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The indirect effects of trait anxiety on drug use via emotion dysregulation in a low-income sample

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Abstract

Background: Research has demonstrated consistent associations between anxiety and illicit drug use. However, few studies to date have examined the shared risk factors that may contribute to this common comorbidity. Therefore, the current investigation tested the indirect effect of trait anxiety on drug use disorder symptoms via emotion dysregulation, a widely recognized transdiagnostic risk factor found to be relevant across both anxiety and illicit drug use.

Method: The sample was comprised of 241 adults (M_{age} = 50.56, SD_{age} = 5.90; 76.8% Black) recruited from a community center serving low-income and homeless individuals. Results: Consistent with our hypothesis, structural equation modeling demonstrated an indirect effect of trait anxiety on drug use disorder symptoms through emotion dysregulation.

Conclusions: The current findings show initial support for emotion dysregulation as an explanatory vulnerability factor indirectly underlying the relationship between anxiety and drug use.

Keywords

emotion dysregulation; trait anxiety; drug use; low-income

The experience of anxiety is universal, yet, at greater levels, it may become a significant source of individual suffering (Whiteford et al., 2013). Approximately one in three adults in the U.S. develop an anxiety disorder at some point in their lives (Bandelow & Michaelis, 2015). Consistent with national and international patterns of psychopathology (Andrade, Caraveo-Anduaga & Berglund, 2000), anxiety disorders tend to be overrepresented among individuals with low socioeconomic status (e.g., Johnson, Cohen, Dohrenwend, Link, & Brook, 1999; Brown, Harris & Eales, 1993); extant research has documented that having an income at or below the poverty level increases the odds of meeting criteria for anxiety (AOR = 1.44; 95% CI = 0.70-4.31), possibly as a result of the ongoing stress, uncertainty, and demoralization experienced by these individuals (e.g., Miech, Caspi, Moffitt, Entner, Silva

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1999; Santiago, Wadsworth, Stump, 2011). In fact, poverty-related stress shows direct associations to anxiety symptoms, which tend to worsen across time (Santiago et al., 2011),

Anxiety tends to co-occur with other psychiatric disorders, leading to worse psychosocial outcomes and greater impairment relative to those individuals with an exclusive diagnosis of anxiety (Smith & Book, 2010). A particularly detrimental, and common comorbidity exists between anxiety and drug use disorders (Lai, Cleary. Sitharthan, Hunt, 2015); 18 to 20% of individuals with one diagnosis also meet criteria for the other disorder (Grant et al., 2004). Furthermore, having an income at or below the poverty level significantly increases the likelihood of meeting criteria for a substance use disorder (AOR = 1.53; 95% CI = 0.48-4.85) (Johnson et al., 1999). The anxiety - drug use connection constitutes a significant public health challenge and a societal economic burden, requiring more than $240 billion in annual costs related to healthcare, lost productivity, and crime (Dupont et al., 1996; Whiteford et al., 2013). Although there is strong evidence surrounding the high rates of co-occurring anxiety and drug use, explanatory psychological vulnerabilities that govern this relationship warrant more research. Greater knowledge on the pathways by which trait anxiety is linked to drug use would help identify important targets of intervention (Baillie et al., 2010), which constitutes an important research endeavor among low-income individuals who tend to have a greater rates of co-occurring drug use and anxiety and have been historically underserved in clinical research (e.g., Rad, Martingano & Ginges, 2018).

One factor that may be central in the connection between anxiety and drug use is emotion dysregulation. Broadly, emotion dysregulation refers to individuals' tendency to experience emotions intensely and uncontrollably to the point of obscuring their capacity to cope with and regulate said emotions (Linehan & Heard, 1992; Gross, 2002; Shedler & Westen, 2004). The developmental psychopathology literature has noted that early childhood adversity, including growing up in poverty, has a positive association with emotion dysregulation (e.g., Calkins & Hill, 2007). Moreover, individuals with anxiety oftentimes struggle with recognizing their emotional experience, have negative reactions to their emotions, and have a diminished capacity to recover following the experience of negative emotionality in comparison to individuals without anxiety (Mennin, Heimberg, Turk & Fresco, 2005; Sloan et al., 2017). Heightened emotional intensity has shown strong positive correlations with using substances to alleviate distress (Berking, et al., 2011; Bonn-Miller, Vujanonic & Zvolensky, 2008). In fact, prominent paradigms of substance use suggest that individuals are motivated to use substances to escape from or avoid aversive negative emotionality and its corresponding uncomfortable physiological symptoms (e.g., Baker et al., 2004; Solomon & Corbit, 1974). Supporting these theories, emotion dysregulation, and specifically one's inability to tolerate negative emotions, predicted relapse during and after psychotherapy for alcohol use dependence (Berking et al., 2011). While several investigations have identified the key role of emotion dysregulation on both anxiety and drug use problems independently, to our knowledge, no study to date has considered emotion dysregulation as an underlying link between these constructs with one exception, which focused on alcohol use. A recent study among Latinx adults in a primary care setting found evidence of a statistically significant indirect effect of anxiety on problematic alcohol use through emotion dysregulation (Paulus et al., 2017). To add to this emerging, yet scarce literature focused on explaining the relation between anxiety and drug use, the current study focused on a low-

