The Role of Gender and Race in the Relation between Adolescent Distress Tolerance and Externalizing and Internalizing Psychopathology

Stacey B. Daughters[a], **Stephanie M. Gorka**[b], **Jessica F. Magidson**[c], **Laura MacPherson**[d], and **C.J. Seitz-Brown**[d]

[a]Department of Psychology, University of North Carolina-Chapel Hill [b]Department of Psychology, University of Illinois – Chicago [c]Massachusetts General Hospital/Harvard Medical School [d]Department of Psychology, University of Maryland

Abstract

Distress tolerance (DT) is an established construct contributing to the onset and maintenance of psychopathology in adulthood; however, few studies have examined the role of DT in older adolescent psychopathology. Emerging data suggest that gender and race may influence this relation. Therefore, the current study examined the relation between gender, race, and DT on parent-reported internalizing and externalizing DSM-oriented symptoms among a community sample of 128, 14 to 18 year old adolescents. Results indicated a moderating effect of gender on affective problems, such that females with low DT, but not males, displayed significantly greater affective problems. Findings also indicated a significant moderating effect of race, such that Caucasians with low DT, but not African Americans, displayed significantly higher somatic, oppositional defiant, and conduct problems. These findings suggest that DT is an important clinical variable in older adolescence, particularly among Caucasians and females.

Introduction

Externalizing and internalizing symptomatology often emerge in the adolescent period (Steinberg et al., 2006), and are associated with functional impairment, increased risk for severe psychopathology, poor health outcomes, and reduced psychosocial functioning in adulthood (Colman, Wadsworth, Croudace, & Jones, 2007; de Wit, Adlaf, Offord, & Ogborne, 2000; Steinberg et al., 2006). Adolescence, in particular, has been identified as a critical period for the development of psychopathology, as individuals experience numerous transitions including changes in one's social context and pubertal development. These rapid

Correspondence: Stacey B. Daughters, Ph.D. 247 Davie Hall Department of Psychology University of North Carolina-Chapel Hill Chapel Hill, NC 27599 daughter@unc.edu.

developmental changes, alongside other normative stressors, often result in increased negative affect and few resources to regulate these emotions, which precipitates the onset of psychopathology (King & Chassin, 2008; Sontag, Graber, Brooks-Gunn, & Warren, 2008). Importantly, however, not all adolescents experience these adverse consequences in response to distress, suggesting that there are key individual difference factors underlying the relation between response to negative affect and psychopathology within adolescents.

Negative Reinforcement Framework

Negative affect, and particularly one's response to negative affect, is a central focus of negative reinforcement-based models of behavior. Negative reinforcement models emphasize that the motivational basis for much of behavior is to escape or avoid negative affective states. Although these models have been most commonly applied to understanding substance use behaviors (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004), recent evidence suggests that negative reinforcement may play a critical role in multiple forms of psychopathology (Eissenberg, 2004; Daughters et al., 2009; MacPherson et al., 2010a). More specifically, in response to negative affect, individuals have been shown to escape or avoid distress via both internal (e.g., isolation, worry) and external coping techniques (e.g., substance use, aggression), which similarly provide relief, thereby reinforcing the behavior and increasing the likelihood of using these techniques in the future (Glick & Orsillo, 2011). Over time, the reliance on these avoidance-based strategies are thought to contribute to the onset or worsening of internalizing and externalizing symptoms (Abrantes et al., 2008; Ellis, Fischer, & Beevers, 2010; Schmidt, Rickey, & Fitzpatrick, 2006).

One way to assess an individual's propensity to engage in behaviors motivated by negative reinforcement is to examine distress tolerance (DT), defined as the ability to persist in goal-directed behavior while experiencing affective distress. Over the past decade there have been marked advancements in the conceptualization and measurement of DT, including the development of behavioral tasks designed to serve as a proxy for negative reinforcement-based responding and self-report measures which capture individuals' perceived ability to tolerate distress (Leyro, Zvolensky, & Bernstein, 2010). Using these measures, DT has been shown to be associated with numerous pathological behaviors and diagnoses including substance use (Brandon et al., 2003; Quinn, Brandon, & Copeland, 1996), borderline personality disorder (Bornovalova et al., 2008), depression (Buckner, Keough, & Schmidt, 2007), and eating disorders (Anestis, Selby, Fink, & Joiner, 2007).

Role of Distress Tolerance in Adolescent Psychopathology

Although accumulating evidence indicates that DT is an important factor underlying psychopathology in adults, relatively few studies have examined these relations in adolescents. Importantly, however, there have been a few recent exceptions, which have corroborated the adult literature and suggested that low DT is related to both internalizing and externalizing adolescent symptomatology. For instance, in a large community sample of individuals ages 9-13, Daughters and colleagues (2009) demonstrated that low DT was associated with an increased risk for alcohol use among Caucasians, greater delinquent risk behaviors among African Americans, and elevated internalizing symptoms among females. In addition, MacPherson et al. (2010a) examined the interactive effects of positive and

negative reinforcement-based processes on risk-taking among early adolescents and found that increased risk taking propensity was associated with engagement in real-world risk behaviors, but only among adolescents with low DT. In one of the most direct examinations of the role of DT in adolescent psychopathology to date, Cummings and colleagues (2013) conducted a 4-year longitudinal study among early adolescents and found low DT to be cross-sectionally associated with both internalizing and externalizing symptoms, yet to prospectively only predict externalizing symptoms at the 4 year follow-up. It is important to note that this study also reported that individual differences in DT were relatively stable over the course of adolescence, with little mean or individual-level changes, which is consistent with extant conceptualizations of DT as a trait-like mechanism. Taken together, the existing literature highlights the clinical importance of DT in adolescent psychopathology, but also indicates that there may be key moderators influencing the association as DT has been shown to be a more robust predictor of psychiatric symptoms within certain subgroups.

Gender and Race as Moderators

Two factors that may potentially influence the relation between DT and internalizing and externalizing symptoms are gender and race. First, several studies have documented that males and females differ in their levels of DT (MacPherson, Stipelman, Duplinsky, Brown, & Lejuez, 2008; Simons & Gaher, 2005; Bornovalova et al., 2008), and rates of internalizing and externalizing psychopathology (Grant et al., 2004; Kessler et al., 1994). Empirical evidence suggests that adolescent females are more likely to cope with distress using negative self-evaluation and rumination (Galaif, Sussman, Chou, & Wills, 2003; Hankin & Abramson, 2001; Piko, 2001), whereas adolescent males are more likely to cope by engaging in risk behaviors such as substance use and delinquency (Achenbach, 1991; Hankin, Mermelstein, & Roesch, 2007). It is further thought that these differences in managing affective distress contribute to gender differences in the prevalence of psychiatric disorders, such that adolescent females' internal responses cause them to be vulnerable to internalizing psychopathology, while adolescent males' external responses increase their propensity for externalizing psychopathology (Compas, Orosan, & Grant, 1993; Hankin et al., 2007). Consistent with this literature, Daughters et al. (2009) found that within adolescent females, low DT was associated with increased internalizing symptoms, but that within adolescent males, there was no relation between DT and internalizing symptoms. Moreover, Cummings et al. (2013) reported that there was a stronger relationship between distress tolerance and anxiety symptoms in early adolescent girls; however, gender was unrelated to the relationship between DT and externalizing symptoms. These findings, coupled with the aforementioned literature, underscore the need to for further investigation on the role of gender in the relation between DT and adolescent psychopathology, with a particular need to examine more specific facets of internalizing and externalizing symptoms.

