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Distress Tolerance and Early Adolescent Externalizing and Internalizing Symptoms: The Moderating Role of Gender and Ethnicity

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Abstract

A large body of research has examined the development of internalizing and externalizing symptoms in childhood and early adolescence. Notably, there is significant concomitant impairment associated with early adolescent symptomatology, as well as association of these symptoms with future development of psychopathology, poor physical health, self-destructive thoughts and behaviors, criminal behavior, and HIV risk behaviors. Drawing on negative reinforcement theory, the current study sought to examine the potential role of distress tolerance, defined as the ability to persist in goal-directed activity while experiencing emotional distress, as a potential mechanism that may underlie both internalizing and externalizing symptoms among 231 Caucasian and African American youth (M age = 10.9 years; 45.5% female; 54.5% Caucasian ethnicity). A series of regressions resulted in significant moderated relationships, such that low distress tolerance conferred increased risk for alcohol use among Caucasians, delinquent behavior among African Americans, and internalizing symptoms among females. Clinical implications, including the potential role of negative reinforcement models in early intervention with young adolescents, are discussed.

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Keywords

Negative Reinforcement; Distress Tolerance; Alcohol; Externalizing Behavior; Internalizing Symptoms; Adolescents

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1. Introduction

A large body of research has examined the development of internalizing and externalizing symptoms in childhood and early adolescence, noting the impairment associated with such symptoms, as well as their association with the future development of psychopathology (Colman, Wadsworth, Croudace, Jones, 2007; DeWit, Adlaf, Offord, & Ogborne, 2000), poor physical health (Keenan-Miller, Hammen, Brennan, 2007), self-destructive thoughts and behaviors (Klomek et al., 2008), criminal behavior (Sourander et al., 2007), and HIV risk behaviors (Brook, Adams, & Balka, 2004). Although often treated separately and considered to develop through different pathways (Achenbach & Edelbrock, 1984), internalizing and externalizing symptoms share important commonalities in their association with negative affect (Oland & Shaw, 2005). As such, to better understand and assess common mechanisms underlying the development of both internalizing and externalizing symptoms, a negative reinforcement-based model provides a potentially useful approach (Baker et al., 2004; Khantzian, 1985).

1.1. Negative Reinforcement Behavior

Negative reinforcement models emphasize that the motivational basis of behavior is the escape or avoidance of negative affective states. Although negative reinforcement models have been applied almost exclusively to the dependence stages of substance use (see Eissenberg, 2004 for an exception), with the use of substances functioning to reduce incipient physical and psychological symptoms of withdrawal (Baker et al., 2004), this model may be particularly relevant for understanding early adolescent development of internalizing and externalizing symptoms. Specifically, the ways in which emerging adolescents respond to developmental changes, and the accompanying negative affect that often coincides with such stressors, may impact current and future adjustment and psychopathology (Grant, Compas, Thurm, McMahon & Gipson, 2004; McMahon, Grant, Compas, Thurm, & Ey, 2003; Schneiders et al., 2006). For instance, a large body of literature has demonstrated that the normative stressors that come with adolescence often result in increased levels of negative affect (e.g., Brooks-Gunn & Warren, 1989; Larson & Ham, 1993), and those individuals who rely on dysfunctional styles of coping in the face of negative emotions are less able to effectively regulate their negative mood states. This inability to regulate affective distress thereby increases vulnerability to the immediate relief offered by either (1) isolating themselves, as is common in depression and anxiety, or (2) engaging in various risky behavioral alternatives (e.g., alcohol use). Engagement in these behaviors often brings relief (perceived and/or actual), thereby enhancing the attractiveness and likelihood of such behavior for future situations. For example, a socially anxious youth who feels uncomfortable around peers may find that when they drink alcohol their anxiety is reduced, completely absent of any dependence or accompanying withdrawal symptoms. Because drinking alcohol in this case aided in successfully reducing their anxiety/negative affect, the youth is more likely to drink alcohol in the future. This scenario fits well with the established empirical literature examining the role of social anxiety and social discomfort in relation to alcohol use which has a strong basis in stress-coping and other negative reinforcement models (e.g., Morris, Stewart, & Ham, 2005; Myers, Aarons, Tomlinson, & Stein, 2003; Weinberg & Bartholomew, 1996). Further, prominent behavioral theories of anxiety among youth have long implicated the role of avoidance in both the development and maintenance of anxiety symptoms and behavior (e.g., Barlow, 2002).

1.2. Behavioral assessment of negative reinforcement behavior: Distress tolerance

To capture an individual's propensity towards behavior motivated by negative reinforcement, studies on adult samples have utilized behavioral assessments of *distress tolerance*, defined as the ability to persist in goal-directed activity while experiencing emotional distress. Briefly, the behavioral assessment of distress tolerance involves participant engagement in and persistence on a computerized task that gradually increases in difficulty thereby increasing affective distress. The participant has the option to persist (with some small positive reinforcement available for persisting) or, in contrast, to terminate the task, thereby reducing emotional distress in the short term (negative reinforcement) but losing out on the rewards in the long-term. In regard to externalizing behavior such as substance use and delinquent behavior, low distress tolerance as measured by these behavioral tasks is associated with increased substance use (Quinn, Brandon, & Copeland, 1996), shorter durations of smoking cessation and illicit drug use abstinence attempts (Brandon et al., 2003; Brown, Lejuez, Kahler, & Strong, 2002; Daughters, Lejuez, Kahler et al., 2005), increased dropout rates from residential drug treatment (Daughters, Lejuez, Bornovalova et al., 2005), and higher rates of antisocial personality disorder among a sample of male participants (Daughters et al., 2008). Speaking to internalizing symptoms, low distress tolerance is associated with higher rates of borderline personality disorder in a sample consisting largely of female participants (Bornovalova et al., 2008), anxiety sensitivity (Anestis, Selby, Fink, & Joiner, 2007) and depression (Buckner, Keough, & Schmidt, 2006).

In order to begin to translate our understanding of distress tolerance and adult outcomes to an early adolescent sample, it is important to consider potential moderators of the relationship between negative affect and behavior, especially given evidence of clear gender and ethnicity differences in internalizing and externalizing symptoms. As such, the following sections highlight the potential role of gender and ethnicity in the development of these symptoms and behaviors.