income non-treatment seeking sample. The present investigation examined the indirect effect of trait anxiety on drug use disorder symptoms via emotion dysregulation using structural equation modeling. We hypothesized that trait anxiety would be related to drug use disorder symptoms through its association with emotion dysregulation above and beyond theoretically-relevant covariates demonstrated to impact drug use disorders including age, ethnicity/race, and gender (Kilpatrick et al, 2000).

Method

All procedures were approved by the [University of Maryland-College Park's] Institutional Review Board. Participants were recruited via flyers designed to target adults from a community center in Baltimore, Maryland that serves low-income and homeless adults who were interested in completing a computerized program to improve working memory. The center provides a number of services for the neighborhood, including free hot lunches and basic health services. The study consists of a secondary analysis of data from individuals who completed a battery of questionnaires to determine whether they were eligible to participate in a study that evaluated a cognitive training program to improve working memory. The present study includes all available data from individuals who completed the eligibility process, regardless of whether they qualified or not for the study. The battery of questionnaires included demographic information items, information about drug use, emotion dysregulation, and trait anxiety. Participants received $5.00 for completing the battery of questionnaires.

Materials and Measures

Demographic Characteristics.—Participants completed a demographics questionnaire that was developed to assess participants' age, gender, race/ethnicity, education, and household income. Gender was coded as (0) male and (1) female and race/ethnicity was dichotomized and coded as (0) non-black/African-American and (1) black/African-American. The race/ethnicity variable was dichotomized due to small cell sizes for individuals from other races/ethnicities.

Emotion dysregulation.—The Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer, 2004), is a 36-item instrument that assesses six facets of emotion regulation, including non-acceptance of emotional responses, difficulties engaging in goal directed behavior, impulse control difficulties, lack of emotional awareness, access to emotion regulation strategies, and lack of emotional clarity. Respondents were asked to rate a series of statements on a scale from 1 (*almost never*) to 5 (*almost always*). Scores are calculated by summing responses in each of the subscales and scores range between 0 and 180, with higher scores representing a greater degree of emotion dysregulation. The DERS has been used widely across various populations and demonstrates good internal consistency (Gratz and Roemer, 2004; Weinberg and Klonsky, 2009). In the current study, internal consistency for the DERS was excellent at $\alpha = 0.95$.

Anxiety.—To measure trait anxiety, participants completed the State-Trait Anxiety Inventory for Trait Anxiety (STAI; Spielberger, 2010) in which respondents rate how they

"generally feel" on a series of 20 items using a 4-point Likert scale. Response options range from "almost never" to "almost always." Scores are computed by adding the response values. Individuals are presented with statements such as "I am a steady person" or "I lack self-confidence." The STAI for Trait Anxiety has demonstrated good internal consistency, test–retest reliability, and convergent and discriminant validity in clinical and non-clinical samples (Barnes et al., 2002; Hishinuma et al., 2000; Kabacoff, Segal, Hersen, & Van Hasselt, 1997; Vautier, 2004). In the present study, the Inventory demonstrated excellent internal consistency ($\alpha = 0.93$).

Drug Use.—The Drug History Questionnaire (Sobell, Kwan, & Sobell, 1995) was used to assess the types and frequency of drug use in the last six months. Types of drugs assessed via the Questionnaire include alcohol, cannabis, hallucinogens, depressants, inhalants, narcotics, stimulants, tranquilizers, caffeine, nicotine, and other drugs. Additionally, participants completed the 11-item Drug Use Disorders Identification Test (DUDIT), intended to identify individuals with drug use problems, with higher scores on the measure representing greater drug use disorder symptoms. Participants answer questions such as "how many times do you take drugs on a typical day when you use drugs?" and "Over the past year, have you felt that your longing for drugs was so strong that you could not resist it?" Total scores are calculated by summing the points for each item. Clinical cut-off scores for men have been suggested at 6 or more, and for women at 2 or more. The DUDIT has strong psychometric properties with clinical and non-clinical populations, including high convergent validity, discriminant validity, and internal consistency (alpha = 0.94), with high sensitivity and specificity scores (Berman, Bergman, Palmstieran & Schlyter, 2005; Voluse et al., 2012). In the current study, the internal consistency of the instrument was $\alpha = .93$.