Accumulating evidence also indicates that there are important racial/ethnic differences in responses to stress (Chapman & Mullis, 2000; Treiber et al., 1990) and the manifestation and prevalence of adolescent psychopathology (Austin & Chorpita, 2004; Kistner, David, & White, 2003; Roberts & Chen, 1995). Several studies have shown that Caucasian adolescents are more likely to engage in alcohol use than their same-aged African American

peers (Blum et al., 2000; Broman, 2007), and consequently have more alcohol related problems (Horton, 2007). These racial differences in alcohol use are not well understood but have been postulated to reflect more liberal drinking attitudes and lower religiosity in Caucasians relative to other racial groups (Brown, Parks, Zimmerman, & Phillips, 2001; Caetano & Clark, 1999; Herd, 1997). Meanwhile, data indicate that African American adolescents exhibit higher rates of aggression (Buka, Stichick, Birdthistle, & Earls, 2001; Laird, Pettit, Dodge, & Bates, 2005) and delinquent behaviors (Lynne-Landsman, Graber, Nichols, & Botvin, 2011), which may be due to cultural differences in the value of confrontation and assertiveness (Dodge, 2006; Harris & Majors, 1993). Recent data also highlight the importance of considering both race and gender, as one study demonstrated that African American adolescent males exhibited higher levels of aggressive behavior, physiological anxiety symptoms, and disordered eating relative to White and Hispanic males (McLaughlin, Hilt, & Nolen-Hoeksema, 2007), while Hispanic adolescent females had higher levels of depression, anxiety, and passive aggression compared with all other groups. In contrast to externalizing symptoms, research on racial differences in the prevalence of internalizing symptoms has yielded some mixed results, although a large number of studies have found that African American adolescents have increased internalizing symptoms relative to Caucasian adolescents (Kistner et al., 2003; Kistner, David-Ferdon, Lopez, & Dunkel, 2007; Lewis, Byrd, & Ollendick, 2012).

To date, the mechanisms underlying these racial differences are unclear. However, a converging body of evidence suggests that exposure to stressors and subsequent coping responses play an important role. For instance, several theories on racial disparities in mental and physical health outcomes posit that African Americans are more likely to experience chronic perceived stress (e.g., racism, lower socio-economic position), and have fewer environmental resources available to cope with negative affect, which subsequently impacts psychiatric symptoms (Clark, Anderson, Clark, & Williams, 1999; Kim, 2013). Given differences in daily stressors and coping resources, it is plausible that low DT may manifest differently in African American and Caucasian adolescents. Consistent with this hypothesis, Daughters et al. (2009) found that race moderated the association between DT and psychiatric symptoms in early adolescence, such that low DT was associated with an increased risk for alcohol use only among Caucasians and greater delinquent risk behaviors only among African Americans. These findings, however, have yet to be replicated or examined in an older adolescent population (i.e., individuals past the age of 13 years), which is noteworthy given that age has been shown to moderate the relation between race and psychiatric symptoms within adolescents (Franko et al., 2005).

Factors Associated with Adolescent Psychopathology

Several other factors are also known to influence adolescent psychopathology. Individual differences in sensation seeking and exposure to deviant behavior in one's neighborhood are two such factors that have been shown to confer risk for multiple internalizing and externalizing disorders. More specifically, evidence indicates that there is a rise in sensation seeking during adolescence (Romer & Hennessy, 2007), which is associated with an increase in depressive symptoms, suicide ideation and attempts, substance use, and risk taking behaviors (Arnett, 1996; Ortin, Lake, Kleinman, & Gould, 2012; MacPherson,

Magidson, Reynolds, Kahler, & Lejuez, 2010b). Further, adolescent exposure to community criminal behavior and violence has been linked to a wide range of emotional and behavioral problems including depression, post-traumatic stress disorder, anxiety, and aggression (Cooley-Quille, Boyd, Frantz, & Walsh, 2001; Gorman-Smith & Tolan, 1998; O'Keefe, 1997). Given that these risk factors have a robust association with adolescent psychopathology, it is important to attempt to account for the impact of these individual differences factors on internalizing and externalizing symptoms when examining the relations between DT, race, gender, and adolescent psychopathology.

The Current Study

Taken together, the adult literature indicates that DT is an important clinical variable and is related to internalizing and externalizing psychopathology. However, relatively few studies have explored these relations in adolescent samples and there has been a dearth of research in older adolescents, who are likely to endorse a wider range of symptoms (Hicks et al., 2007; Last, Perrin, Hersen, & Kazdin, 1992). Previous investigations have also rarely examined symptomatology that maps onto Diagnostic and Statistical Manual of Mental Disorder, Fourth edition (DSM-IV) criteria, an avenue of research which may provide valuable clinical insights. Lastly, emerging evidence indicates that gender and race are potential key moderators of the association between DT and adolescent psychopathology; however, there is a need for further investigation and replication of earlier findings. As such, the primary aim of the current study was to examine the relation between DT and parent-reported internalizing and externalizing psychopathology among a community sample of middle to older adolescents (i.e., 14-18 years), and to explore whether gender and race moderated these relationships. Given the role of adolescent sensation seeking and exposure to deviant behavior in one's neighborhood, these variables were included as covariates in the current study. Based on previous findings, we hypothesized that low DT would be associated with internalizing psychopathology among females and externalizing psychopathology among males. We also hypothesized that low DT would be related to more externalizing psychopathology in African American adolescents relative to Caucasians. The effect of race on internalizing psychopathology, however, was considered to be exploratory.

Method

Participants

A total of 161 adolescents were recruited via newspaper advertisements and letters sent to parents/guardians of all high school students within the local county seeking participants for a larger study examining the relationship between adolescence and stress (recruitment response rate = 40%). Inclusion criteria for the larger study included adolescents between the ages of 14-18, participation of a parental guardian, English speaking, and the ability of both the adolescent and parental guardian to provide informed assent/consent. The racial/ethnic background of the full sample was in-line with the US Census Bureau statistics for the area the sample was drawn from (i.e., Prince George's County, Maryland, USA; U.S. Bureau of the Census et al., 2010), and included 53.4% African American, 26.1% Caucasian, 5.0% Hispanic/Latino, 2.5% Native American, and 13.0% Asian. Given the distribution of racial/ethnic background, we were only able to test differences between

African American and Caucasian adolescents in the present study with adequate statistical power. Members of other groups were therefore excluded from the current study. The final sample included 128 adolescents (53.1% female; 67.2% African American/32.8% Caucasian) and their primary caregiver (85.2% biological mother). Adolescents ranged in age from 14 to 18 ($M = 16.1$, $SD = 1.0$) while caregivers ranged in age from 32 to 59 ($M = 48.6$, $SD = 7.3$). The mean annual household income was $87,300 ($SD = $46,400).

Procedure

Upon arrival to the testing session, parents/guardians and adolescents provided written informed consent and assent, respectively. All aspects of the study and the consent/assent forms were approved by the University Institutional Review Board. Following informed consent, guardians and adolescents separately completed a battery of self-report measures and a computerized behavioral DT task, the *Paced Auditory Serial Addition Task* (PASAT-C; Lejuez, Kahler, & Brown, 2003). Before and after the PASAT-C, participants provided self-report mood ratings to assess changes in affective distress. Compensation for participation consisted of $40 cash for parents/guardians and $25 in gift cards for adolescents. For the current study, adolescents self-reported sensation seeking and exposure to deviant behavior in one's neighborhood, while parents provided data on demographic information and current adolescent internalizing and externalizing symptoms.

Distress Tolerance

The *Computerized Paced Auditory Serial Addition Task* (PASAT-C; Lejuez et al., 2003) was administered to assess DT. As described in detail elsewhere (e.g., Daughters et al., 2009; MacPherson et al., 2010a), the PASAT-C has been shown to reliably increase participant distress levels and has repeatedly been used as a behavioral measure of DT among adolescent samples. Following multiple levels of stress exposure on the task, during the final level participants are given the option to terminate the task at any time by clicking on a "Quit" button in the upper left hand corner of the screen, yet they are told that their performance on the task determines the magnitude of their payment at the end of the session. Participants rate their level of anxiety, frustration, difficulty concentrating, physical discomfort, and irritability on a scale from 1 indicating "none" to 100 indicating "extreme." Ratings are made prior to the final level of the task to prevent any confounds associated with termination latency. Ratings from each of the mood scales are averaged to create a composite pre- and post-stress affective distress score.

Using the PASAT-C, DT can be conceptualized as either a continuous (i.e., latency to task termination) or dichotomous (i.e., quit the task vs. did not quit the task) variable. A Shapiro-Wilk test (Shaprio & Wilk, 1965) indicated that task termination was not normally distributed in the current sample ($z_{skew} = -1.42$, $z_{kurtosis} = 0.36$, $p < .001$). Therefore, DT is best represented as a dichotomous variable, which is consistent with numerous prior studies that have used the PASAT-C (Anestis, Gratz, Bagge, & Tull, 2012; Gorka, Ali, & Daughters, 2012; Schloss & Haaga, 2011; Tull, Gratz, Coffey, Weiss, & McDermott, 2012). Specifically, individuals who persisted the entire 7 minutes during the final level of the task were categorized as "high DT" and those who terminated the task in less than 7 minutes were categorized as "low DT."