1.3. Gender Differences in Internalizing Symptoms

Evidence indicates that female adolescents in comparison to males report higher levels of internalizing symptoms such as depression, anxiety, and psychosomatic complaints (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Kolip, 1997; Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998; Wade, Cairney, & Pevalin, 2002). This may be the result of females and males responding to normative adolescent stressors differently. For instance, the relationship between the frequency of stressful life events and depressive symptoms intensifies as females mature, but diminishes for males. Female adolescents also report a higher number of stressful life events, have more acute reactions to these events, and view these events as more taxing than adolescent males (e.g., Jose & Ratcliffe, 2004). Risk factors, such as body image, self-esteem, pubertal changes, and transitions to high school also increase adolescents' chance of developing depression and the effect of these risk factors have been shown to be more intense for female versus male adolescents (Marcotte, Fortin, Potvin, & Papillon, 2002). Furthermore, the most pronounced gender differences in depression are among symptoms of affective distress, such as a depressed and anxious mood, while less significant gender differences were found in other symptoms of depression, such as sleep and concentration problems (Compas et al., 1997). In line with a negative reinforcement approach, the link between symptoms of affective distress and internalizing symptoms such as depression and anxiety among females may be a gender specific consequence of an inability to effectively cope with affective distress.

1.4. Ethnicity Differences in Externalizing Behavior

Emerging evidence suggests clear ethnicity differences in the engagement of externalizing behaviors, with a specific focus on alcohol use and delinquent behavior. In regard to alcohol use, Caucasian adolescents are significantly more likely to consume alcohol than their African

American peers (Blum et al., 2000; Broman, 2007; Horton, 2007). Furthermore, Caucasians report drinking on more days and having more alcohol related problems than African Americans (Horton, 2007). Potential environmental mediators for ethnicity differences include less alcohol use, and stronger negative views about the harmful effects of alcohol, among African American than Caucasian parents (Peterson, Hawkins, Abbott, & Catalano, 1994). Differences in parental views and behavior may translate into children's attitudes toward alcohol use. In support of this view, African American elementary school students express stronger expectations that alcohol use will result in a loss of control and more long term negative effects, while Caucasian students believe that alcohol use will lead to positive affective reactions (Rinehart et al., 2006). Further, African American children convey more negative attitudes toward adult alcohol use and fewer intentions to use alcohol as adults than their Caucasian peers. In regard to violent and delinquent behavior, evidence suggests that this behavior is more common among African American youth than their Caucasian peers (Eaton et al., 2006; Sampson, Morenoff, & Raudenbush, 2005). For instance, compared to Caucasians, studies indicate that African American youth are more likely to be diagnosed with conduct disorder (Cameron & Guterman, 2007), self report engaging in a higher rate of index offenses (Elliot, Huizinga, & Ageton, 1985), and to be involved in more serious delinquent behavior such as weapons offenses, auto theft, burglary, and felony drug offenses (Farrington, Loeber, Stouthamer-Loeber, Van Kammen, & Schmidt, 1996; Kurtz, Giddings, Sutphen, Gill, & Martin, 1991).

Given evidence indicating that externalizing problems in youth are linked with global measures of negative emotionality, as well as specific indices of anger, hostility, and emotionality (e.g., Clark, Watson, & Mineka, 1994; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Lengua, West, & Sandler, 1998; Rothbart & Bates, 1998), negative reinforcement processes may be underlying the engagement in risk behavior, such that individuals' unable to tolerate negative emotions are engaging in an increase in externalizing behavior. In support of this, previous studies have implicated avoidant-coping in the engagement of delinquent behaviors (Vassallo et al., 2002; Eftekhari, Turner, & Larimer, 2004; Hasking 2007).

1.5. Current Study

The construct of distress tolerance has been largely unstudied within early adolescent samples. Thus, it remains unclear whether a tendency to engage in negative reinforcement behavior (i.e., low distress tolerance) is present prior to regular engagement in substance use, delinquent behavior, and expression of internalizing symptoms. Further, the research that has been conducted has paid little attention to gender and race. This is of particular relevance because low distress tolerance may be a pathway to different aspects of internalizing and externalizing problems, to the extent that these problems differ as a function of race and gender as outlined above. Thus, the aim of the present investigation was to examine the main and interactive effects of distress tolerance in regard to internalizing and externalizing symptoms among a diverse sample of emerging adolescents. Specifically, it was hypothesized that emerging adolescents with low distress tolerance will report significantly greater rates of alcohol use, delinquent behavior, and internalizing symptoms, and that the nature of these relationships would depend upon gender and ethnicity. Specifically, it was hypothesized that low distress tolerance would be significantly related to an increase in alcohol use among Caucasians, delinquent behavior among African Americans, and internalizing symptoms among females.

2. Method

2.1 Participants

Cross-sectional data were collected from a socioeconomically and ethnically diverse sample of 231 Caucasian and African American youth participating in a larger prospective study of

behavioral, environmental, and genetic mechanisms of risk for HIV-related risk behaviors in youth. Participants were recruited through media outreach in the greater Washington, DC metropolitan area, as well as mailings sent to area schools, libraries, and Boys and Girls Clubs. The average age of participants in the sample was 10.9 years ($SD = 0.9$; range = 9-13 years), 45.5% of the sample were female ($n = 105$), 54.5% ($n = 126$) indicated Caucasian ethnicity and 45.5% ($n = 105$) indicated African American ethnicity. The median family income was \$87,791.13 ($SD = \$59,104.81$) per year, with 15.1% reporting less than \$30,000 per year. For analysis purposes, extreme outliers (more than 4 SD above the mean; $n = 2$) were trimmed to a value of 1 greater than the next maximum value (i.e., \$250,001); this variable was square-root transformed to correct positive skewness and standardized (z -scored) to ease interpretation in regression analyses.

2.2. Measures

2.2.1. The Centers for Disease Control and Prevention Youth Risk Behavior Surveillance System (YRBS; CDC, 2001)—A shortened version of the YRBS was used to examine past year prevalence of delinquent behavior and substance use. Youth were asked to indicate the frequency of past year alcohol, smoking, marijuana, and illicit drug use. In addition, the shortened measure assesses 10 different delinquent behaviors, which inquire whether adolescents have: (a) rode in a car without wearing a seatbelt; (b) rode a bicycle or motorcycle without a helmet; (c) crossed the street recklessly; (d) been in a physical fight; (e) initiated a physical fight; (f) carried a weapon such as a gun, knife, or club outside of the home; (g) used a weapon such as a gun, knife, or club outside of the home; (h) stolen from a store; (i) stolen from a person; and (j) gambled with real money. We examined an aggregate measure of these behaviors. This strategy has been used successfully in previous research with adolescents (Lejuez, et al., 2003; Lejuez et al., 2007). In these studies, a composite of risk behaviors has shown good reliability (all α 's $> .7$), and have been shown to be significantly related to other self-report measures of risk related constructs including sensation seeking and impulsivity.