Participants

All available data were used. Of the 241 individuals who completed the screening questionnaire, 4 were missing data on all predictor variables while 14 were missing data on all outcomes. The sample was 49.8% female and ranged between 40 to 65 years old (M_{age} = 50.56, SD_{age} = 5.90). Participants self-identified predominantly as Black/African-American (76.8%) and White (20.3%). Fifty-four percent of the sample had a high school diploma or GED and 26% had completed grammar school. According to the most recent definitions by the Department of Health and Human Services (2019), the poverty guideline in the U.S. for one person is $12,490 of household annual income; 77% of the study sample reported an household annual income of less than $10,000 and 16% reported having a household annual income of $20,000 or less.

The mean score for trait anxiety was 42.20 (SD = 11.31) out of a score of 80, which suggests that on average, the sample had high trait anxiety. The mean score for emotion dysregulation as measured by the DERS was 78.45 (SD = 25.62) out of 160, which represent scores comparable to previous studies comprised of samples with individuals in a substance use residential facility (e.g., Hopwood et al., 2015). The mean DUDIT score was 5.71 (SD = 9.17) for drug use disorder symptoms out of a possible score of 44. Drug use disorder symptoms scores ranged from 0 to 38; 34.4% of the sample did not endorse DUDIT items.

According to the proposed DUDIT cut-off for problematic drug use, 38% of males and 34.1% of females were above the threshold.

Participants indicated past year use of cannabis (23.3%), opiates (16.4%), and cocaine (19.5%). Seven percent of individuals who indicated using cannabis in the past year, reported using cannabis daily, and 38.6% reported using it between two and four times per month. A little less than half of the respondents who indicated that they had used opiates (47.2%) reported using the substance four or more times per week. Of the people who reported that they used cocaine in the past year, 28.6% indicated using the substance four or more times per week. Forty-three percent of the sample indicated having consumed alcohol in the past year; of those, 64.4% reported drinking alcohol once a week or more often, with half indicating that they consumed two to four drinks per sitting and 22% indicating that they consumed one drink per sitting. Furthermore, 17.5% of the sample reported using two or more illicit drugs in the past year.

Data Analytic Procedures—In order to examine the indirect effect of trait anxiety on drug use via emotion dysregulation, we examined a structural equation model (SEM) using M*plus* 6.0 (Muthén & Muthén, 2010). M*plus* utilizes maximum likelihood methods to produce parameter estimates that account for missing data. This approach yields less biased estimates in comparison to listwise and pairwise deletion when data is missing at random (Little & Rubin, 1987). We evaluated model fit using four indices, including: the χ^2 statistic, the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker-Lewis Index, 1973) and the Root Mean Square Error of Approximation (RMSEA; Steiger, 1980).

Latent variables were used to create error-free estimates of our key constructs of interest. Because the DERS encompasses six previously established subscales (Gratz & Roemer, 2004), we used each of these subscales as indicators of a latent emotion dysregulation. We utilized an item parceling approach to model self-reported trait anxiety and drug use by randomly selecting items to create three indicators of trait anxiety and drug use, respectively. This approach has been shown to reduce error variances and improve the reliability of estimated parameters compared to approaches that use single manifest measures (Kishton & Widaman, 1994; Little, Cunningham, Shahar & Widaman, 2002).

First, we examined a measurement model of our constructs to ensure appropriate model fit. Next, we examined a structural mediation model in which the latent trait anxiety factor predicted emotion dysregulation which, in turn, predicted drug use, controlling for participant gender, age, and race/ethnicity. The significance of the indirect effect was determined by estimating a 95% confidence interval band, using the bootstrapping procedure recommended by Preacher and Hayes (2008). As opposed to hypothesis testing which relies on assumptions regarding the normality of the distribution of the indirect effect (such as the Sobel test), bootstrapping procedures do not assume estimates of the indirect effect are normally distributed (Preacher & Hayes, 2008). A 95% confidence interval for the associated indirect effect that excludes 0 is statistically significant.