Internalizing and Externalizing Symptoms

The *Child Behavior Checklist* (Achenbach & Rescorla, 2001) is a parent self-report questionnaire assessing behavioral and emotional problems in 6-18 year old children and adolescents. Parents rate their children on 112 items using a 3-point scale (0 = not true, 1 = somewhat or sometime true, 2 = often true). The CBCL is used to identify specific problems as well as syndromes (i.e., clusters of problematic behaviors that occur together; Achenbach & Rescorla, 2001). The current study included six DSM-oriented scales including three internalizing problem scales (i.e., Affective, Anxiety, Somatic) and three externalizing problem scales (i.e., Attention Deficit/Hyperactivity, Oppositional Defiant, Conduct). Cronbach's alpha coefficients ranged from α = .71 (Affective Problems) to .91 (Conduct Problems) on the DSM-oriented scales in the current sample [Note: there were no significant differences in alpha coefficients between African Americans and Caucasians]. Scores for the CBCL DSM-oriented scales were derived using age and gender based T-scores. A T-score of 50 indicates average functioning relative to same age and gender peers. Scores of 64 or above are in the clinical range and scores of 60-63 are considered borderline clinical (Achenbach & Rescorla, 2001; Achenbach, 1991).

Potential Covariates

Demographic information including age, gender, race, and annual household income (parent-report) were collected for each participant via self-report. Sensation seeking was assessed using the 40-item true-false self-report *Sensation Seeking Scale* (SSS; Zuckerman, 1994). In addition to a total score, the SSS includes four subscales: Thrill and Adventure Seeking (SSS-TAS), Experience Seeking (SSS-ES), Disinhibition (SSS-DIS), and Boredom Susceptibility (SSS-BS). Reliability of each of the subscales in the current sample was good (α's = .72 - .79). The *Neighborhood Environment Scale* (NES; Elliot, Huizinga, & Ageton, 1985) was used to assess exposure to deviant behavior in the neighborhood. Deviant behavior includes violent crime, drug use and sales, racism, and prejudice. Total scores range from 0 to 18 with higher scores indicating greater levels of exposure and neighborhood disadvantage. Reliability in the current sample was also good (α = .76).

Data Analysis Plan

Analyses were conducted with the CBCL DSM-oriented scales as the primary dependent variables. DT was coded dichotomously as 0 = high DT (i.e., those who persist the entire 7 minutes) and 1 = low DT (i.e., those who terminate the task in less than 7 minutes). Baseline demographic variables, sensation seeking subscales, and exposure to deviant behavior in the neighborhood were first examined for univariate associations with each of the CBCL DSM-oriented scales. If any of these variables were significantly associated with the dependent variables, then they were included as covariates in subsequent hierarchical linear regression analyses. The main effects of DT, gender, and race, as well as the moderating effects of gender and race were examined in linear regression analyses with CBCL DSM-oriented scales as the dependent variable. Significant interactions were followed-up using two separate *post-hoc* linear regression analyses at each level of the moderator (i.e., males vs. females, or Caucasians vs. African Americans; Holmbeck, 2002). All previously identified covariates were included in the follow-up analyses.

Results

Distress Tolerance

Participants with high DT ($n = 87$) persisted on the PASAT-C for the entire 420 seconds, whereas participants with low DT ($n = 41$) persisted on the PASAT-C for an average of 156.0 seconds ($SD = 139.4$). Paired t-tests indicated a significant increase in self-reported distress during the PASAT-C [$t(1, 142) = -7.2$, $p < .001$], and a repeated measures ANOVA indicated that there was no relationship between DT and change in affective distress from pre to post task [$F(1, 142) = 2.1$, $p > .05$].

Identification of Covariates

Means for the entire sample, as well as intercorrelations for the continuous IVs (i.e., age, income, SSS, and NES) and DVs (i.e., CBCL scales) are presented in **Table 1**. The oppositional defiant and conduct problem scales were positively associated with SSS-DIS and SSS-BS, the affective problem scale was positively associated with SSS-BS, and the anxiety problems scale was positively associated with age and NES total scores.

Independent samples t-tests were conducted to examine the association of the dichotomous IVs (e.g., gender, race, DT) with study variables. Neither gender nor race were significantly associated with the CBCL scales (all p's > .12). DT was not associated with adolescent age, household income, SSS-DIS, SSS-BS, SSS-ES, or NES scores (all $p's$ > .14). However, low DT was significantly associated with greater SSS-TAS scores [$t(1, 127) = 2.48$, $p < .05$], and greater CBCL somatic problems [$t(1, 127) = 2.01$, $p < .05$].

Hierarchical Regression Analyses

Table 2 displays mean CBCL DSM-oriented problem scores for adolescents with low and high DT by race and gender. Hierarchical linear regression analyses predicting each CBCL DSM-oriented scale are presented in **Table 3**. Significant covariates for each CBCL DSM-oriented scale, gender, ethnicity, and DT were entered in Step 1; and the two interaction terms were entered in the 2nd and final step. As illustrated in **Figure 1**, procedures outlined by Aiken and West (1991) were then used to identify the simple slopes of significant interaction terms. Of note, higher order (i.e., 3-way) interactions were tested but were non-significant; therefore only 2-way interactions are reported.

Affective problems—Step 1 (race, gender, DT, SSS-BS) contributed significantly to the regression model [$F(4, 118) = 2.51$, $p< .05$], with greater SSS-BS significantly associated with greater affective problems. Introducing the interaction terms provided a significant increase in variance [$F(2, 116) = 3.10$, p < .05], with the DT × Gender interaction significantly associated with affective problems. Follow-up analyses indicated that low DT was associated with higher scores on the affective problems scale among females ($B = 3.45$, $SE = 1.59$, $sr^2 = .07$, $p = .03$), but not males (**Figure 1a**).

Anxiety Problems—Step 1 (race, gender, DT, age, NES) contributed significantly to the regression model [$F(5, 117) = 3.27$, $p< .01$], with age positively associated with anxiety

problems. Introducing the interaction terms did not provide a significant increase in variance [F (2, 115) = 2.12, $p > .05$].

Somatic Problems—Step 1 (race, gender, DT) did not contribute significantly to the regression model [F (3, 123) = 2.20, $p > .05$]. Introducing the interaction terms provided a significant increase in variance [F (2, 121) = 4.52, $p < .01$], with the DT × Race interaction significantly associated with somatic problems. Follow-up analyses indicated that low DT was associated with higher scores on the somatic problems scale among Caucasians ($B = 5.53$, $SE = 2.01$, $sr^2 = .16$, $p < .01$), but not African Americans (**Figure 1b**).

Attention Deficit/Hyperactivity Problems—Step 1 (race, gender, DT, SSS-BS) did not contribute significantly to the regression model [F (4, 118) = 2.2, $p > .05$), and introducing the interaction terms did not provide a significant increase in variance [F (2, 116) = 0.91, $p > .05$].

Oppositional Defiant Problems—Step 1 (race, gender, DT, SSS-DIS, SSS-BS) contributed significantly to the regression model [F (5, 117) = 3.92, $p < .01$], with greater SSS-DIS and SSS-BS significantly associated with more oppositional defiant (OD) problems. Introducing the interaction terms provided a significant increase in variance [F (2,121) = 4.52, $p < .01$], with the DT × Race interaction significantly related to OD problems. Follow-up analyses indicated that low DT was associated with higher scores on the OD problems scale among Caucasians ($B = 5.55$, $SE = 1.76$, $sr^2 = .18$, $p < .01$), but not African Americans (**Figure 1c**).

Conduct Problems—Step 1 (race, gender, DT, SSS-DIS, SSS-BS) contributed significantly to the regression model [F (5, 117) = 3.36, $p < .01$], with greater SSS-DIS and SSS-BS significantly associated with more conduct problems. Introducing the interaction terms provided a significant increase in variance [F (2, 115) = 3.56, $p < .05$], with the DT × Race interaction significantly related to conduct problems. Follow-up analyses indicated that low DT was associated with higher scores on the conduct problems scale among Caucasians ($B = 6.39$, $SE = 1.84$, $sr^2 = .21$, $p < .001$), but not African Americans (**Figure 1d**).