2.2.2. The Revised Child Anxiety and Depression Scales (RCADS; Chorpita et al., 2000)—The RCADS was designed to assess symptoms of DSM-IV defined anxiety disorders and major depression including subscales targeting major depression, social phobia, panic disorder, separation anxiety disorder, generalized anxiety disorder, and obsessive-compulsive disorder. Items ask about frequency of symptoms (*never, sometime, often, always*) and are scored on a 4-point Likert scale. RCADS subscale scores and a total internalizing symptom score were obtained by summing across relevant items. The RCADS has demonstrated convergent validity with existing measures of childhood anxiety and anxiety disorders (Chorpita et al., 2000).

2.2.3. The Behavioral Indicator of Resiliency to Distress (BIRD; Lejuez, Daughters, Danielson, & Ruggiero, 2006)—The BIRD, which was developed based upon the adult computerized distress tolerance task, the PASAT-C (Lejuez et al., 2003), was used in the current study as a measure of distress tolerance. Ten numbered boxes (1-10) are presented on a computer screen and participants are instructed to use the computer's mouse to click a green dot that appears above a numbered box before the green dot jumps to another number. If the numbered box, where the green dot is located is successfully clicked before the dot moves, the bird then flies out of its cage, the computer makes a pleasant chirping sound, and a point is earned. Alternatively, if the green dot moves before the youth clicks on the numbered box or the wrong numbered box is clicked, a loud and unpleasant noise is made, the bird remains in its cage, and no point is earned. The first level of the BIRD lasts 3 minutes. This level begins with a 5-second latency in between dot presentations and titrates this latency based upon performance (correct answers reduce the latency by 0.5 seconds whereas incorrect

answers or non-responses increase the latency 0.5 seconds); from this level an average latency is calculated to index skill level. The second level is more difficult, beginning with the average latency from the previous level for four minutes and then reducing the latency in half for the final minute making the task extremely difficult (i.e., challenge latency). Following a brief rest period, the final level includes the challenge latency for up to 5 minutes. At all points in the final level, the participant has an escape option. Specifically, the participant is informed prior to beginning the final level that they can click the 'quit game' button on the computer screen to end the game, but that the magnitude of the prize they would earn was dependent upon their task performance. Similar to other distress tolerance work, participants were informed of the possible prizes (e.g., books, DVDs, board games, gift certificates to area stores, sporting equipment, and art/school supplies) but were given no exact information about the requirements for each prize. Throughout the task, the total number of points earned was visible on the upper right hand corner of the screen. Distress tolerance was indicated by persistence on the final level, and can be examined as a categorical variable (whether or not they terminated the task). Total score on the first two levels is recorded to control for the effects of skill on persistence. At the conclusion of the study, youth selected a prize of their choosing based on their performance on the task.

Participants completed the *Positive and Negative Affect Schedule-Children* (PANAS-C; Laurent et al., 1999) prior to Level 1 and after Level 2 of the BIRD as a measure of change in negative affect during the task. The PANAS-C is composed of positive and negative affect subscales on a 10-point scale ranging from not at all to extremely the degree to which they currently feel excited, mad, interested, frustrated, happy, upset, energetic, embarrassed, proud, and nervous.

2.3. Procedure

Permission to conduct research was obtained from the University of Maryland Institutional Review Board. After providing informed consent, participants were escorted into a private room where they filled out the self report questionnaires and the computerized distress tolerance task (BIRD) on a laptop computer. All measures were counterbalanced. Sessions lasted approximately one hour.

3. Results

3.1. Data Analysis Plan

Analyses were conducted with past year alcohol use, delinquent behavior, and internalizing symptoms as the primary dependent variables. Alcohol use was coded categorically (no use, one time, a few times or more), and both delinquent behavior and internalizing symptoms were coded continuously (number of delinquent behaviors, total RCADS score). Baseline demographic data were first examined for associations with each of the dependent variables (past year alcohol use, delinquent behavior, internalizing symptoms). If any of the demographic variables were significantly associated with the dependent variables then they were included as covariates in subsequent regression analyses. The relationship between distress tolerance and the internalizing and externalizing symptoms were examined using three separate regression analyses. Separate regression analyses were conducted to examine the potential impact of gender and ethnicity on the relationship between distress tolerance and the dependent variables of past year alcohol use, delinquent behavior, and current internalizing symptoms. For these analyses, distress tolerance was dummy-coded with high distress tolerance as the reference group (i.e., coded 0) and low distress tolerance coded as 1. Likewise, gender was coded with males as the reference group and race/ethnicity was coded with Caucasians as the reference group. In line with our hypotheses, the interaction between distress tolerance and either gender or ethnicity were included in the final step of each regression.

3.2. Descriptive Data

3.2.1. Distress Tolerance—Individuals persisted on the BIRD for an average of 216.2 seconds ($SD = 105.6$) and 50.2% ($n = 116$) quit the task before the 5 minute time period expired. Paired t tests indicated a significant increase in self-reported negative affect during the first two levels of the task, as reported by the PANAS-C during the BIRD ($p < .001$), suggesting that the task was psychologically stressful. Skill on the BIRD was indexed as the number of correct responses during the first two levels. There was no relationship between number of correct responses and either BIRD duration or quitting the task ($ps > .50$). Participants were grouped into low and high distress tolerance based on whether they quit the task (Low DT, $n = 116$) or were able to persist for the entire 5 minutes (High DT, $n = 115$).

3.2.2. Substance Use—Self-report of past year alcohol use included 71.4% ($n = 165$) no use, 17.3% ($n = 40$) one time, and 11.3% ($n = 26$) a few times or more. For past year cigarette use, 97.0% ($n = 224$) reported no use, 1.3% ($n = 3$) one time, 1.7% ($n = 4$) a few times or more. Past year marijuana use included 98.2% ($n = 227$) no use, 0.4% ($n = 1$) one time, 1.2% ($n = 3$) a few times or more. Only 2.2% ($n = 5$) of the sample reported use of any illicit drug other than marijuana. Given the low frequency of substance use other than alcohol across the entire sample we only included past year alcohol use in subsequent analyses.