Results

Patterns of missing data were examined using Little's Missing Completely at Random (MCAR) test (Little, 1988), which suggested that data could be considered MCAR: χ^2 (20) = 29.76, p = .074. Bivariate correlations between all variables can be found in Table 1. Of note, adults who identified as non-Black reported higher levels of trait anxiety. Trait anxiety was also positively associated with greater drug use disorder symptoms and emotion dysregulation. Moreover, drug use was also correlated with emotion dysregulation.

Indirect Effects Model

First, we examined a measurement model of our multiply indicated latent constructs. The measurement model provided an acceptable fit to the data, indicating appropriate relations between latent variables and assigned indicators: χ^2 (51) = 159.50, p < .001; CFI = .94; TLI = 0.92; and RMSEA = .09 [90% CI = .08 to .11]. Next, we examined our proposed mediation model (see Figure 1).

This model fit the data well: χ^2 (81) = 190.56, p < .001; CFI = .94; TLI = 0.92; and RMSEA = .07 [90% CI = .06 to .09]. Findings suggested that identifying as Black was associated with greater emotion dysregulation while identifying as male was associated with greater drug use disorder symptoms. Results also indicated trait anxiety was positively related to emotion dysregulation but not drug use; whereas, emotion dysregulation was associated with drug use. Moreover, the indirect effect of trait anxiety on drug use via emotion dysregulation was significant: std. ind. eff. = .25, *SE* = .12, bootstrapped 95% CI = .03 to .48[1]. In order to test the directionality of the hypothesized effects, we tested a model using a latent trait anxiety factor as the mediator and a latent emotion dysregulation factor as the predictor. The model continued to fit the data well: χ^2 (81) = 185.38, p < .001; CFI = .94; TLI = 0.93; and RMSEA = .08 [90% CI = .06 to .09]. The pathway from emotion dysregulation to trait anxiety was significant (std. beta = 0.78, p < .001); however, the pathway from trait anxiety to a latent drug use problem factor was not significant (std. beta = −0.10, p = .523). Moreover, the indirect effect of emotion dysregulation on drug use disorder symptoms was not significant (std. est. = −0.08, SE = .120, 95% CI = −0.31 to 0.16).

Discussion

Consistent with our hypothesis, this study found that trait anxiety was indirectly associated to drug use disorder symptoms through emotion dysregulation in a sample of low-income adults above and beyond the effects of age, gender, and ethnicity/race. The results contribute in significant ways to the current literature. The empirical literature on the factors that underlie the anxiety–drug use association in low-income community samples is scarce and requires attention given reports that drug use is most pronounced among individuals with lower income and neighborhood disadvantage through increased social stressors and higher

[1]A further model was examined that evaluated alcohol use disorder symptoms (as measured by the Alcohol Use Disorders Identification Test; World Health Organization, 1982) as an additional outcome. The model fit the data well: χ^2 (90) = 204.15, p < .001; CFI = .94; TLI = 0.92; and RMSEA = .07 [90% CI = .06 to .09]. Findings suggest no significant direct effects of anxiety (std. beta = 0.15, p = .275) or emotion dysregulation (std. beta = 0.18, p = .177) on alcohol use disorder symptoms; moreover the indirect effect from anxiety to alcohol use disorder symptoms was not significant (std. est. = 0.15, SE = .11, 95% CI = −0.06 to 0.36).

levels of psychological distress (e.g., Boardman et al., 2001; Johnson et al., 1999). Considered together, these results suggest an important pathway by which anxiety results in drug use and a potential target for future interventions. In fact, the study extends previous findings that unhealthy attempts to regulate emotions may lead to drug use problems among individuals with greater levels of trait anxiety. These results are consistent with existing literature that suggests that anxiety affects individuals' ability to regulate their emotional experiences, driving increases in emotion dysregulation (Hofmann, Sawyer, Fang & Asnaani, 2012). Moreover, individuals with anxiety disorders display more marked difficulties regulating their emotions when induced to worry compared to those without anxiety (McLaughlin, Mennin & Farach, 2007). This may be particularly true in the context of chronic stress related to low socioeconomic status. In fact, the developmental literature suggests that adults who report greater numbers of adverse childhood experiences, also report higher levels of emotion dysregulation and anxiety symptoms (Poole, Dobson, & Pusch, 2017). It may be that these experiences shape stress reactivity patterns (e.g. McLaughlin et al., 2010) and as anxiety symptoms exacerbate experiences of everyday stress, these individuals become increasingly less able to regulate these stress responses. Our results also provide support for negative affect regulation models of drug use (e.g. Baker et al., 2004; Cooper, 1994; Cooper, Frone, Russell, & Mudar, 1995), and are consistent with coping models that posit that individuals engage in drug use to cope with experiences of distress (Khantzian, 1997).