Discussion

Research indicates that DT is an important factor underlying adult psychopathology (Leyro et al., 2010). However, few studies have examined the role of DT in middle to late adolescence – a critical developmental period marked by increases in negative affect and psychiatric symptoms (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Further, emerging evidence suggests that gender and race may influence the relation between DT and adolescent psychopathology, yet little data exists on the roles of these important demographic factors. Therefore, the aim of the current study was to examine gender and race as moderators of the relationship between a behavioral measure of DT and internalizing and externalizing psychopathology, while controlling for individual differences in sensation seeking and exposure to deviant behavior in one's neighborhood, in a sample of older adolescents.

Distress Tolerance and Gender

In the current study, gender moderated the relationship between DT and the affective problems scale of the CBCL, such that low levels of DT predicted higher affective problems only among females. This is consistent with a large body of evidence suggesting that in response to negative affect, females are more likely to cope via internal strategies such as rumination and isolation (Copeland & Hess, 1995), which can precipitate the onset of affective problems (Compas et al., 1993; Hankin et al., 2007). Notably, adolescent females with low DT appear to be at the highest risk for these affective problems, possibly due to greater reliance on these avoidance-based internal strategies to alleviate their negative affective states.

It is interesting to note that gender did not moderate the relationship between DT and anxiety or somatic problems. This is somewhat surprising considering the findings from Cummings et al. (2013) and that gender has been found to moderate the association between stress and internalizing symptoms more broadly (Galaif et al., 2003). Given that internalizing symptomatology is heterogeneous, it is possible that DT is more robustly associated with certain facets of internalizing symptoms within older adolescent females. More specifically, the current findings suggest that low DT may be uniquely related to aspects of internalizing psychopathology that are captured by the affective problems subscale of the CBCL, which include self-harm and talking about suicide, guilt, worthlessness, and vegetative sleep and appetite symptoms. Interesting, these particular internalizing symptoms have also been shown to be more common in females than males (Bennett, Ambrosini, Kudes, Metz, & Rabinovich, 2005; Hawton, 2000; Lewinsohn, Rohde, Seeley, & Baldwin, 2001; Silverstein, 1999; 2002; Wenzel, Steer, & Beck, 2005). Thus, it is possible that low DT is specifically related to internalizing psychopathology that is characteristic of depression among adolescent females.

The present findings also indicated that there were no main effects of DT or DT by gender interactions on any of the externalizing subscales of the CBCL. Since prior studies indicate that adolescent males are more likely to engage in external avoidance-based coping strategies that increase the risk for externalizing psychopathology (Achenbach,1991; Hankin et al., 2007), we hypothesized that within males, low DT would be associated with the externalizing subscales. This hypothesis was not supported, suggesting that regardless of DT status or gender, adolescents may exhibit a moderate level of developmentally appropriate externalizing symptoms and behaviors.

Distress Tolerance and Race

Importantly, our findings did indicate that among Caucasian adolescents, lower levels of DT were significantly related to higher rates of oppositional defiant, conduct, and somatic problems. Thus, for Caucasian adolescents, DT may represent a broad risk factor and/or maintenance factor of psychiatric symptomatology. More specifically, an inability or unwillingness to tolerate negative emotional states in adolescence may lead to a variety of adverse coping strategies, which increases immediate and long-term risk for psychopathology (Jaser et al., 2007; Steinhausen, Haslimeier, & Metzke, 2007).

The association between low DT and externalizing symptomatology (i.e., oppositional defiant and conduct problems) among Caucasian adolescents is consistent with a broader literature suggesting that the combined influence of individual differences in self-regulatory capabilities and increased levels of negative affect predicts aggression and delinquency (Deater-Deckard, Petrill, & Thompson, 2007; Sontag et al., 2008), and that externalizing behaviors may function as a means to avoid, alleviate, or regulate aversive affective states (Eftekhari, Turner, & Larimer, 2004; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006; Hasking, 2007; Jakupcak, 2003; Jakupcak, Lisak, & Roemer, 2002; Vassallo et al., 2002). Notably, results indicate that among Caucasians, low DT is associated with greater oppositional defiant and conduct problems, but not ADHD symptoms. Although all three scales are considered to be on the disruptive behaviors spectrum, ADHD is qualitatively different in several ways and has greater overlap with internalizing psychopathology (e.g., symptoms of inattention) than the other two scales. Moreover, research indicates that conduct disorder/oppositional defiant disorder and ADHD represent different risk profiles (Fergusson, Boden, & Horwood, 2010). Therefore, given this pattern of results, low DT may be more robustly associated with delinquency and reward-seeking behaviors that are characteristic of conduct and oppositional defiant problems, relative to symptoms of inattention and hyperactivity characteristic of ADHD. Given the specificity of these findings, the current study therefore expands and clarifies the role of DT in the emergence and maintenance of externalizing psychopathology.

It is important to note that our results indicated that the aforementioned pattern of results was only true for Caucasian adolescents. One potential explanation for these findings is that contextual factors including financial strain, exposure to racial discrimination, parenting practices, behavioral expectancies, and cultural attitudes and messages may be more robust predictors of psychopathology, especially for African American adolescents, and consequently influence the relation between low DT and psychiatric symptoms (Brody et al., 2006; Buu et al., 2009; Chen & Killeya-Jones, 2006; Sellers, Copeland-Linder, Martin, & Lewis, 2006). This is consistent with some prior studies that have demonstrated that risk factors for psychopathology may differ across race as a function of contextual variables (Shih, Miles, Tucker, Zhou, & D'Amico, 2012; Wallace & Muroff, 2002; Widom, Czaja, Wilson, Allwood, & Chauhan, 2013). For instance, parental monitoring and physical parental discipline have been shown to be more related to Caucasians' externalizing symptoms than African Americans' externalizing symptoms, possibly due to cultural differences in parenting norms (Fowler et al., 2009; Larzelere, 2000). The importance of accounting for social and cultural factors may also relate to the discrepant race findings between the current study and Daughters et al., (2009), which found that low DT was associated with greater delinquent risk behaviors in African Americans. As such, there appear to be key contextual variables that significantly influence the relation between low DT and psychopathology and future research is critically needed to examine racial/cultural factors that underlie these associations.

An alternative explanation may be that racial differences in coping strategies impact the relationship between DT and adolescent psychopathology. For example, African American adolescents have been shown to utilize social support, including spiritual, family, and community support, as a means to cope with distress more so than Caucasians (Chapman &

Mullis, 2000; Maton et al., 1996). Given that studies have repeatedly demonstrated that increased social support can attenuate the effects of stress on mental and physical health outcomes (Kessler et al., 1985; Taylor, 2007; Uchino, 2004), it is plausible that increased utilization of social support may buffer African American adolescents from some of the negative outcomes associated with low DT. In light of the race findings from Daughters et al., (2009), it is also possible that age significantly impacts these relationships, as younger adolescents may not have substantial roles in their communities and consequently, are unable to utilize social support to the same extent as older adolescents. As we were unable to test this hypothesis with our data, it will be important for future studies to examine whether social support may impact the relation between race, DT, and psychopathology.

Limitations

The current study has several limitations. First, the study was cross-sectional which limits our ability to infer causality or temporal relations between DT and adolescent psychopathology. As such, future research would benefit from a longitudinal design examining the role of gender and race that spans childhood through young adulthood. Second, our assessment was limited to parent report of adolescent symptomatology, and data indicate that parents may under-report symptoms (Cantwell, Lewinsohn, Rohde, & Seeley, 1997). Future research using a multi-method, multi-informant assessment approach is critical. Third, statistical power limited analyses to Caucasian and African American adolescents. The relatively small sample size may have also limited our ability to detect 3-way interactions between gender, race, and DT. Similarly, it is unclear whether the findings generalize to other ethnic groups and/or adolescents from different socio-economic positions. Fourth, some data have suggested that within African Americans, the CBCL is less internally consistent and exhibits weak convergent validity with parent report scales relative to normative samples (Mano, Davies, Klein-Tasman, & Adesso, 2009). Although our analyses indicated no significant ethnic differences in reliability for any of the CBCL subscales, it is possible that the present findings may be influenced by these racial methodological differences. Lastly, we only had data on two (i.e., sensation seeking and exposure to deviant behavior in one's neighborhood) of the many important covariates that may contribute to the present findings. Future research is therefore necessary to continue to elucidate factors that may mediate and/or moderate the associations between DT and adolescent psychopathology.

