was not found to be significantly associated ($b = -.006, p = .118$) with alcohol abuse symptoms.

**Tests of mediation.** The current study hypothesized peer deviance, risk aversion, and negative emotionality would mediate the association between internalizing problems and the three alcohol use outcomes; frequency of use, frequency of heavy use, and problematic use. More specifically, internalizing problems were predicted to be indirectly negatively associated with alcohol use through its hypothesized inverse associations with deviant peers and impulsivity, and indirectly positively associated with alcohol use through its hypothesized positive association with negative emotionality.

**Frequency of alcohol use model.** Mediation analyses showed that negative emotionality significantly mediated the association ($b = -.004, 95\% \text{ CI} = -.008 \text{ to } -.001$) between internalizing problems and frequency of alcohol use, such that the significant negative association between internalizing problems and frequency of alcohol use was accounted for by the significant positive association between internalizing problems and negative emotionality and the significant negative association between negative emotionality and frequency of alcohol use. However, the direction of the mediation ran counter to the expected direction due to the unexpected negative association between negative emotionality and alcohol use. Deviance of peers ($b = .007, 95\% \text{ CI} = -.001 \text{ to } .016$) and impulsivity ($b = .001, 95\% \text{ CI} = .0001 \text{ to } .003$) were not found to mediate the association between internalizing problems and frequency of alcohol use.
**Frequency of heavy alcohol use model.** Contrary to the hypotheses, deviance of peers ($b = .026$, 95% CI = -.002 to .057), impulsivity ($b = .003$, 95% CI = -.002 to .013), and negative emotionality ($b = .004$, 95% CI = -.013 to .022) were not found to mediate the association between internalizing problems and frequency of heavy alcohol use.

**Alcohol abuse symptoms model.** Contrary to the hypotheses, deviance of peers ($b = .0003$, 95% CI = -.0003 to .001), impulsivity ($b = .0001$, 95% CI = .000 to .0004), and negative emotionality ($b = -.0003$, 95% CI = -.001 to .0001) were not found to mediate the association between internalizing problems and alcohol abuse symptoms.

**Supplemental analyses.** For exploratory purposes, peer deviance was also tested as a moderator of the association between internalizing problems and all alcohol use outcomes. Results showed that peer deviance was not a significant moderator of the relationship between internalizing problems and alcohol use.

In addition, the models were tested with their respective wave 1 use scores as a control variable (e.g., wave 1 frequency of alcohol use was controlled in the frequency of alcohol use model). For frequency of alcohol use, the pattern of results remained the same for the peer deviancy pathway. For the negative emotionality pathway, the association between negative emotionality and frequency of use became non-significant ($b = -.075$, $p = .083$), and negative emotionality was no longer a significant mediator ($b = -.0033$, 95% CI = -.0073 to .0002). Finally, impulsivity and frequency of use were found to be significantly negatively associated ($b = -.187$, $p = .029$), and impulsivity now significantly positively mediated the relationship ($b = .0011$, 95% CI = .0001 to .0032) between internalizing problems and frequency of use.
In the frequency of heavy alcohol use model, results were consistent with original analyses for the negative emotionality and impulsivity pathways. When controlling for wave 1 heavy use, internalizing problems became significantly positively associated \((b = -0.006, p = .118)\) with deviance of peers. Deviance of peers was also found to significantly positively mediate the relationship \((b = .0227, 95\% \text{ CI} = .0009 \text{ to } .0509)\) between internalizing problems and frequency of heavy alcohol use.

The pattern of results remained the same for all pathways in the alcohol abuse model. Of note, impulsivity was found to positively mediate the associated between internalizing problems and alcohol abuse at trend level \((b = .0001, 95\% \text{ CI} = .0000 \text{ to } .0004)\).
CHAPTER 4

DISCUSSION

The present study sought to explain the contradictory findings in the literature regarding the relationship between internalizing disorders and the development of alcohol use by assessing potential mediating risk (i.e., negative emotionality) and protective (i.e., risk aversion, deviance of peers) factors in a longitudinal adolescent sample. It was hypothesized that internalizing disorders would lead to less alcohol use because it would make people less impulsive and less likely to associate with deviant peers. It was also predicted that internalizing disorders would increase someone's chance of developing alcohol use due to their high levels of negative emotionality, as it was expected that high levels of negative emotionality would promote alcohol use for the purpose of tension reduction. Three alcohol use outcomes (i.e., frequency of use, frequency of heavy use, alcohol abuse) were examined, though the same pattern of results was hypothesized for each.