Further, the results suggested that demographic characteristics such as race and gender were differentially related to the study variables. Identifying as Black was associated with higher emotion dysregulation scores assessed by the DERS. The DERS has been used with samples comprised of individuals predominantly identifying as Black (e.g., Hopwood et al., 2015; Weiss et al., 2012) and the present study's mean scores are comparable to those of previous studies. Although the reason for higher mean DERS scores in this subsample are currently unknown, future research should assess invariance across race/ethnicity in this measure as well as examine the impact of race/ethnicity on these relations. Additionally, the study's results indicated that being male was associated with higher drug use disorder symptoms, a finding that aligns with the extant literature that there exist gender differences underlying illicit drug use patterns (Becker & Hu, 2008), with substance use disorders being more prevalent in males (Merikangas & McClaire, 2012).

Findings suggest a number of important clinical and research implications. Although to our knowledge there are no cut-off scores for the trait STAI subscale and the DERS, the sample mean scores were elevated considering that participants were not treatment-seeking. For example, the sample's DERS scores are comparable to the scores of individuals who were in an inpatient substance use treatment facility (Weiss et al., 2011; Hopwood et al., 2015). Furthermore, if we follow the cut-off guidelines for the STAI-trait subscale of a score of 40 and above that has been suggested by some (e.g., Austin et al., 2005), on average the current sample had high trait anxiety. Moreover, more than a third of the sample endorsed problematic drug use disorder symptoms. Combined, the elevated scores in each of the variables assessed suggest that it is critical to provide accessible mental health care consisting of targeted interventions in community centers serving low-income individuals.

Furthermore, these results support targeting emotion dysregulation as a mechanism to prevent or improve drug use outcomes among anxious individuals. Improving emotion dysregulation has been found to be a transdiagnostic predictor of treatment improvement across both anxiety and drug use disorders (Sloan et al., 2017), suggesting treatments targeting emotion dysregulation may critical to developing unified treatments for internalizing and externalizing behaviors. Fortunately, intervention research suggests that emotion dysregulation is a malleable construct, lending itself to specific intervention approaches, such as mindfulness and acceptance-based approaches (Gratz & Tull, 2010). Given these promising findings, it may also be that utilizing interventions that target emotion dysregulation adjunctive to more standard approaches for treating anxiety symptoms (such as cognitive behavioral therapy and exposure treatment) may prevent the onset of hazardous drug use in the longer term.

These findings should be considered within the context of study limitations. Foremost, these data were collected at a single time point, limiting our ability to examine longitudinal relations. Future prospective studies will be critical to establish mediation of emotion dysregulation in temporal relations between these constructs, which is necessary for determining causality (Maxwell & Cole, 2007). This concern may be mitigated in the current study in part by the alternative mediation model that was tested in which emotion dysregulation was specified as a predictor, and trait anxiety as the mediator. Second, all measures were self-report. This may have resulted in bias related to using a single, common method. Future studies should consider including more objective assessment methods, such as biological markers of recent drug use (Snell, Bhave, Takacs & Tabakoff, 2016). Finally, while the use of a low-income, traditionally underserved population is a unique strength of the current study, it is not possible to generalize these findings to samples engaged in either significant drug use or experiencing more impairing levels of anxiety symptoms. Thus, future research should examine these relations among clinical, treatment-seeking populations. The current study did not assess for homelessness; future research is necessary to examine the role of homelessness on the study variables of interest to understand whether these results are as robust in individuals who are low-income relative to those who are homeless. Despite these limitations, the study has various strengths including its focus on a historically underrepresented population in mental health research and the use of latent measures of study constructs.

References

Andrade L, Caraveo-Anduaga JJ, Berglund P, Bijl R, Kessler RC, Demler O, … & Wittchen HU (2000). Cross-national comparisons of the prevalences and correlates of mental disorders. Bulletin of the World Health Organization, 78, 413–425. [PubMed: 10885160]

Austin MP, Hadzi-Pavlovic D, Leader L, Saint K, & Parker G (2005). Maternal trait anxiety, depression and life event stress in pregnancy: relationships with infant temperament. Early human development, 81, 183–190. [PubMed: 15748973]

Baillie AJ, Stapinski L, Crome E, Morley K, Sannibale C, Haber P, & Teesson M (2010). Some new directions for research on psychological interventions for comorbid anxiety and substance use disorders. Drug And Alcohol Review, 29, 518–524. doi:10.1111/j.1465-3362.2010.00206.x [PubMed: 20887575]