Conclusions

Despite these limitations, the current study has several important implications. Most notably, although prior studies have demonstrated a relationship between low DT and psychiatric symptoms, the current pattern of results suggest that these associations may be more nuanced in middle to older adolescents, such that low DT is associated with certain facets of psychopathology (i.e., affective problems, somatic problems, oppositional defiant problems, and conduct problems), within certain subgroups of individuals (i.e., females, Caucasians). Although the precise mechanism underlying the current findings is an open empirical question, Caucasian and female adolescents with low DT may be at-risk groups for certain psychiatric symptoms. Subsequently, treatment programs for these at-risk Caucasians and female adolescents may benefit by directly aiming to increase DT, as research has

demonstrated that intervention programs are most effective when they are targeted to specific vulnerabilities (Nation et al., 2003). There are several existing interventions that may be useful platforms towards this end, including exposure- and mindfulness-based treatment approaches (e.g., Acceptance and Commitment Therapy; Hayes, Luoma, Bond, Masuda, & Lillis, 2006) and Dialectical Behavior Therapy for adolescents (DBT-A; Miller, Rathus, DuBose, Dexter-Mazza, & Goldklang, 2007). In sum, future work is needed to continue to elucidate the complex relationships between DT and psychopathology across gender and race and consider other variables that may also underlie these differences, as this work has promising implications for both treatment and prevention.

References

Abrantes AM, Strong DR, Lejuez CW, Kahler CW, Carpenter LL, Price LH, Niaura R, Brown RA. The role of negative affect in risk for early lapse among low distress tolerance smokers. Addictive Behaviors. 2008; 33:1394–1401. [PubMed: 18684569]

Achenbach, TM. Manual for the child behavior checklist/4-18 and 1991 profile. Department of Psychiatry, University of Vermont; Burlington: 1991.

Achenbach, TM.; Rescorla, LA. Manual for the ASEBA school-age forms & profiles. University of Vermont Research Center for Children, Youth, & Families; Burlington: 2001.

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]

Anestis MD, Tull MT, Bagge CL, Gratz KL. The moderating role of distress tolerance in the relationship between posttraumatic stress disorder symptom clusters and suicidal behavior among trauma exposed substance users in residential treatment. Archives of Suicide Research. 2012; 16(3): 198–211. [PubMed: 22852782]

Arnett JJ. Sensation seeking, aggressiveness, and adolescent reckless behavior. Personality and Individual Differences. 1996; 20:693–702.

Austin AA, Chorpita BF. Temperament, anxiety, and depression: Comparisons across five ethnic groups of children. Journal of Clinical Child and Adolescent Psychology. 2004; 33(2):216–226. [PubMed: 15136185]

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]

Bennett DS, Ambrosini PJ, Kudes D, Metz C, Rabinovich H. Gender differences in adolescent depression: Do symptoms differ for boys and girls? Journal of Affective Disorders. 2005; 89:35–44. [PubMed: 16219362]

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]

Bornovalova MA, Gratz KL, Daughters SB, Nick B, Delany-Brumsey A, Lynch TR, Lejuez CW. A multimodal assessment of the relationship between emotion dysregulation and borderline personality disorder among inner-city substance users in residential treatment. Journal of Psychiatric Research. 2008; 42:717–726. [PubMed: 17868698]

Brady SS, Gorman-Smith D, Henry DB, Tolan PH. Adaptive coping reduces the impact of community violence exposure on violent behavior among African American and Latino male adolescents. Journal of Abnormal Child Psychology. 2008; 36:105–115. [PubMed: 17687640]

Brandon TH, Herzog TA, Juliano LM, Irvin JE, Lazev AB, Simmons VN. Pretreatment task-persistence predicts smoking cessation outcome. Journal of Abnormal Psychology. 2003; 112:448–456. [PubMed: 12943023]

Brody GH, Chen YF, Murry VM, Ge X, Simons RL, Gibbons FX, Cutrona CE. Perceived discrimination and the adjustment of African American youths: A five-year longitudinal analysis

with contextual moderation effects. Child Development. 2006; 77(5):1170–1189. [PubMed: 16999791]

Broman CL. Perceived discrimination and alcohol use among Black and White college students. Journal of Alcohol and Drug Education. 2007; 51(1):8–16.

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]

Buka SL, Stichick TL, Birdthistle I, Earls FJ. Youth exposure to violence: Prevalence, risks, and consequences. American Journal of Orthopsychiatry. 2001; 71(3):298–310. [PubMed: 11495332]

Buu A, DiPiazza C, Wang J, Puttler LI, Fitzgerald HE, Zucker RA. Parent, family, and neighborhood effects on the development of child substance use and other psychopathology from preschool to the start of adulthood. Journal of Studies on Alcohol and Drugs. 2009; 70(4):489. [PubMed: 19515288]

Cantwell DP, Lewinsohn PM, Rohde P, Seeley JR. Correspondence between adolescent report and parent report of psychiatric diagnostic data. Journal of the American Academy of Child & Adolescent Psychiatry. 1997; 36(5):610–619. [PubMed: 9136495]

Chapman PL, Mullis RL. Racial differences in adolescent coping and self-esteem. The Journal of Genetic Psychology. 2000; 161(2):152–160. [PubMed: 10851678]

Clark R, Anderson NB, Clark VR, Williams DR. Racism as a stressor for African Americans: A biopsychosocial model. American Psychologist. 1999; 54(10):805–816. [PubMed: 10540593]

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]

Cooley-Quille M, Boyd RC, Frantz E, Walsh J. Emotional and behavioral impact of exposure to community violence in inner-city adolescents. Journal of Clinical Child Psychology. 2001; 30:199–206. [PubMed: 11393920]

Compas BE, Orosan PG, Grant KE. Adolescent stress and coping: Implications for psychopathology during adolescence. Journal of Adolescence. 1993; 16:331–349. [PubMed: 8282901]

Copeland EP, Hess RS. Differences in young adolescents' coping strategies based on gender and ethnicity. Journal of Early Adolescence. 1995; 15:203–219.

Costello EJ, Mustillo S, Erkanli A, Keeler G, Angold A. Prevalence and development of psychiatric disorders in childhood and adolescence. Archives of General Psychiatry. 2003; 60(8):837. [PubMed: 12912767]

Cummings JR, Bornovalova MA, Ojanen T, Hunt E, Macpherson L, Lejuez C. Time doesn't change everything: The longitudinal course of distress tolerance and its relationship with externalizing and internalizing symptoms during early adolescence. Journal of Abnormal Child Psychology. 2013

Daughters SB, Reynolds EK, MacPherson L, Kahler CW, Danielson CK, Zvolensky M, Lejuez CW. Distress tolerance and early adolescent externalizing and internalizing symptoms: The moderating role of gender and ethnicity. Behaviour Research and Therapy. 2009; 47:198–205. [PubMed: 19135649]

Deater-Deckard K, Petrill SA, Thompson LA. Anger/frustration, task persistence, and conduct problems in childhood: a behavioral genetic analysis. Journal of Child Psychology and Psychiatry. 2007; 48:80–87. [PubMed: 17244273]

de Wit 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]

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(Suppl 1):5–29. [PubMed: 15128378]

Elliott, DS.; Huizinga, D.; Ageton, SS. Explaining delinquency and drug use (Report No. 21). Behavioral Research Institute; Boulder, CO: 1982.

Ellis AJ, Fischer KM, Beevers CG. Is dysphoria about being red and blue? Potentiation of anger and reduced distress tolerance among dysphoric individuals. Cognition and Emotion. 2010; 24(4):596–608.

Fergusson DM, Boden JM, Horwood LJ. Classification of behavior disorders in adolescence: scaling methods, predictive validity, and gender differences. Journal of Abnormal Psychology. 2010; 119:699–712. [PubMed: 20853914]

Fowler PJ, Toro PA, Tompsett CJ, Baltes BB. Community and family violence: Indirect effects of parental monitoring on externalizing problems. Journal of Prevention & Intervention in the Community. 2009; 37:302–315. [PubMed: 19830625]

Franko DL, Striegel-Moore RH, Bean J, Barton BA, Biro F, Kraemer HC, Schreiber GB, Crawford PB, Daniels SR. Self-reported symptoms of depression in late adolescence to early adulthood: a comparison of African-American and Caucasian females. Journal of Adolescent Health. 2005; 37:526–529. [PubMed: 16310134]

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; 32:243–258.