Involvement with Deviant Peers

The first hypothesis was that there would be a negative association between internalizing disorders and affiliation with deviant peers. Results revealed that for all alcohol use outcome models, a person's internalizing problems did not predict how often they associated with deviant peers. These findings are inconsistent with findings by Fanti
and Henrich (2010) and Fite et. al (2006), which showed adolescents with internalizing problems were less likely to associate with deviant peers. One possible explanation for this discrepancy could be the age of the sample. Studies have shown that as one progresses through adolescence, the amount they associate with deviant peers increases (Fite et. al, 2006; Moss, Lynch, & Hardie, 2003). The current study measured peer deviancy levels in participants ranging in age from about 11-17 years, whereas Fanti and Henrich (2010) and Fite et. al (2006) only assessed adolescents up to age 13. It is possible that any protective effects of internalizing problems against deviant peer affiliations do not persist throughout mid to late adolescence. Supporting this possibility, a longitudinal study following adolescents from age 10 until 16 did not find internalizing disorders to predict later levels of peer delinquency (Moss, Lynch, & Hardie, 2003).

The second hypothesis stated that affiliation with deviant peers would be positively associated with all alcohol use outcomes. Analyses confirmed this prediction, such that the more deviant an adolescent's peers, the greater their overall frequency of alcohol use, frequency of heavy use, and alcohol abuse symptomatology. This expands on previous research, which had shown high levels of peer delinquency increase an adolescent’s risk to initiate alcohol use (Fite et. al, 2006). Furthermore, these findings suggest support for social learning theory (Akers et. al, 1979), which would suggest that delinquent peers contribute to drinking by modeling and reinforcing its use.

Finally, it was posited that low levels of peer deviance would mediate a negative association between internalizing problems and alcohol use outcomes. This hypothesis was not supported by the results, as peer deviance was not a significant mediator of this
relationship. As discussed above, it is possible that the age of the adolescent may play a role in how influential internalizing disorders are on one’s decision of who to be friends with, and therefore how often alcohol is available and its use reinforced. Additionally, a study by Zimmerman and Vasquez (2011) suggests that there might be other variables that moderate the influence of peers on adolescent substance use. They found this relationship to be dependent on neighborhood context: for those in a neighborhood with more opportunities for crime, the peer effect decreases over time, but for those in a neighborhood with fewer opportunities for crime, the peer effect increases over time. Furthermore, they found the adolescent’s perceptions of health risks of substance use partially mediated the association between their peers’ substance use and their self-reported use. Therefore, in mid to late adolescence, factors other than one’s anxiety or depression might have a greater influence on adolescents’ responsiveness to peers’ deviant behavior.

**Impulsivity and Risk Aversion**

The present study hypothesized that there would be a negative association between internalizing disorders and impulsivity. Results were in line with this prediction for all models, such that as an adolescent's internalizing problems increased, their impulsivity decreased. This finding is consistent with previous research (Eisenberg et al., 2001; Eisenberg et al., 2009; Lorian, Mahoney, & Grisham, 2012) and supports the idea that those with anxiety and depression are likely to think carefully about all possible consequences before taking action.
Contrary to previous research and the current hypothesis of a positive association, analyses revealed that the higher someone's impulsivity, the lower their alcohol abuse symptoms. This same relationship was found at a marginal level ($p < .10$) for one's frequency of alcohol use, and though not significant, the direction of the relationship was in the same direction for frequency of heavy alcohol use. Without exception, the literature supports a positive link between impulsivity and alcohol use making this a difficult finding to explain. More research is needed to determine if this is an anomaly, or if the relationship between impulsivity and adolescent substance use varies when factors such as externalizing problems are controlled.

The hypothesis that impulsivity would mediate a negative association between internalizing problems and alcohol use outcomes was not supported by the current data. This could suggest that low impulsivity does not serve a protective function against alcohol use for adolescents with internalizing problems. It is also likely that impulsivity was not a significant mediator due to the inconsistent findings on the relationship between impulsivity and alcohol use. As previously discussed, those findings go against a wealth of literature. Therefore, the extent to which conclusions can be drawn regarding the effect of impulsivity on the development of alcohol use in those with internalizing disorders is limited.