3.3.3. Internalizing Symptoms—Internalizing symptoms were calculated based on the total score of the RCADS. The mean total RCADS score for the entire sample was 31.97 ($SD = 19.37$). Although subscale scores were calculated (see Method), due to the high intercorrelations among the subscale scores (all $rs > .57$), we used the total RCADS score in outcome analyses (Cronbach $\alpha = 0.95$).

3.3.4. Delinquent Behavior—Youth endorsed the following delinquent behaviors over the past year: (a) rode in a car without wearing a seatbelt (78.4%, $n = 181$); (b) rode a bicycle or motorcycle without a helmet (67.1%, $n = 155$); (c) crossed the street recklessly (48.1%, $n = 111$); (d) been in a physical fight (47.2%, $n = 109$); (e) initiated a physical fight (29.0%, $n = 67$); (f) carried a weapon such as a gun, knife, or club outside of the home (5.2%, $n = 12$); (g) used a weapon such as a gun, knife, or club outside of the home (10.3%, $n = 24$); (h) stolen from a store (10.4%, $n = 24$); (i) stolen from a person (26.8%, $n = 62$); and (j) gambled with real money (32.9%, $n = 76$). The mean number of delinquent behaviors engaged in over the past year was 3.6 ($SD = 1.9$).

3.3. Identifying Covariates for Each Dependent Variable

3.3.1. Past Year Alcohol Use—There was a significant relationship between past year alcohol use and income, with higher income related to a higher likelihood of using alcohol in the past year [$F(2, 229) = 9.76, p < .001$]. Caucasians reported significantly more alcohol use in the past year ($\chi^2(2, 229) = 6.19, p < .05$) compared to African Americans. Past year alcohol use was not related to child's age or gender.

3.3.2. Delinquent Behavior—There was a significant relationship between past year number of delinquent behaviors and ethnicity, with African Americans reporting engagement in significantly more delinquent behaviors than Caucasians [$F(1, 230) = 4.91, p < .05$]. There was no relationship between past year number of delinquent behaviors and age, gender, or income.

3.3.3. Internalizing Symptoms—There was a significant relationship between internalizing symptoms and age, with younger adolescents reporting significantly more internalizing symptoms ($r = -.15, p < .05$). Internalizing symptoms were not related to gender, ethnicity, or income.

3.4. Distress Tolerance and Past Year Alcohol Use, Delinquent Behavior, and Internalizing Symptoms

3.4.1. Past Year Alcohol Use—To determine the unique predictors of past year alcohol use we conducted an ordinal logistic regression with the three categories of (1) never used alcohol, (2) used alcohol once, and (3) used alcohol more than once in the past year. As indicated in Table 1, income, ethnicity, and distress tolerance were entered in the first step of the analysis. The distress tolerance (DT) X ethnicity interaction was added in the final step of the analysis. The proportional odds assumption was satisfied by a non significant score tests for both the main effects and interactions models, $ps > .60$. The overall main effects model was significant [χ^2 (df = 3) = 20.60, $p < .001$] and indicated that greater income was associated with a greater odds of alcohol use ($OR = 1.75$, 95% $CI = 1.20-2.56$, $p < .001$). The final step of the model indicated a significant improvement in fit, $\Delta\chi^2$ (df = 1) = 4.4, $p < .05$. In the final model, greater income ($OR = 1.88$, 95% $CI = 1.26-2.0$, $p < .01$), low distress tolerance ($OR = 0.37$, 95% $CI = 0.17-0.79$, $p < .01$), and the interaction between distress tolerance and ethnicity ($OR = 3.78$, 95% $CI = 2.05-13.33$, $p < .05$) were significantly related to a greater odds of using alcohol in the past year. The relationship between distress tolerance, ethnicity, and past year alcohol use is illustrated in Figure 1. Controlling for income, low distress tolerance among Caucasians was associated with significantly greater odds of past year alcohol use ($OR = 0.37$, 95% $CI = 0.17-0.79$, $p < .01$); among African-Americans, this association was reversed and was not significant ($OR = 1.41$, 95% $CI = 0.51-3.91$, $p = .51$).

3.4.2. Delinquent Behavior—To determine the unique predictors of past year delinquent behavior we conducted a hierarchical linear regression with ethnicity and distress tolerance in Step 1, and the DT X ethnicity interaction term in the final step. As indicated in Table 2, Step 1 was significant ($R^2 = .04$, $F = 5.00$, $p < .01$), with ethnicity ($B = .54$, $sr^2 = .02$, $p < .05$) and distress tolerance ($B = .59$, $sr^2 = .02$, $p < .05$) significantly related to a greater number of delinquent behaviors. After entering the interaction terms in the final step, the final model was significant ($\Delta R^2 = .02$, $F = 5.25$, $p < .05$), with the interaction of DT X ethnicity ($B = 1.18$, $sr^2 = .02$, $p < .05$), significantly related to past year delinquent behavior. The relationship between distress tolerance and delinquent behavior is depicted in Figure 2. African American ethnicity and having low distress tolerance places adolescents at increased risk of engaging in delinquent behavior ($B = 1.24$, $sr^2 = .09$, $p < .001$) whereas for Caucasians level of distress tolerance is not a risk factor for delinquent behavior ($B = 0.06$, $sr^2 = .00$, $p = .87$).

3.4.3. Internalizing Symptoms—To determine the unique predictors of internalizing symptoms we conducted a hierarchical linear regression with age, gender, and distress tolerance in Step 1, and the DT X gender interaction term in the final step. As indicated in Table 3, Step 1 was significant ($R^2 = 0.04$, $F = 4.00$, $p < .01$), with age ($B = -3.00$, $sr^2 = 0.02$, $p < .05$) significantly related to internalizing symptoms. After entering the interaction term, the final model was significant ($\Delta R^2 = 0.02$, $F = 4.20$, $p < .01$), with age ($B = -3.00$, $sr^2 = 0.02$, $p < .05$), and the interaction of DT X gender ($B = 9.64$, $sr^2 = 0.02$, $p < .05$) significantly related to past year internalizing symptoms. The relationship between distress tolerance and internalizing symptoms is depicted in Figure 3. Controlling for age, being female and having low distress tolerance increases risk for internalizing symptoms ($B = 9.40$, $sr^2 = 0.05$, $p < .05$), whereas for males, level of distress tolerance is not a risk factor for internalizing symptoms ($B = -0.08$, $sr^2 = 0.00$, $p = .98$).