Glick DM, Orsillo SM. Relationships among social anxiety, self-focused attention, and experiential distress and avoidance. Journal of Cognitive and Behavioral Psychotherapies. 2011; 11:1–12.

Gorka SM, Ali B, Daughters SB. The role of distress tolerance in the relationship between depressive symptoms and problematic alcohol use. Psychology of Addictive Behaviors. 2012; 26:621–626. [PubMed: 22121919]

Gorman-Smith D, Tolan P. The role of exposure to community violence and developmental problems among inner-city youth. Development and Psychopathology. 1998; 10:101–116. [PubMed: 9524810]

Grant BF, Stinson FS, Dawson DA, Chou SP, Ruan W, Pickering RP. Co-occurrence of 12-month alcohol and drug use disorders and personality disorders in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Archives of General Psychiatry. 2004; 61(4):361–368. [PubMed: 15066894]

Gratz KL, Rosenthal M, Tull MT, Lejuez CW, Gunderson JG. An experimental investigation of emotion dysregulation in borderline personality disorder. Journal of Abnormal Psychology. 2006; 115:850–855. [PubMed: 17100543]

Hankin BL, Abramson LY. Development of gender differences in depression: An elaborated cognitive vulnerability–transactional stress theory. Psychological Bulletin. 2001; 127(6):773–796. [PubMed: 11726071]

Hankin BL, Mermelstein R, Roesch L. Sex differences in adolescent depression: stress exposure and reactivity models. Child Development. 2007; 78(1):279–295. [PubMed: 17328705]

Hasking PA. Reinforcement sensitivity, coping, and delinquent behaviour in adolescents. Journal of Adolescence. 2007; 30:739–749. [PubMed: 17178154]

Hawton, K.; van Heeringen, K., editors. The international handbook of suicide and attempted suicide. John Wiley & Sons Ltd; New York, NY US: 2000.

Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J. Acceptance and commitment therapy: Model, processes and outcomes. Behaviour Research and Therapy. 2006; 44:1–25. [PubMed: 16300724]

Hicks BM, Blonigen DM, Kramer MD, Krueger RF, Patrick CJ, Iacono WG, McGue M. Gender differences and developmental change in externalizing disorders from late adolescence to early adulthood: A longitudinal twin study. Journal of Abnormal Psychology. 2007; 116(3):433–447. [PubMed: 17696699]

Holmbeck GN. Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. Journal of Pediatric Psychology. 2002; 27(1):87–96. [PubMed: 11726683]

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]

Jaser SS, Champion JE, Reeslund KL, Keller G, Merchant MJ, Benson M, Compas BE. Cross-situational coping with peer and family stressors in adolescent offspring of depressed parents. Journal of Adolescence. 2007; 30:917–932. [PubMed: 17241658]

Jakupcak M. Masculine gender role stress and men's fear of emotions as predictors of self-reported aggression and violence. Violence and Victims. 2003; 18:533–541. [PubMed: 14695019]

Jakupcak M, Lisak D, Roemer L. The role of masculine ideology and masculine gender role stress in men's perpetration of relationship violence. Psychology of Men & Masculinity. 2002; 3(2):97–106.

Larzelere RE. Child outcomes of nonabusive and customary physical punishment by parents: An updated literature review. Clinical Child and Family Psychology Review. 2000; 3(4):199–221. [PubMed: 11225737]

Lewis KM, Byrd DA, Ollendick TH. Anxiety symptoms in African-American and Caucasian youth: Relations to negative life events, social support, and coping. Journal of Anxiety Disorders. 2012; 26(1):32–39. [PubMed: 21930362]

Lynne-Landsman SD, Graber JA, Nichols TR, Botvin GJ. Trajectories of aggression, delinquency, and substance use across middle school among urban, minority adolescents. Aggressive Behavior. 2011; 37(2):161–176. [PubMed: 21274853]

Mano KEJ, Davies WH, Klein-Tasman BP, Adesso VJ. Measurement equivalence of the Child Behavior Checklist among parents of African American adolescents. Journal of Child and Family Studies. 2009; 18:606–620.

Maton K, Teti D, Corns K, Viera-Baker C, Lavine J, Gouze K, Keating D. Cultural specificity of support sources, correlates and contexts: Three studies of African-American and Caucasian youth. American Journal of Community Psychology. 1996; 24:551–587. [PubMed: 8969449]

Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, Kendler KS. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. Archives of General Psychiatry. 1994; 51(1):8–9. [PubMed: 8279933]

Kessler RC, Price RH, Wortman CB. Social factors in psychopathology: Stress, social support, and coping processes. Annual Review of Psychology. 1985; 36:531–72.

Kim M. Racial/Ethnic Disparities in Depression and Its Theoretical Perspectives. Psychiatric Quarterly. 2013:1–8. [PubMed: 22610382]

King KM, Chassin L. Adolescent stressors, psychopathology, and young adult substance dependence: A prospective study. Journal of Studies on Alcohol and Drugs. 2008; 69:629–638. [PubMed: 18781237]

Kistner JA, David-Ferdon CF, Lopez CM, Dunkel SB. Ethnic and sex differences in children's depressive symptoms. Journal of Clinical Child and Adolescent Psychology. 2007; 36:171–181. [PubMed: 17484690]

Kistner JA, David CF, White BA. Ethnic and sex differences in children's depressive symptoms: Mediating effects of perceived and actual competence. Journal of Clinical Child and Adolescent Psychology. 2003; 32:341–350. [PubMed: 12881023]

Laird RD, Pettit GS, Dodge KA, Bates JE. Peer relationship antecedents of delinquent behavior in late adolescence: Is there evidence of demographic group differences in developmental progress? Development and Psychopathology. 2005; 17:127–144. [PubMed: 15971763]

Last CG, Perrin S, Hersen M, Kazdin AE. DSM-III-R anxiety disorders in children: Sociodemographic and clinical characteristics. Journal of the American Academy of Child & Adolescent Psychiatry. 1992; 31(6):1070–1076. [PubMed: 1429407]

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; 26:290–293.

Lewinsohn PM, Rohde P, Seeley JR, Baldwin CL. Gender differences in suicide attempts from adolescence to young adulthood. Journal of the American Academy of Child & Adolescent Psychiatry. 2001; 40:427–434. [PubMed: 11314568]

Leyro TM, Zvolensky MJ, Bernstein A. Distress tolerance and psychopathological symptoms and disorders: A review of the empirical literature among adults. Psychological Bulletin. 2010; 136:576–600. [PubMed: 20565169]

Lynne-Landsman SD, Graber JA, Nichols TR, Botvin GJ. Trajectories of aggression, delinquency, and substance use across middle school among urban, minority adolescents. Aggressive Behavior. 2011; 37:161–176. [PubMed: 21274853]

MacPherson L, Reynolds EK, Daughters SB, Wang F, Cassidy J, Mayes LC, Lejuez CW. Positive and negative reinforcement underlying risk behavior in early adolescents. Prevention Science. 2010a; 11(3):331–342. [PubMed: 20309633]

MacPherson L, Magidson JF, Reynolds EK, Kahler CW, Lejuez CW. Changes in sensation seeking and risk-taking propensity predict increase in alcohol use among early adolescents. Alcoholism: Clinical and Experimental Research. 2010b; 34:1400–1408.

MacPherson L, Stipelman BA, Duplinsky M, Brown RA, Lejuez CW. Distress tolerance and pre-smoking treatment attrition: Examination of moderating relationships. Addictive Behaviors. 2008; 33(11):1385–1393. [PubMed: 18706768]

Mano KEJ, Davies WH, Klein-Tasman BP, Adesso VJ. Measurement equivalence of the Child Behavior Checklist among parents of African American adolescents. Journal of Child and Family Studies. 2009; 18:606–620.

Maton K, Teti D, Corns K, Viera-Baker C, Lavine J, Gouze K, Keating D. Cultural specificity of support sources, correlates and contexts: Three studies of African-American and Caucasian youth. American Journal of Community Psychology. 1996; 24:551–587. [PubMed: 8969449]

Miller, AL.; Rathus, JH.; DuBose, AP.; Dexter-Mazza, ET.; Goldklang, AR. Dialectical behavior therapy for adolescents.. In: Dimeff, LA.; Koerner, K.; Dimeff, LA.; Koerner, K., editors. Dialectical behavior therapy in clinical practice: Applications across disorders and settings. Guilford Press; New York, NY US: 2007. p. 245-263.