**Negative Emotionality**

The first hypothesis regarding negative emotionality was that it would be positively associated with internalizing problems. This prediction was confirmed, such that as one's internalizing symptoms increased, so did their negative emotionality. This is
consistent with the construct of internalizing symptoms, of which negative emotionality is a primary subcomponent. In addition, previous literature aligns with this finding and suggests that those with anxiety and depression experience negative emotions at higher levels (Eisenberg, et. al, 2001).

Next, it was hypothesized that negative emotionality would be positively associated with the alcohol use outcomes, and that it would mediate the association between internalizing problems and alcohol use. Negative emotionality was not found to be associated with frequency of heavy drinking or with alcohol abuse symptoms. Also contradicting what was predicted, results indicated that as negative emotionality increased, the person's frequency of alcohol use decreased. Negative emotionality also significantly mediated the relationship between internalizing disorders and frequency of alcohol use, but in the opposite direction as what was expected. In other words, it was the experience of high levels of negative emotions that led people with internalizing disorders to drink alcohol less frequently.

These results go against the self-medication and tension reduction hypotheses, which state that people use substances with the expectancy that they will alleviate negative emotional states (Cooper, Frone, Russell, & Mudar, 1995; Cox & Klinger, 1988; Khantzian, 1997, 2003). While previous studies have shown that people with internalizing disorders tend to experience higher levels of negative emotions, this was only important to their alcohol use behaviors when they also held strong drinking to cope motivations (Cooper, Frone, Russell, & Mudar, 1995; O’Connor, Farrow, & Colder, 2008). In the current study, it was hypothesized that those who had high negative
emotionality would also hold these drinking motivations. Unfortunately, there were no direct measures of such motivations in the data set. Therefore, it is possible that our measure of negative emotionality did not accurately capture the individuals with internalizing disorders who also held strong tension reduction motivations, and therefore would have been at a greater risk for developing problematic alcohol use.

**Strengths**

The current study benefits greatly from a few notable strengths in its methodology. First, it is representative of a wide range of individuals, as the sample was composed of an almost even division between three racial/ethnic groups (i.e., Hispanic, African American, Caucasian) and socioeconomic backgrounds. Additionally, the sample size was fairly large allowing for a more reliable representation of the population and a greater ability to detect associations between the variables of interest.

The second major advantage is the longitudinal cohort design, which allowed for a prospective analysis of the development of alcohol use in multiple adolescent age groups. Such an approach more accurately captures the temporal ordering and effects of posited risk and protective factors occurring during development. Though advantageous, this design still does not allow for causal inference, as it cannot be guaranteed that all potential confounding factors have been controlled.

**Limitations and Future Directions**

There are some limitations to the current study, one being the imperfect measure of tension reduction motivation. This study was restricted to a dispositional measure of negative emotionality, which based on previous research was hypothesized to capture
individuals who would have a greater likelihood of holding tension reduction expectancies for alcohol use. Findings on the relationship between internalizing disorders, negative emotionality, and alcohol use contradicted previous research, though. This suggests the possibility that one’s level of negative emotionality may not accurately represent their motivation to use alcohol to cope. In future research, longitudinal studies should be conducted examining drinking motivations explicitly from before first use through young adulthood in order to better understand how these expectancies play a role in the development of problematic alcohol use.

Another limitation was the timing of the impulsivity measure. The current study conceptualized this characteristic as being dispositional in nature, so it was acceptable to derive this variable from wave 1. However, there is research to suggest that impulsivity levels change over the course of adolescence into young adulthood, and that this rate of change has differential effects on alcohol use (Quinn & Hardin, 2013). Therefore, the potential protective effect of low impulsivity for those with internalizing problems might be better assessed over multiple times points, especially when examining mid to late adolescence.

The measures of internalizing problems, impulsivity, and negative emotionality were also limited by being parent-report. Internalizing problems are so named because they are characterized by symptoms that tend to manifest internally for the individual (e.g., worrisome thoughts, sad mood). Previous research has shown that adolescent self-reports of internalizing symptoms tend to be higher than parent-reports, and the most accurate picture of an adolescent’s emotional problems comes from utilizing multiple
informants (Achenbach, McConaughy, & Howell, 1987; Grigorenko, Geiser, Slobodskaya, & Francis, 2010; Stanger & Lewis, 1993). Without self-report of these experiences, we are limited in the current analyses to what the parents were able to witness behaviorally in their child that would suggest the presence of these symptoms.