4. Discussion

Although negative reinforcement processes may represent a common pathway for internalizing and externalizing symptoms, little work has been focused on this factor among early adolescents. Further, work that has been conducted on negative reinforcement mechanisms has

yet to consider meaningfully the role of gender and ethnicity in the development of internalizing and externalizing symptoms. Towards this end, the current study examined a behavioral task of distress tolerance as a proxy for negative reinforcement responding in a gender balanced sample of African American and Caucasian early adolescents, and its specific relationship to past year alcohol use, delinquent behavior, and internalizing symptoms.

Regarding externalizing symptoms, the current study replicated previous findings indicating greater alcohol use in Caucasian early adolescents (e.g., Blum et al., 2000) and delinquency behavior in African American early adolescents (e.g., DelBellow, Lopez-Larson, Soutullo, & Strakowski, 2001). Further, results support the argument that distress tolerance interacts with ethnicity in understanding both alcohol use and delinquent behavior. Specifically, (a) among Caucasian youth, low distress tolerance was significantly related to an increase in past year alcohol use, whereas there was no relationship between distress tolerance and alcohol use among African-American youth; and (b) among African American youth, low distress tolerance was significantly related to an increase in past year delinquent behavior, whereas there was no relationship between distress tolerance and delinquent behavior among Caucasian youth. These findings set the stage for further research testing the hypothesis that an inability to tolerate affective distress manifests in different behavioral outcomes in African American and Caucasian youth (cf. Wills, Ainette, Mendoza, Gibbons, & Brody, 2007). However, it is crucial that such testing would occur in the context of a more comprehensive effort that addresses the impact of other relevant variables including environmental factors such as peer influence and parental monitoring (Chen & Killea-Jones, 2006; Ludwig, Duncan, Hirschfield, 2000; Wallace & Muroff, 2002), expectancies (e.g., Rinehart, Bridges, & Sigelman, 2006), and other aspects of learning history (e.g., Nasim, Belgrave, Jagers, Wilson, Owens, 2007).

In addition to differences in alcohol use and delinquent behavior, gender moderated the relationship between distress tolerance and internalizing symptoms. Specifically, female youth who were low in distress tolerance reported a greater number of internalizing symptoms than female youth high in distress tolerance, and level of distress tolerance did not exert an effect on internalizing symptoms among male youth. The interaction of distress tolerance and gender supports previous research indicating that the relationship between perceived stress and internalizing symptoms is moderated by gender (Galaif, Sussman, Chou, & Wills, 2003), and thus supports theory suggesting female youth are more likely to cope with distress internally through rumination and depression (e.g., Copeland & Hess, 1995).

The present study has several limitations worth noting. Although it is critical to elucidate mechanisms underlying development of externalizing and internalizing behaviors in youth, the present sample of early adolescents had relatively low rates of alcohol use and delinquent behaviors, as well as modest levels of internalizing symptoms, which may have contributed to the relatively small observed effects. Thus, future studies should expand this research to older adolescents with a wider range of substance use, delinquent behaviors, and internalizing symptoms. As this was a first step in examining negative reinforcement behavior assessed in vivo among young adolescents, the study design was cross-sectional and thus limits our ability to draw concrete conclusions regarding the causal nature and temporal sequencing of these processes. For example, externalizing problems and alcohol use were assessed as 1-year retrospective reports; as such, it is possible that such difficulties led to less ability to tolerate distress rather than distress tolerance leading to such difficulties. A logical next step is a longitudinal analysis of the relationship between distress tolerance and internalizing and externalizing behaviors in youth. Such a design would allow for the specification of the direction of effects between distress tolerance and putative outcomes in adolescents. Finally, we examined a limited number of covariates in the present study and, as mentioned above, future research would benefit from investigation of other theoretically important characteristics (e.g., parental monitoring, exposure to models of delinquent and substance using behaviors,

negative life events, substance use expectancies, neighborhood risk) that may exert general and/or specific effects on engagement in various externalizing and internalizing behaviors.

Keeping in mind the aforementioned limitations, this study implicates distress tolerance as a common mechanism across demographic subgroups, supporting theoretical and empirical research linking these basic behavioral processes to poor outcomes. As such, results of the study have several implications for understanding distress tolerance as it relates to the development of externalizing and internalizing behaviors in youth. To our knowledge, this is the first study to examine behavioral measurement of negative reinforcement behavior among a community sample of early adolescents in relation to a range of problematic behaviors and symptomatology. Findings provided preliminary support for the concurrent validity of our behavioral distress tolerance task and the role of negative reinforcement behavior in relation to internalizing and externalizing problems among specific demographic subgroups of youth, and findings are directly in line with adult literature suggesting a relationship between low distress tolerance and substance use (e.g., Quinn, Brandon, & Copeland, 1996), antisocial personality disorder (Daughters et al., 2008), and borderline personality disorder (Bornoalova et al., 2008). This is notable as this approach may prove to be useful for identifying those most at risk for low distress tolerance and can aid in developing specific, targeted treatments to increase youth's ability to persist through distress, while simultaneously aiming to identify healthy, prosocial activities and skills that can similarly work to reduce negative affect in adaptive ways and subsequently help reinforce engagement in these activities. This also may involve targeting such early intervention efforts at large peer groups (e.g., school-based interventions) so as to influence norms regarding appropriate methods of coping with negative affect. Finally, the results may have implications for understanding gender and race differences in the manifestation of risk behavior. Although distress tolerance may be a common process underlying risk behavior, it may manifest in different risk behaviors as a function of these demographic variables. Future work should consider other variables that underlie the impact of gender and/or race on the relationship between low distress tolerance and internalizing/externalizing symptoms and behaviors.