Nation M, Crusto C, Wandersman A, Kumpfer KL, Seybolt D, Morrissey-Kane E, Davino K. What works in prevention: Principles of effective prevention programs. American Psychologist. 2003; 58:449–456. [PubMed: 12971191]

O'Keefe M. Adolescents' exposure to community and school violence: Prevalence and behavioral correlates. Journal of Adolescent Health. 1997; 20(5):368–376. [PubMed: 9168384]

Ortin A, Lake AM, Kleinman M, Gould MS. Sensation seeking as risk factor for suicidal ideation and suicide attempts in adolescence. Journal of Affective Disorders. 2012; 143:214–222. [PubMed: 22921521]

Piko B. Gender differences and similarities in adolescents' ways of coping. Psychological Record. 2001; 51:223–236.

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; 4:186–190.

Roberts RE, Chen YW. Depressive symptoms and suicidal ideation among Mexican-origin and Anglo adolescents. Journal of the American Academy of Child and Adolescent Psychiatry. 1995; 34(1): 81–90. [PubMed: 7860463]

Romer D, Hennessy M. A biosocial-affect model of adolescent sensation seeking: The role of affect evaluation and peer-group influence in adolescent drug use. Prevention Science. 2007; 8:89–101. [PubMed: 17286212]

Schloss HM, Haaga DA. Interrelating behavioral measures of distress tolerance with self-reported experiential avoidance. Journal of Rational-Emotive & Cognitive-Behavior Therapy. 2011; 29(1): 53–63. [PubMed: 21448252]

Schmidt NB, Richey J, Fitzpatrick K. Discomfort intolerance: Development of a construct and measure relevant to panic disorder. Journal of Anxiety Disorders. 2006; 20(3):263–280. [PubMed: 16564432]

Sellers RM, Copeland-Linder N, Martin PP, Lewis RH. Racial identity matters: The relationship between racial discrimination and psychological functioning in African American adolescents. Journal of Research on Adolescence. 2006; 16(2):187–216.

Shapiro SS, Wilk MB. An Analysis of Variance Test for Normality (Complete Samples). Biometrika. 1965; 52:591–611.

Shih RA, Miles JN, Tucker JS, Zhou AJ, D'Amico EJ. Racial/ethnic differences in the influence of cultural values, alcohol resistance self-efficacy, and alcohol expectancies on risk for alcohol initiation. Psychology of Addictive Behaviors. 2012; 26:460–470. [PubMed: 22867294]

Silverstein B. Gender differences in the prevalence of clinical depression: The role played by depression associated with somatic symptoms. The American Journal of Psychiatry. 1999; 156:480–482. [PubMed: 10080570]

Silverstein B. Gender differences in the prevalence of somatic versus pure depression: A replication. The American Journal of Psychiatry. 2002; 159:1051–1052. [PubMed: 12042198]

Simons JS, Gaher RM. The Distress Tolerance Scale: Development and validation of a self-report measure. Motivation and Emotion. 2005; 29:83–102.

Sontag LM, Graber JA, Brooks-Gunn J, Warren MP. Coping with social stress: Implications for psychopathology in young adolescent girls. Journal of Abnormal Child Psychology: An official publication of the International Society for Research in Child and Adolescent Psychopathology. 2008; 36:1159–1174.

Steinberg, L.; Dahl, R.; Keating, D.; Kupfer, DJ.; Masten, AS.; Pine, DS. The study of developmental psychopathology in adolescence: Integrating affective neuroscience with the study of context.. In: Cicchetti, D.; Cohen, DJ.; Cicchetti, D.; Cohen, DJ., editors. Developmental psychopathology, Vol 2: Developmental neuroscience. 2nd ed.. John Wiley & Sons Inc.; Hoboken, NJ US: 2006. p. 710-741.

Steinhausen HC, Haslimeier C, Metzke C. Psychosocial factors in adolescent and young adult self-reported depressive symptoms: Causal or correlational associations? Journal of Youth and Adolescence. 2007; 36:89–100.

Taylor, SE. Social support.. In: Friedman, HS.; Silver, RC., editors. Foundations of Health Psychology. Oxford University Press; New York: 2007. p. 145-171.

Treiber FA, Musante L, Braden D, Arensman F, Strong WB, Levy M, Leverett S. Racial differences in hemodynamic responses to the cold face stimulus in children and adults. Psychosomatic Medicine. 1990; 52(3):286–296. [PubMed: 2367620]

Tull MT, Gratz KL, Coffey SF, Weiss NH, McDermott MJ. Examining the interactive effect of posttraumatic stress disorder, distress tolerance, and gender on residential substance use disorder treatment retention. Psychology of Addictive Behaviors. 2012

Uchino, BN. Social Support and Physical Health: Understanding the Health Consequences of Relationships. Yale University Press; New Haven, CT: 2004.

Vassallo S, Smart D, Sanson A, Dussuyer I, McKendry B, Toumbourou J. Patterns and precursors of adolescent antisocial behaviour (First report). 2002 Report commissioned by Crime Prevention Victoria.

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.

Wenzel A, Steer RA, Beck AT. Are there any gender differences in frequency of self-reported somatic symptoms of depression? Journal of Affective Disorders. 2005; 89:177–181. [PubMed: 16202455]

Widom CS, Czaja S, Wilson HW, Allwood M, Chauhan P. Do the long-term consequences of neglect differ for children of different races and ethnic backgrounds? Child Maltreatment. 2013; 18(1): 42–55. [PubMed: 23076836]

Zuckerman, M. Behavioral expressions and biosocial bases of sensation seeking. Cambridge University Press; New York, NY US: 1994.
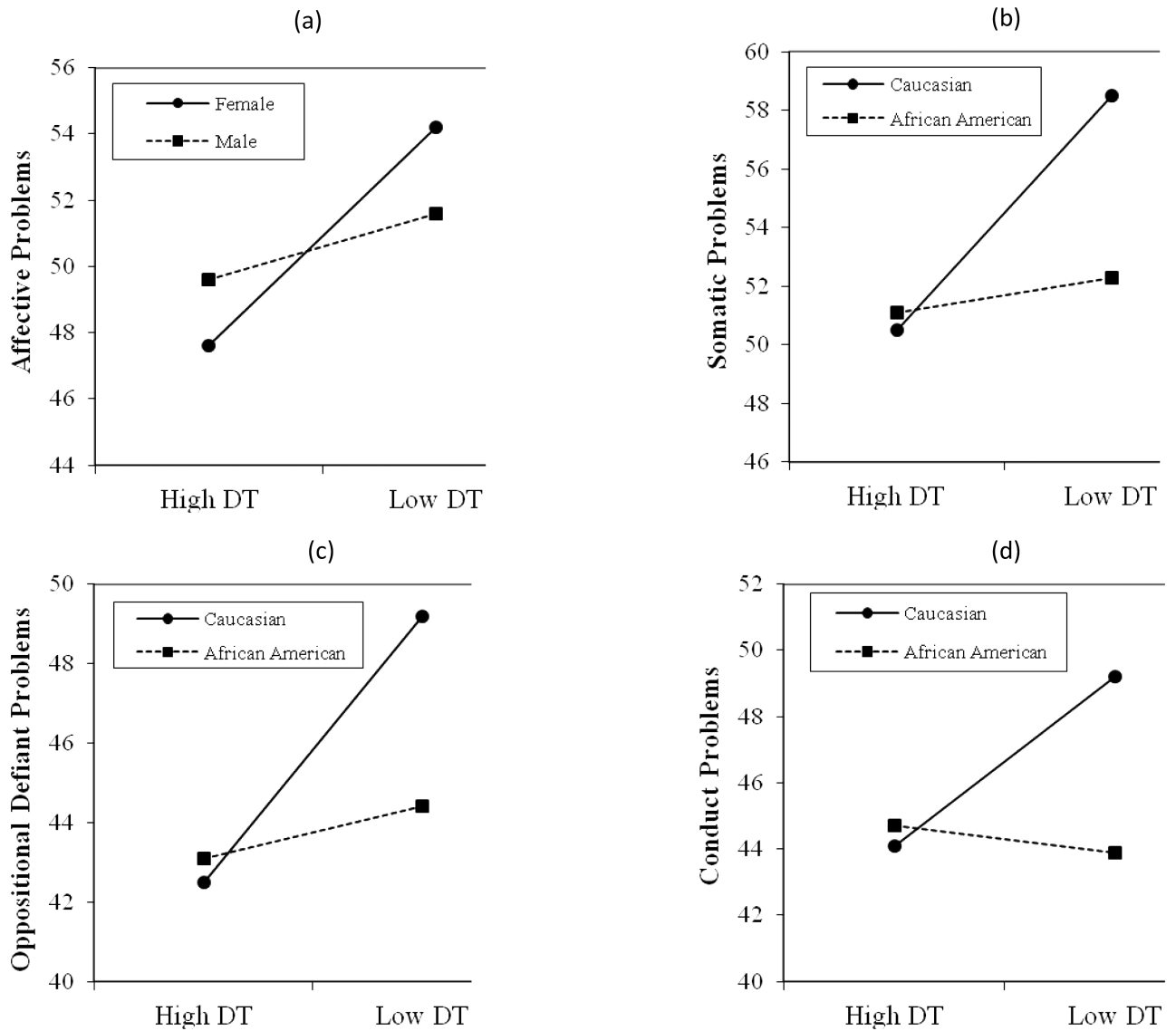
Figure 1.
Interaction effect of gender with distress tolerance (DT) on (a) CBCL affective problems, and interaction effect of race with DT on (b) somatic problems, (c) conduct problems, and (d) oppositional defiant problems.