Future longitudinal studies should also assess impulsivity, risk aversion, and drinking motivations simultaneously in those with internalizing problems into adulthood. It is possible that the hypotheses of the current study were not supported because alcohol use for tension reduction does not occur until later in the lifespan. Cloninger and colleagues’ (1981) typology of alcoholism supports this possibility, as their anxiety-linked (i.e., high harm avoidance, low novelty seeking) Type I alcoholism does not onset until after age 25 (Cloninger, Sigvardsson, & Bohman, 1996). Cloninger hypothesized that after experiencing a reduction in anxiety while drinking in a socially acceptable manner, they would thereafter be motivated to use alcohol, thus increasing their risk for alcoholism. A more thorough assessment of risk aversion and drinking motivations across adolescence and early adulthood might produce insight into their true temporal ordering, interaction, and impact on problematic alcohol use development in those with internalizing problems.

The current study’s findings, the age of onset in Cloninger’s Type I alcoholism, and the mixed results in the literature raise another the possibility. Namely, prior studies’ reports of a relationship between internalizing problems and alcohol use might have been spurious in nature. In other words, maybe there is no relationship between internalizing problems and alcohol use in adolescence. When accounting for co-occurring
externalizing problems, it might be that adolescents with internalizing problems do not experience an increased risk for heavy and/or problematic alcohol use until they reach adulthood. Further longitudinal studies spanning this developmental transition are needed to determine the true onset of problematic use for those with predominantly internalizing problems.

Finally, the sample used was evenly distributed between Hispanic, African American, and Caucasian individuals, as well as those in the upper, middle, and lower socioeconomic classes. In contrast, much of the literature base utilizes predominately Caucasian populations living above the poverty line. The greater representation of minority and low SES individuals in the current sample might have influenced the pattern of results found. This could account for some of the discrepancies with previous research findings. Thus, to further explore these differences, future studies should test the relationships between the current study variables in a wide range of racial/ethnic and socioeconomic groups.

Conclusions

This study sought to explain the contradictory findings in the literature regarding the relationship between internalizing disorders and alcohol use through prospective risk and protective factors during adolescence. The findings in the present study unanimously replicated past findings showing that adolescents with internalizing problems experience high levels of negative emotionality and tend to be low in impulsivity. Furthermore, they add to the deviant peer literature by showing that affiliation with deviant peers increases adolescents’ risk for multiple alcohol use outcomes: frequency of use, frequency of heavy
use, and alcohol abuse. Interventions aimed at reducing these peer influences could be beneficial in preventing the development of problematic alcohol use in adolescents.

There were conflicting findings with the current literature on the relationships between negative emotionality, impulsivity, and alcohol use. It was found that adolescents with internalizing problems drank alcohol less frequently as a result of higher levels of negative emotionality. Also, the higher one’s impulsivity the less frequently they showed signs of alcohol abuse. Even when controlling for wave one substance use in supplemental analyses, the results did not support the study’s hypotheses. These inconsistencies suggest that more research is needed in order to better understand the factors through which internalizing problems have a unique effect on the development of alcohol use in adolescence.
REFERENCES


doi:10.1017/S0954579412000284


doi: 10.1126/science.277.5328.918


APPENDIX A

CHILD BEHAVIOR CHECKLIST (CBCL) SAMPLE ITEMS

For each item that describes ***** now or within the past 6 months, please say “2” if that item is very true or often true of *****. Say “1” if the item is somewhat or sometimes true of *****. If the item is not true of *****, say “0”. Please answer all items as well as you can, even if some do not seem to apply to *****.

0 = Not True
1 = Somewhat True
2 = Very True

8. Can’t concentrate, can’t pay attention for long

12. Complains of loneliness

14. Cries a lot

26. Doesn't seem to feel guilty after misbehaving

31. Fears he/she might think or do something bad

41. Impulsive or acts without thinking

50. Too fearful or anxious

57. Physically attacks people

75. Shy or timid

77. Sleeps more than most kids during day and/or night

103. Unhappy, sad, or depressed

112. Worries
APPENDIX B

DEVIANCE OF PEERS

Please tell me how many of the people you spend time with have done the following things using these choices: 4. All of them, 3. Most of them, 2. Some of them, 1. None of them.