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References

- Achenbach TM, Edelbrock CS. Psychopathology of childhood. *Annual Review of Psychology* 1984;35:227–256.
- Anestis MD, Selby EA, Fink EL, Joiner TE. The multifaceted role of distress tolerance in dysregulated eating behaviors. *International Journal of Eating Disorders* 2007;40(8):718–726. [PubMed: 17868125]
- Angold A, Erkanli A, Silberg J, Eaves L, Costello EJ. Depression scale scores in 8–17-year-olds: Effects of age and gender. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 2002;43:1052–1063.
- Baker TB, Piper ME, McCarthy DE, Majeskie MR, Fiore MC. Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review* 2004;111:33–51. [PubMed: 14756584]
- Barlow, DH. *Anxiety and its disorders: The nature and treatment of anxiety and panic*. New York: Guilford Press; 2002.
- Blum RW, Beuhring T, Shew ML, Bearinger LH, Sieving RE, Resnick MD. The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *American Journal of Public Health* 2000;90:1879–1884. [PubMed: 11111260]

- Bornoalova MA, Daughters SB, Richards J, Hernandez G, Lejuez CW. Differences in impulsivity and risk taking propensity between urban crack/cocaine and heroin users. *Experimental and Clinical Psychopharmacology* 2005;13:311–8. [PubMed: 16366761]
- Bornoalova MA, Gratz KL, Daughters SB, Nick B, Delany-Brumsey A, Lynch TR, Kosson D, Lejuez CW. *Journal of Psychiatric Research* 2008;42:717–726. [PubMed: 17868698]
- Brandon TH, Herzog TA, Juliano LM, Irvin JE, Lazev AB, Simmons VN. Pretreatment task-persistence predicts smoking cessation outcome. *Journal of Abnormal Psychology* 2003;112(3):448–456. [PubMed: 12943023]
- Broman CL. Perceived discrimination and alcohol use among Black and White college students. *Journal of Alcohol and Drug Education* 2007;51(1):8–16.
- Bronfenbrenner, U. A Future Perspective. In: Bronfenbrenner, U., editor. *Making human beings human: Bioecological perspectives on human development*. Thousand Oaks, CA: Sage Publications; 1979. p. 50-59.2005
- Brooks-Gunn J, Warren MP. Biological and social contributions to negative affect in young adolescent girls. *Child Development* 1989;60:40–55. [PubMed: 2702873]
- Brook JS, Adams RE, Balka EB. Illicit Drug Use and Risky Sexual Behavior Among African American and Puerto Rican Urban Adolescents: The Longitudinal Links. *Journal of Genetic Psychology* 2004;165(2):203–220. [PubMed: 15259877]
- Brooks TL, Harris SK, Thrall JS, Woods ER. Association of adolescent risk behaviors with mental health symptoms in high school students. *Journal of Adolescent Health* 2002;31:240–246. [PubMed: 12225736]
- Brown RA, Lejuez CW, Kahler CW, Strong D. Distress tolerance and duration of past smoking cessation attempts. *Journal of Abnormal Psychology* 2002;111:180–185. [PubMed: 11866171]
- Buckner JD, Keough ME, Schmidt NB. Problematic alcohol and cannabis use among young adults: The roles of depression and discomfort and distress tolerance. *Addictive Behaviors* 2007;32(9):1957–1963. [PubMed: 17258398]
- Cameron M, Guterman NB. Diagnosing conduct problems of children and adolescents in residential treatment. *Child & Youth Care Forum* 2007;36(1):1–10.
- Centers for Disease Control and Prevention. National school-based Youth Risk Behavior Survey. 2001. Public-use data documentation
- Chen KW, Killea-Jones LA. Understanding Differences in Marijuana Use Among Urban Black and Suburban White High School Students from Two U.S. Community Samples. *Journal of Ethnicity in Substance Abuse* 2006;5(2):51–73. [PubMed: 16635974]
- Chorpita BF, Yim L, Moffitt C, Umemoto LA, Francis SE. Assessment of symptoms of DSM-IV anxiety and depression in children: A revised child anxiety and depression scale. *Behavior Research and Therapy* 2000;38(8):835–855.
- Clark LA, Watson D, Mineka S. Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology* 1994;103:103–116. [PubMed: 8040472]
- Colman I, Wadsworth MEJ, Croudace TJ, Jones PB. Forty-year psychiatric outcomes following assessment for internalizing disorder in adolescence. *American Journal of Psychiatry* 2007;164:126–133. [PubMed: 17202554]
- Compas BE, Oppedisano G, Connor JK, Gerhardt CA, Hinden BR, Achenbach TM, et al. Gender differences in depressive symptoms in adolescence: Comparison of national samples of clinically referred and nonreferred youths. *Journal of Consulting and Clinical Psychology* 1997;65(4):617–626. [PubMed: 9256563]
- Copeland EP, Hess RS. Differences in young adolescents' coping strategies based on gender and ethnicity. *Journal of Early Adolescence* 1995;15(2):203–219.
- Craske MG. Fear and anxiety in children and adolescents. *Bulletin of the Menninger Clinic* 1997;61:A4–A36. [PubMed: 9149463]
- Daughters SB, Lejuez CW, Bornoalova MA, Kahler C, Strong D, Brown R. Distress tolerance as a predictor of early treatment dropout in a residential substance abuse treatment facility. *Journal of Abnormal Psychology* 2005;114:729–734. [PubMed: 16351393]