Baker TB, Piper ME, McCarthy DE, Majeskie MR, & Fiore MC (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. Psychological Review, 111, 33–51. doi:10.1037/0033-295X.111.1.33 [PubMed: 14756584]

Bandelow B, & Michaelis S (2015). Epidemiology of anxiety disorders in the 21st century. Dialogues in clinical neuroscience, 17, 327–335. [PubMed: 26487813]

Barnes LB, Harp D, & Jung WS (2002). Reliability generalization of scores on the Spielberger State-Trait Anxiety Inventory. Educational and Psychological Measurement, 62, 603–618. doi:10.1177/0013164402062004005

Becker JB, & Hu M (2008). Sex differences in drug abuse. Frontiers in neuroendocrinology, 29, 36–47. [PubMed: 17904621]

Bentler PM (1990). Comparative fit indexes in structural models. Psychological Bulletin, 107, 238–246. doi: 10.1037/0033-2909.107.2.238. [PubMed: 2320703]

Berking M, Margraf M, Ebert D, Wupperman P, Hofmann SG, & Junghanns K (2011). Deficits in emotion-regulation skills predict alcohol use during and after cognitive–behavioral therapy for alcohol dependence. Journal of Consulting and Clinical Psychology, 79, 307–318. doi:10.1037/a0023421 [PubMed: 21534653]

Berman A, Bergman H, Palmstierna T, & Schlyter F (2005). Evaluation of the drug use disorders identification test (DUDIT) in criminal justice and detoxification settings and in a Swedish population sample. European Addiction Research, 11, 22–31. doi: 10.1159/000081413 [PubMed: 15608468]

Boardman JD, Finch BK, Ellison CG, Williams DR, & Jackson JS (2001).Neighborhood disadvantage, stress, and drug abuse among adults. Journal of Health & Social Behavior, 42, 151–165. doi: 10.2307/3090175 [PubMed: 11467250]

Bonn-Miller MO, Vujanovic AA, & Zvolensky MJ (2008). Emotional dysregulation: Association with coping-oriented marijuana use motives among current marijuana users. Substance Use & Misuse, 43, 1653–1665. doi:10.1080/10826080802241292

Brown GW, Harris TO, & Eales MJ (1993). Aetiology of anxiety and depressive disorders in an inner-city population: 1. Early adversity. Psychological Medicine. 23, 143–154. doi: 10.1017/S0033291700038939 [PubMed: 8475202]

Calkins SD, Hill A (2007). Caregiver influences on emerging emotion regulation: Biological and environmental transactions in early development In Gross JJ (Ed.), Handbook of emotion regulation. (1st ed., pp. 249–248) New York, NY: The Guliford Press.

Cooper ML (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. Psychological Assessment. 6 117–128. doi: 10.1037/1040-3590.6.2.117.

Cooper ML, Frone MR, Russell M, & Mudar P (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. Journal of Personality and Social Psychology, 69, 990–1005. doi:10.1037/0022-3514.69.5.990 [PubMed: 7473043]

Department of Health and Human Services (2019). 2019 Federal Poverty Guidelines. Federal Register. 84 (22), 1167–1168. Retrieved from https://www.federalregister.gov/documents/2019/02/01/2019-00621/annual-update-of-the-hhspoverty-guidelines

DuPont RL, Rice DP, Miller LS, Shiraki SS, Rowland CR, & Harwood HJ (1996). Economic costs of anxiety disorders. Anxiety, 2, 167–172. doi: 10.1002/(SICI)1522-7154 [PubMed: 9160618]

Grant BF, Stinson FS, Dawson DA, Chou P, Dufour MC, Compton W, & … Kaplan K (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the National epidemiologic survey on alcohol and related conditions. Archives of General Psychiatry, 61, 807–816. doi:10.1001/archpsyc.61.8.807 [PubMed: 15289279]

Gratz KL, & Roemer L (2008). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale: Erratum. Journal of Psychopathology and Behavioral Assessment, 30, 315. doi:10.1007/s10862-008-9102-4

Gratz KL, & Tull MT (2010). Emotion regulation as a mechanism of change in acceptance- and mindfulness-based treatments In Baer RA, Baer RA (Eds.), Assessing mindfulness and acceptance

processes in clients: Illuminating the theory and practice of change (pp. 107–133). Oakland, CA, US: Context Press/New Harbinger Publications

Gross JJ (2002). Emotion regulation: Affective, cognitive, and social consequences. Psychophysiology, 39, 281–291. doi:10.1017/S0048577201393198 [PubMed: 12212647]