During the last 12 months, how many of the people you spend time with…


3. Have gotten into trouble at school? 3.

5. How many have been generally honest and told the truth? 5.

6. How many have purposefully damaged or destroyed property that did not belong to them? 6.

7. How many have stolen something worth more than $5 but less than $500? 7.

8. How many have attacked someone with a weapon with the idea of seriously hurting them? 8.
9. How many have used marijuana or pot?

10. How many have used any form of alcohol, including wine, liquor, or beer?

11. How many have used tobacco?

13. During the last 12 months, how often have people you spend time with asked you to go drinking with them? Would you say… [1. Never, 2. Once or Twice, 3. Several Times, or 4. Often]?

14. During the last 12 months, how often have people you spend time with offered, gave, or sold marijuana to you? [1. Never, 2. Once or Twice, 3. Several Times, or 4. Often]?
For each one, try to rate ***** on a scale from 1 to 5, with 1 being uncharacteristic or not at all like ***** and 5 being characteristic or very much like *****.

1 = Uncharacteristic (NOT at all like your child)
2 = Somewhat Uncharacteristic (NOT very much like your child)
3 = Neither Uncharacteristic nor Characteristic
4 = Somewhat Characteristic (sort of like your child)
5 = Characteristic (very much like your child)

2. ***** often acts on the spur of the moment.

6. ***** has trouble resisting temptation.

9. ***** cries easily.

11. ***** tends to be somewhat emotional.

13. ***** generally seeks new and exciting experiences and sensations.

17. ***** gets upset easily.

23. ***** tends to get bored easily.

29. ***** generally likes to see things through to the end.

34. ***** reacts intensely when upset.
APPENDIX D

SUBSTANCE USE INTERVIEW

All cohorts (9, 12, and 15) were asked questions 2C and 2D. Only cohorts 9 and 12 were asked questions 17-24.

Now I have some questions about your use of cigarettes, alcohol, marijuana and other drugs. Some questions will be about alcohol or drugs you may have used at any time in your life. Others will be about your alcohol or drug use in the last 12 months or in the past 30 days. Please listen carefully to each question so that you know which time period I am asking about.

The following questions are about drinking alcohol. This includes BEER, WINE, WINE COOLERS, and LIQUOR. A drink means a 12 oz. can or bottle of beer, a 4 oz. glass of wine, a 12 oz. wine cooler, or a shot glass of hard liquor (like scotch, gin, vodka). Liquor also includes a mixed drink.

<table>
<thead>
<tr>
<th>How many days have you had alcohol to drink in…</th>
<th>Never</th>
<th>1-2</th>
<th>3-5</th>
<th>6-11</th>
<th>12-24</th>
<th>25-50</th>
<th>51-99</th>
<th>100-199</th>
<th>200+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2C. …the last 12 months?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

If ‘NEVER’ in the past 12 months, Go to Q (6A)

<table>
<thead>
<tr>
<th>2D During the past 12 months, about how many days have you gotten drunk or very high on alcoholic beverages?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Days)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>17 During the past 12 months, have you had a period of a month or more when you spent a great deal of time getting or using [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS]?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Alcohol</td>
<td></td>
</tr>
<tr>
<td>Yes……………………1</td>
<td></td>
</tr>
<tr>
<td>No……………………2</td>
<td></td>
</tr>
<tr>
<td>Not used……………….7</td>
<td></td>
</tr>
</tbody>
</table>
### Question 18
During **the past 12 months**, have you had a period of a month or more when you spent a great deal of time getting over the effects of [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS]?

| A. Alcohol | Yes.................1  
|  | No...................2  
|  | Not used.............7 |

### Question 19
During **the past 12 months**, have you used [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS] much more often or in larger amounts than you intended to?

| A. Alcohol | Yes.................1  
|  | No...................2  
|  | Not used.............7 |

### Question 20
During **the past 12 months**, have you experienced tolerance for [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS], so that using the same amount of it had less effect than before?

| A. Alcohol | Yes.................1  
|  | No...................2  
|  | Not used.............7 |