- Daughters SB, Lejuez CW, Kahler C, Strong D, Brown R. Psychological distress tolerance and duration of most recent abstinence attempt among residential treatment seeking substance abusers. *Psychology of Addictive Behaviors* 2005;19:208–211. [PubMed: 16011392]
- Daughters SB, Sargeant M, Gratz KL, Bornovalova MA, Lejuez CW. The Relationship between distress tolerance and antisocial personality disorder among male residential treatment seeking inner-city substance users. *Journal of Personality Disorders*. in press
- DelBello MP, Lopez-Larson MP, Soutullo CA, Strakowski SM. Effects of race on psychiatric diagnosis of hospitalized adolescents: A retrospective chart review. *Journal of Child and Adolescent Psychopharmacology* 2001;11(1):95–103. [PubMed: 11322750]
- DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age of first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry* 2000;157:745–750. [PubMed: 10784467]
- Durant R, Getts AG, Cadenhead C, Woods E. The association between weapon carrying and the use of violence among adolescents living in and around public housing. *Journal of Adolescent Health* 1995;17(6):376–380. [PubMed: 8924444]
- Eaton DK, Kann L, Kinchen S, Ross J, Hawkins J, Harris WA, Lowry R, McManus T, Chyen D, Shanklin S, Lira C, Grunbaum JA, Wechsler H. Youth risk behavior surveillance--United States, 2005. *Journal of School Health* 2006;76:353–372. [PubMed: 16918870]
- Eftekhari A, Turner AP, Larimer ME. Anger expression, coping, and substance use in adolescent offenders. *Addictive Behaviors* 2004;29:1001–1008. [PubMed: 15219349]
- Eissenberg T. Measuring the emergence of tobacco dependence: The contribution of negative reinforcement models. *Addiction* 2004;99(Suppl1):5–29. [PubMed: 15128378]
- Eisenberg N, Fabes R, Guthrie I, Reiser M. Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology* 2000;78:136–157. [PubMed: 10653511]
- Elliot, DS.; Huizinga, D.; Ageton, SS. Explaining delinquency and drug use. Newbury Park, CA: Sage; 1985.
- Farrington DP, Loeber R, Stouthamer-Loeber M, Van Kammen WB, Schmidt L. Self-reported delinquency and a combined delinquency seriousness scale based on boys, mothers, and teachers: Concurrent and predictive validity for African-Americans and Caucasians. *Criminology* 1996;34(4):493–517.
- Galaif ER, Sussman S, Chou CP, Wills TA. Longitudinal relations among depression, stress, and coping in high risk youth. *Journal of Youth and Adolescence* 2003;32(4):243–258.
- Grant KE, Compas BE, Thurm AE, McMahon SD, Gipson PY. Stressors and child and adolescent psychopathology: Measurement issues and prospective effects. *Journal of Clinical Child and Adolescent Psychology* 2004;33:412–425. [PubMed: 15136206]
- Hasking PA. Reinforcement sensitivity, coping, and delinquent behaviour in adolescents. *Journal of Adolescence* 2007;30:739–749. [PubMed: 17178154]
- Horton EG. Racial differences in the effects of age of onset on alcohol consumption and development of alcohol-related problems among males from mid-adolescence to young adulthood. *Journal of Ethnicity in Substance Abuse* 2007;6(1):1–13. [PubMed: 17430813]
- Jose PE, Ratcliffe V. Stressor frequency and perceived intensity as predictors of internalizing symptoms: Gender and age differences in adolescence. *New Zealand Journal of Psychology* 2004;33(3):145–154.
- Keenan-Miller D, Hammen CL, Brennan PA. Health Outcomes Related to Early Adolescent Depression. *Journal of Adolescent Health* 2007;41:256–262. [PubMed: 17707295]
- Khantzian EJ. The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry* 1985;142:1259–1264. [PubMed: 3904487]
- Klomek AB, Sourander A, Kumpulainen K, Piha J, Tamminen T, Moilanen I, Almqvist F, Gould MS. Childhood bullying as a risk for later depression and suicidal ideation among Finnish males. *Journal of Affective Disorders* 2008;109:47–55. [PubMed: 18221788]
- Kolip P. Gender differences in health status during adolescence: A remarkable shift. *International Journal of Adolescent Medicine and Health* 1997;9:9–17.

- Kurtz, PD.; Giddings, MM.; Sutphen, R.; Gill, K.; Martin, J. Georgia's juvenile justice system: A prospective study of racial disparity. Research report to the Georgia Children and Youth Coordinating Council; Atlanta, GA: 1991.
- Larson R, Ham M. Stress and 'storm and stress' in early adolescence: The relationship of negative events with dysphoric affect. *Developmental Psychology* 1993;29:130–140.
- Laurent J, Catanzaro SJ, Joiner TE, Rudolph KD, Potter KI, Lambert S, Osborne L, Gathright T. A measure of positive and negative affect for children: Scale development and preliminary validation. *Psychological Assessment* 1999;11:326–338.
- Lengua LJ, West SG, Sandler IN. Temperament as a predictor of symptomatology in children: Addressing contamination of measures. *Child Development* 1998;69:164–181. [PubMed: 9499565]
- Lejuez CW, Aklin WM, Zvolensky MJ, Pedulla CM. Evaluation of the Balloon Analogue Risk Task (BART) as a predictor of adolescent real-world risk-taking behaviours. *Journal of Adolescence* 2003;26:475–479. [PubMed: 12887935]
- Lejuez CW, Aklin W, Daughters S, Zvolensky M, Kahler C, Gwadz M. Reliability and validity of the youth version of the Balloon Analogue Risk Task (BART-Y) in the assessment of risk-taking behavior among inner-city adolescents. *Journal of Clinical Child and Adolescent Psychology* 2007;36:106–111. [PubMed: 17206886]
- Lejuez CW, Daughters SB, Danielson CW, Ruggiero K. The Behavioral Indicator of Resiliency to Distress (BIRD). 2006Unpublished manual
- Lejuez CW, Kahler CW, Brown RA. A modified computer version of the Paced Auditory Serial Addition Task (PASAT) as a laboratory-based stressor. *The Behavior Therapist* 2003;26(4):290–293.
- Lewinsohn PM, Gotlib IH, Lewinsohn M, Seeley JR, Allen NB. Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology* 1998;107:109–117. [PubMed: 9505043]
- Loeber R, Farrington DP, Stouthamer-Loeber M, Moffitt T, Caspi A. The development of male offending: Key findings from the first decade of the Pittsburgh Youth Study. *Studies in Crime and Crime Prevention* 1998;7:141–172.
- Ludwig J, Duncan GJ, Hirschfield P. Urban poverty and juvenile crime: Evidence from a randomized housing-mobility experiment. *The Quarterly Journal of Economics* 2001;116:655–679.
- Marcotte D, Fortin L, Potvin P, Papillon M. Gender differences in depressive symptoms during adolescence: Role of gender-typed characteristics, self-esteem, body image, stressful life events, and pubertal status. *Journal of Emotional and Behavioral Disorders* 2002;10(1):29–43.
- McMahon SD, Grant KE, Compas BE, Thurm AE, Ey S. Stress and psychopathology in children and adolescents: Is there evidence of specificity? *Journal of Child Psychology and Psychiatry and Allied Disciplines* 2003;44:107–133.
- Metcalfe J, Mischel W. A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review* 1999;106:3–19. [PubMed: 10197361]
- Morris EP, Stewart SH, Ham LS. The relationship between social anxiety disorder and alcohol use disorders: A critical review. *Clinical Psychology Review* 2005;25:734–760. [PubMed: 16042994]
- Myers MG, Aarons GA, Tomlinson K, Stein M. Social anxiety, negative affectivity, and substance use among high school students. *Psychology of Addictive Behaviors* 2003;17:277–283. [PubMed: 14640823]
- Nasim A, Belgrave FZ, Jagers RJ, Wilson KD, Owens K. The moderating effects of culture on peer deviance and alcohol use among high-risk African-American adolescents. *Journal of Drug Education* 2007;37(3):335–363. [PubMed: 18047186]
- Neumark-Sztainer D, Story M, Dixon LB, Murray DM. Adolescents engaging in unhealthy weight control behaviors: Are they at risk for other health-compromising behaviors? *American Journal of Public Health* 1998;88:952–955. [PubMed: 9618628]
- Oland AA, Shaw DS. Pure versus co-occurring externalizing and internalizing symptoms in children: The potential role of socio-developmental milestones. *Clinical Child and Family Psychology Review* 2005;8:247–270. [PubMed: 16362255]
- Peterson PL, Hawkins JD, Abbott RD, Catalano RF. Disentangling the effects of parental drinking, family management, and parental alcohol norms on current drinking by Black and White adolescents. *Journal of Research on Adolescence* 1994;4(2):203–227.