Table 1

Means, standard deviations, and intercorrelations among continuous independent and dependent variables.

	M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	16.1 (1.0)	1												
2. Income (thousands)	87.3 (46.4)	−.15	1											
3. NES	4.2 (2.9)	.20*	−.15	1										
4. SSS-ES	6.5 (2.1)	−.01	.21*	.04	1									
5. SSS-TAS	5.6 (2.1)	−.08	.27*	.03	.40**	1								
6. SSS-DIS	5.5 (2.2)	−.10	.10	.08	.42**	.40**	1							
7. SSS-BS	6.9 (1.8)	−.11	−.02	.09	.24**	.09	.33*	1						
8. CBCL-Affective	54.4 (6.0)	.11	−.09	.09	.04	−.02	.17	.28*	1					
9. CBCL-Anxiety	53.7 (5.4)	.27*	−.08	.18*	−.01	−.06	.06	.22*	.65**	1				
10. CBCL-Somatic	53.5 (5.6)	.07	.10	.06	.07	−.01	.13	.14	.44**	.31**	1			
11. CBCL-ADH	54.2 (5.6)	.04	−.14	.03	.12	−.06	.17	.23*	.47**	.46**	.23*	1		
12. CBCL-OD	53.8 (5.9)	−.07	−.07	−.02	.15	.12	.28**	.29**	.48**	.31**	.26**	.63**	1	
13. CBCL-CP	53.9 (5.9)	−.07	−.10	.08	.08	.06	.30**	.21*	.51**	.39**	.18*	.61**	.68**	1

Note.

NES = Neighborhood and Environment Scale, SSS = Sensation Seeking Scale, ES = excitement seeking, TAS = thrill and adventure seeking, DIS = disinhibition, BS = boredom susceptibility; CBCL = Child Behavior Checklist, ADH = attention deficit/hyperactivity problems, OD = oppositional defiant problems, CP = conduct problems.

*
$p < .05$

**
$p < .01$

Table 2

Mean CBCL DSM-oriented problem scale T-scores among adolescents with low and high distress tolerance across gender and race.

	Gender				Race			
	Female		Male		Caucasian		African American	
CBCL Subscale	Low DT	High DT	Low DT	High DT	Low DT	High DT	Low DT	High DT
Affective	56.5 (8.0)$_a$	53.4 (4.6)$_b$	54.3 (6.4)$_{a,b}$	54.5 (6.0)$_{a,b}$	58.2 (9.1)$_a$	53.8 (5.7)$_a$	54.5 (6.5)$_a$	53.9 (5.1)$_a$
Anxiety	55.7 (7.2)$_a$	52.4 (4.1)$_b$	53.9 (6.3)$_{a,b}$	54.3 (4.8)$_{a,b}$	55.9 (6.8)$_a$	52.5 (3.1)$_b$	54.5 (6.9)$_a$	53.7 (5.2)$_{a,b}$
Somatic	56.1 (7.8)$_a$	53.4 (4.8)$_a$	53.7 (6.0)$_a$	52.3 (4.4)$_a$	58.4 (10.4)$_a$	51.7 (3.5)$_b$	53.8 (5.3)$_{a,b}$	53.5 (5.0)$_{a,b}$
ADH	54.3 (6.8)$_a$	54.3 (5.5)$_a$	55.1 (5.9)$_a$	53.7 (5.1)$_a$	55.5 (6.3)$_{a,b}$	52.5 (3.4)$_a$	54.4 (6.4)$_{a,b}$	54.8 (5.9)$_b$
Oppositional	55.4 (7.9)$_a$	53.5 (5.8)$_a$	54.3 (6.8)$_a$	53.1 (4.2)$_a$	57.2 (8.3)$_a$	52.1 (3.8)$_b$	54.1 (6.9)$_{a,b}$	53.9 (5.6)$_{a,b}$
Conduct	53.6 (5.7)$_a$	53.7 (6.3)$_a$	56.1 (8.1)$_a$	53.2 (4.2)$_a$	58.0 (9.3)$_a$	52.3 (3.5)$_b$	53.8 (5.9)$_{a,b}$	54.2 (6.1)$_{a,b}$

Note. Means with different subscripts across rows were significantly different in pairwise comparisons ($p < .05$); Comparisons across gender and race conducted separately; ADH = Attention-Deficit/Hyperactivity problems.

Table 3

Hierarchical linear regression analyses predicting CBCL DSM-oriented scales.

	β	t	R²	R²
Affective Problems				
Step 1			0.08[*]	
Race	−0.10	−1.05		
Gender	0.04	0.43		
Distress Tolerance	0.12	1.31		
SSS-BS	0.23[*]	2.52		
Step 2			0.05[*]	0.13
DT × Gender	−0.29[*]	−1.60		
DT × Ethnicity	−0.28	−2.00		
Anxiety Problems				
Step 1			0.13[**]	
Race	0.03	0.37		
Gender	0.09	0.98		
Distress Tolerance	0.15	1.65		
Age	0.26[**]	2.91		
NES Total Score	0.14	1.50		
Step 2			0.03	0.16
DT × Gender	−0.19	−1.37		
DT × Ethnicity	−0.30	−1.75		
Somatic Problems				
Step 1			0.05	
Race	−0.02	−0.18		
Gender	−0.15	−1.64		
Distress Tolerance	0.18[*]	2.01		
Step 2			0.07[**]	0.12
DT × Gender	−0.15	−1.08		
DT × Ethnicity	−0.52[**]	−2.94		
Attention Deficit/Hyperactivity				
Step 1			.07	
Race	0.10	1.14		
Gender	0.02	0.26		
Distress Tolerance	0.06	0.62		
SSS-BS	0.22[*]	2.37		

	β	t	R²	R²
Step 2			.01	.08
DT × Gender	0.05	0.34		
DT × Ethnicity	−0.23	−1.24		

Oppositional Defiant Problems

	β	t	R²	R²
Step 1			0.14**	
Race	0.13	0.15		
Gender	−0.04	−0.40		
Distress Tolerance	0.14	1.63		
SSS-DIS	0.23**	2.49		
SSS-BS	0.19*	2.02		
Step 2			0.05*	0.19
DT × Gender	−0.14	−1.04		
DT × Ethnicity	−.038*	−2.21		

Conduct Problems

	β	t	R²	R²
Step 1			0.13**	
Race	0.00	0.09		
Gender	0.05	0.56		
Distress Tolerance	0.13	1.45		
SSS-DIS	0.27**	2.99		
SSS-BS	0.12*	1.24		
Step 2			0.05*	0.18
DT × Gender	1.71	2.22		
DT × Ethnicity	−5.91*	2.45		

NES = Neighborhood and Environment Scale; SSS = Sensation Seeking Scale; DIS = Disinhibition; BS = Boredom susceptibility; DT = Distress tolerance.

*
$p < .05$

**
$p < .01$