### Question 21
During **the past 12 months**, have you often been under the effects or after-effects of [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS] in situations where your physical safety was threatened (such as riding a bike or driving a car, using heavy machinery, or swimming)?

| A. Alcohol | Yes.................1  
|  | No...................2  
|  | Not used.............7 |

### Question 22
During **the past 12 months**, did your use of [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS] cause you to have emotional problems, or to have problems with your family or friends, work, school or with the police?

| A. Alcohol | Yes.................1  
|  | No...................2  
<p>|  | Not used.............7 |</p>
<table>
<thead>
<tr>
<th>Substance Used</th>
<th>Question 23</th>
<th>Question 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>During the <strong>past 12 months</strong>, have you <strong>wanted</strong> to cut down or stop using [NAME FIRST SUBSTANCE USED IN PAST 12 MONTHS]?</td>
<td>During the <strong>past 12 months</strong>, were you able to stop your use of [NAME FIRST SUBSTANCE USED IN THE PAST 12 MONTHS] every time you wanted to?</td>
</tr>
<tr>
<td></td>
<td>Yes…..Go to Q24B…..1</td>
<td>Yes…………………..1</td>
</tr>
<tr>
<td></td>
<td>No……………………2</td>
<td>No…………………..2</td>
</tr>
<tr>
<td></td>
<td>Not used………………..7</td>
<td></td>
</tr>
</tbody>
</table>

A. Alcohol

Yes…..Go to Q24B…..1
No……………………2
Not used………………..7
APPENDIX E

ALCOHOL USE FOLLOW-UP
(Cohort 15)

3. In the past 12 months, in how many weeks out of the last 52 did you drink at all? Was it...

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Almost every week (48-52)</td>
<td>01</td>
</tr>
<tr>
<td>More weeks than not (30-47)</td>
<td>02</td>
</tr>
<tr>
<td>About half the weeks (23-29)</td>
<td>03</td>
</tr>
<tr>
<td>On average, at least one week a month (12-22)</td>
<td>04</td>
</tr>
<tr>
<td>Fewer weeks than that (1-11)</td>
<td>05</td>
</tr>
</tbody>
</table>

8. Did drinking ever cause you to have...

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>8A…problems with your family?</td>
<td>Yes……1 No……2</td>
</tr>
<tr>
<td>8B…problems with your friends?</td>
<td>Yes……1 No……2</td>
</tr>
<tr>
<td>8C…problems with people at work or school?</td>
<td>Yes……1 No……2</td>
</tr>
<tr>
<td>8D Did you ever get into a physical fight while drinking?</td>
<td>Yes……1 No……2</td>
</tr>
<tr>
<td>8E Have you ever had a traffic accident when you were under the influence of alcohol?</td>
<td>Yes……1 No……2</td>
</tr>
</tbody>
</table>

9. Have you sometimes been under the influence of alcohol in situations where you could have caused an accident or gotten hurt – for example, when riding a bike, driving, operating a machine or anything else? | Yes…………1 No…………2 |

14. Have there often been times when you had a lot more to drink than you intended to have? | Yes…..Go to 15……1 No…..Continue……2 |

14A. Were there many times when your drinking continued for much longer than you intended it to? | Yes…………1 No…………2 |

15. Have there been days when you spent a great deal of time drinking or getting over the effects of alcohol? | Yes…..Go to 15A……1 No…..Go to Q 16……2 |
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>15A. Has this been for a period of two weeks or longer?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>17. Did you find that you had to drink much more than you used to in order to get the same effect?</td>
<td>Yes…Go to 18……1</td>
<td>No…..Continue……2</td>
</tr>
<tr>
<td>17A. Did you find that the amount of alcohol you used to drink had <strong>much less effect</strong> on you than it once did?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>18. Have you ever tried to quit or cut down on your drinking?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>18A. Whenever you decided to quit or cut down, were you always able to do it for at least one month?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>18B. Have you often thought that you should quit or cut down on your drinking, whether or not you tried to?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>23. Has drinking ever caused you…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A…to feel uninterested in things?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>B…to feel depressed?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>C…to feel suspicious of others or paranoid?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
<tr>
<td>D…to believe things that were not true?</td>
<td>Yes……1</td>
<td>No……2</td>
</tr>
</tbody>
</table>