- Rothbart, MK.; Bates, JE. Temperament. In: Damon, W.; Eisenberg, N., editors. Handbook of child psychology. Vol 3. Social, emotional, and personality development. New York: Wiley; 1998. p. 105-176.
- Quinn EP, Brandon TH, Copeland AL. Is task persistence related to smoking and substance abuse? The application of learned industriousness theory to addictive behaviors. *Experimental & Clinical Psychopharmacology* 1996;4(2):186–190.
- Rinehart CS, Bridges LJ, Sigelman CK. Differences between Black and White elementary school children's orientations toward alcohol and cocaine: A three-study comparison. *Journal of Ethnicity in Substance Abuse* 2006;5:75–102. [PubMed: 17135169]
- Sampson RJ, Morenoff JD, Raudenbush S. Social anatomy of racial and ethnic disparities in violence. *American Journal of Public Health* 2005;95(2):224–231. [PubMed: 15671454]
- Schneiders J, Nicolson NA, Berkhof J, Feron FJ, van Os J, deVries MW. Mood reactivity to daily negative events in early adolescence: Relationship to risk for psychopathology. *Developmental Psychology* 2006;42:543–554. [PubMed: 16756444]
- Sourander A, Jensen P, Davies M, Niemelä S, Elonheimo H, Ristkari T, Helenius H, Sillanmäki L, Piha J, Kumpulainen K, Tamminen T, Moilanen I, Almqvist F. Who is at greatest risk for adverse long-term outcomes? The Finnish From a Boy to a Man study. *Academy of Child & Adolescent Psychiatry* 2007;46:1148–1161.
- Vassallo S, Smart D, Sanson A, Dussuyer I, McKendry B, Toumbourou J, Prior M, Oberklaid F. Patterns and precursors of adolescent antisocial behaviour (First report). 2002Report commissioned by Crime Prevention Victoria
- Wade TJ, Cairney J, Pevalin DJ. Emergence of gender differences in depression during adolescence: National panel results from three countries. *Journal of the American Academy of Child and Adolescent Psychiatry* 2002;41:190–198. [PubMed: 11837409]
- Wallace JM, Muroff JR. Preventing substance abuse among African American children and youth: Race differences in risk factor exposure and vulnerability. *Journal of Primary Prevention* 2002;22(3):235–261.
- Weinberg DA, Bartholomew K. Social-emotional adjustment and patterns of alcohol use among young adults. *Journal of Personality* 1996;64:495–527. [PubMed: 8656325]
- Wight RG, Aneshensel CS, Botticello AL, Sepúlveda JE. A multilevel analysis of ethnic variation in depressive symptoms among adolescents in the United States. *Social Science & Medicine* 2005;60(9):2073–2084. [PubMed: 15743655]
- Wills TA, Ainette MG, Mendoza D, Gibbons FX, Brody GH. Self-control, symptomatology, and substance use precursors: Test of a theoretical model in a community sample of 9-year-old children. *Psychology of Addictive Behaviors* 2007;21(2):205–215. [PubMed: 17563140]
- Zeitlin, H. Continuities of childhood disorders into adulthood. In: Reder, P.; McClure, M.; Jolley, A., editors. *Family matters: Interfaces between child and adult mental health*. New York, NY, US: Routledge; 2000. p. 21-37.

Figure 1. Distress tolerance, ethnicity, and past year alcohol use

* Caucasian; $\chi^2(2) = 6.43, p < .05$

Figure 2. Distress tolerance, ethnicity, and past year delinquent behavior

* African American; $F(1,104) = 9.69, p < .01$

Figure 3. Distress tolerance, gender, and internalizing symptoms

* Female; $F(1,104) = 5.05, p < .05$

Table 1
Ordinal Logistic Regression Predicting Past Year Alcohol Use

Predictor	B	SE (B)	Wald / χ^2	OR	95% CI
Step 1					
***			20.6		
Income**	0.56	0.19	8.28	1.75	1.20 2.56
Ethnicity	0.40	0.33	1.48	1.49	0.78 2.86
Distress Tolerance	-0.52	0.30	2.89	0.59	0.33 1.08
Step 2					
***			25.0		
Income**	0.63	0.20	9.56	1.88	1.26 2.80
Ethnicity	-0.35	0.48	0.53	0.70	0.27 1.82
Distress Tolerance**	-1.00	0.39	6.69	0.37	0.17 0.79
DT X Ethnicity*	1.33	0.64	4.30	3.78	2.05 13.33

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 2
Hierarchical Linear Regression Predicting Past Year Delinquent Behavior

Predictor	B	ΔR^2	F	sr^2	95% CI
Step 1 ^{**}		0.04	5.00		
Ethnicity [*]	0.54			0.02	0.04 1.04
Distress Tolerance [*]	0.59			0.02	0.95 1.09
Step 2 [*]		0.02	5.25		
Ethnicity	-0.06			0.00	-0.76 0.65
Distress Tolerance	0.06			0.00	-0.61 0.72
DT × Ethnicity [*]	1.18			0.02	0.20 2.17

* $p < .05$;
** $p < .01$

Table 3
Hierarchical Linear Regression Predicting Past Year Internalizing Symptoms

Predictor	B	ΔR ²	F	sr ²	95% CI
Step 1 ^{**}		0.04	4.00		
Age [*]	-3.00			0.02	-5.34 -0.66
Gender	3.01			0.01	-1.43 7.44
Distress Tolerance	4.17			0.01	-0.25 8.59
Step 2 [*]		0.02	4.20		
Age [*]	-3.00			0.02	-5.28 -0.63
Gender	-1.76			0.00	-7.96 4.44
Distress Tolerance	-0.13			0.00	-6.03 5.76
DT × Gender [*]	9.64			0.02	0.83 18.45

* $p < .05$;

** $p < .01$