Hishinuma ES, Miyamoto RH, Nishimura ST, Nahulu LB, Andrade NN, Makini GJ, & … Guerrero AS (2000). Psychometric properties of the State–Trait Anxiety Inventory for Asian/Pacific-Islander adolescents. Assessment, 7, 17–36. doi:10.1177/107319110000700102 [PubMed: 10668003]

Hofmann SG, Sawyer AT, Fang A, & Asnaani A (2012). Emotion dysregulation model of mood and anxiety disorders. Depression and anxiety, 29, 409–416. [PubMed: 22430982]

Hopwood CJ, Schade N, Matusiewicz A, Daughters SB, & Lejuez CW (2015). Emotion regulation promotes persistence in a residential substance abuse treatment. Substance use & misuse, 50, 251–256.doi: 10.3109/10826084.2014.977393 [PubMed: 25404467]

Johnson JG, Cohen P, Dohrenwend BP, Link BG, & Brook JS (1999). A longitudinal investigation of social causation and social selection processes involved in the association between socioeconomic status and psychiatric disorders. Journal of Abnormal Psychology, 108, 490–499. doi:10.1037/0021-843X.108.3.490 [PubMed: 10466273]

Kabacoff RI, Segal DL, Hersen M, & Van Hasselt VB (1997). Psychometric properties and diagnostic utility of the Beck anxiety inventory and the state-trait anxiety inventory with older adult psychiatric outpatients. Journal of Anxiety Disorders, 11, 33–47. doi:10.1016/S0887-6185(96)00033-3 [PubMed: 9131880]

Khantzian EJ (1997). The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. Harvard Review of Psychiatry, 4, 231–244. doi:10.3109/10673229709030550 [PubMed: 9385000]

Kilpatrick DG, Acierno R, Saunders B, Resnick HS, Best CL, & Schnurr PP (2000). Risk factors for adolescent substance abuse and dependence: Data from a national sample. Journal of consulting and clinical psychology, 68, 19–30. [PubMed: 10710837]

Kishton JM, & Widaman KF (1994). Unidimensional versus domain representative parceling of questionnaire items: An empirical example. Educational and Psychological Measurement, 54, 757–765.

Lai HX, Cleary M, Sitharthan T, & Hunt GE (2015). Prevalence of comorbid substance use, anxiety and mood disorders in epidemiological surveys, 1990–2014: A systematic review and meta-analysis. Drug and Alcohol Dependence, 151, 1541–13. doi:10.1016/j.drugalcdep.2015.05.031

Linehan MM, Heard HL (1992) Dialectical behavior therapy for borderline personality disorder In Clarkin JF, Marziali E, Munroe-Blum H (Eds.), Borderline Personality Disorder: Clinical and Empirical Perspectives (pp 248–267). New York: Guilford Press.

Little RJ (1988). A test of missing completely at random for multivariate data with missing values. Journal of the American statistical Association, 83, 1198–1202.

Little TD, Cunningham WA, Shahar G, & Widaman KF (2002). To parcel or not to parcel: Exploring the question, weighing the merits. Structural equation modeling, 9, 151–173.

Little R & Rubin D (1987). Statistical analysis with missing data. Hoboken, NJ: Wiley.

McLaughlin KA, Kubzansky LD, Dunn EC, Waldinger R, Vaillant G, & Koenen KC (2010). Childhood social environment, emotional reactivity to stress, and mood and anxiety disorders across the life course. Depression and Anxiety, 27, 1087–1094. doi:10.1002/da.20762 [PubMed: 21132844]

McLaughlin KA, Mennin DS, & Farach FJ (2007). The contributory role of worry in emotion generation and dysregulation in generalized anxiety disorder. Behaviour Research and Therapy, 45, 1735–1752. doi:10.1016/j.brat.2006.12.004 [PubMed: 17270145]

Mennin DS, Heimberg RG, Turk CL and Fresco DM (2005) Preliminary evidence for an emotion dysregulation model of generalized anxiety disorder. Behaviour Research and Therapy, 43, 1281–1310. 10.1016/j.brat.2004.08.008 [PubMed: 16086981]

Merikangas KR, & McClair VL (2012). Epidemiology of substance use disorders. Human genetics, 131, 779–789. [PubMed: 22543841]

Miech RA, Caspi A, Moffitt TE, Wright BE, & Silva PA (1999). Low socioeconomic status and mental disorders: A longitudinal study of selection and causation during young adulthood. American Journal of Sociology, 104, 1096–1131. doi:10.1086/210137

Muthén LK, & Muthén BO (2010). Mplus user's guide, v. 6.1 Los Angeles, CA: Muthén & Muthén.

Paulus DJ, Bakhshaie J, Ditre JW, Viana AG, Garza M, Valdivieso J, & … Zvolensky MJ (2017). Emotion dysregulation in the context of pain and alcohol use among latinos in primary care. Journal of Studies on Alcohol and Drugs, 78, 938–944. doi: 10.15288/jsad.2017.78.938 [PubMed: 29087830]

Poole JC, Dobson KS, & Pusch D (2017). Anxiety among adults with a history of childhood adversity: Psychological resilience moderates the indirect effect of emotion dysregulation. Journal of affective disorders, 217, 144–152. [PubMed: 28410477]

Preacher KJ, & Hayes AF (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40, 879–891. doi:10.3758/BRM.40.3.879 [PubMed: 18697684]

Rad MS, Martingano AJ, & Ginges J (2018). Toward a psychology of Homo sapiens: Making psychological science more representative of the human population. Proceedings of the National Academy of Sciences, 115, 11401–11405.

Santiago CD, Wadsworth ME, & Stump J (2011). Socioeconomic status, neighborhood disadvantage, and poverty-related stress: Prospective effects on psychological syndromes among diverse low-income families. Journal of Economic Psychology, 32, 218–230.

Shedler J, & Westen D (2004). Refining Personality Disorder Diagnosis: Integrating Science and Practice. American Journal of Psychiatry, 161, 1350–1365. doi:10.1176/appi.ajp.161.8.1350 [PubMed: 15285958]

Snell LD, Bhave SV, Takacs L, & Tabakoff B (2016). Biological Markers of Substance Use: Focus on the Objective Assessment of Alcohol. The Oxford handbook of substance use and substance use disorders, 2, 393–429. doi: 10.1093/oxfordhb/9780199381708.013.23

Sobell LC, Kwan E, & Sobell MB (1995). Reliability of a drug history questionnaire (DHQ). Addictive behaviors, 20(2), 233–241. doi: 10.1016/0306-4603(94)00071-9 [PubMed: 7484317]

Spielberger CD (2010). State-Trait anxiety inventory. John Wiley & Sons, Inc. doi: 10.1002/9780470479216.corpsy0943

Sloan E, Hall K, Moulding R, Bryce S, Mildred H, & Staiger PK (2017). Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: A systematic review. Clinical Psychology Review, 57, 141–163. doi:10.1016/j.cpr.2017.09.002 [PubMed: 28941927]

Smith JP, & Book SW (2010). Comorbidity of generalized anxiety disorder and alcohol use disorders among individuals seeking outpatient substance abuse treatment. Addictive Behaviors, 35, 42–45. [PubMed: 19733441]

Solomon RL, & Corbit JD (1974). An opponent-process theory of motivation: I. Temporal dynamics of affect. Psychological Review, 81, 119–145. [PubMed: 4817611]

Steiger JH, Lind JM (1980). Statistically based tests for the number of common factors Paper presented at the Psychometrika Society meeting, Iowa City, Iowa.

Tucker LR, Lewis CA (1973). Reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1–10. doi: 10.1007/BF02291170

Vautier S (2004). A Longitudinal SEM Approach to STAI Data: Two comprehensive multitrait-multistate models. Journal of Personality Assessment, 83, 167–179. doi:10.1207/s15327752jpa8302_11 [PubMed: 15456653]

Voluse AC, Gioia CJ, Sobell LC, Dum M, Sobell MB, & Simco ER (2012). Psychometric properties of the drug use disorders identification test (DUDIT) with substance abusers in outpatient and residential treatment. Addictive Behaviors, 37, 36–41. doi:10.1016/j.addbeh.2011.07.030 [PubMed: 21937169]

Whiteford HA, Degenhardt L, Rehm J, Baxter AJ, Ferrari AJ, Erskine HE, & … Vos T (2013). Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. The Lancet, 382, 1575–1586. doi:10.1016/S0140-6736(13)61611-6

Weinberg A, & Klonsky E (2009). Measurement of emotion dysregulation in adolescents. Psychological Assessment, 21, 616–621. doi: 10.1037/a0016669 [PubMed: 19947794]

Weiss NH, Tull MT, Viana AG, Anestis MD, & Gratz KL (2012). Impulsive behaviors as an emotion regulation strategy: Examining associations between PTSD, emotion dysregulation, and impulsive behaviors among substance dependent inpatients. Journal of anxiety disorders, 26, 453–458 [PubMed: 22366447]

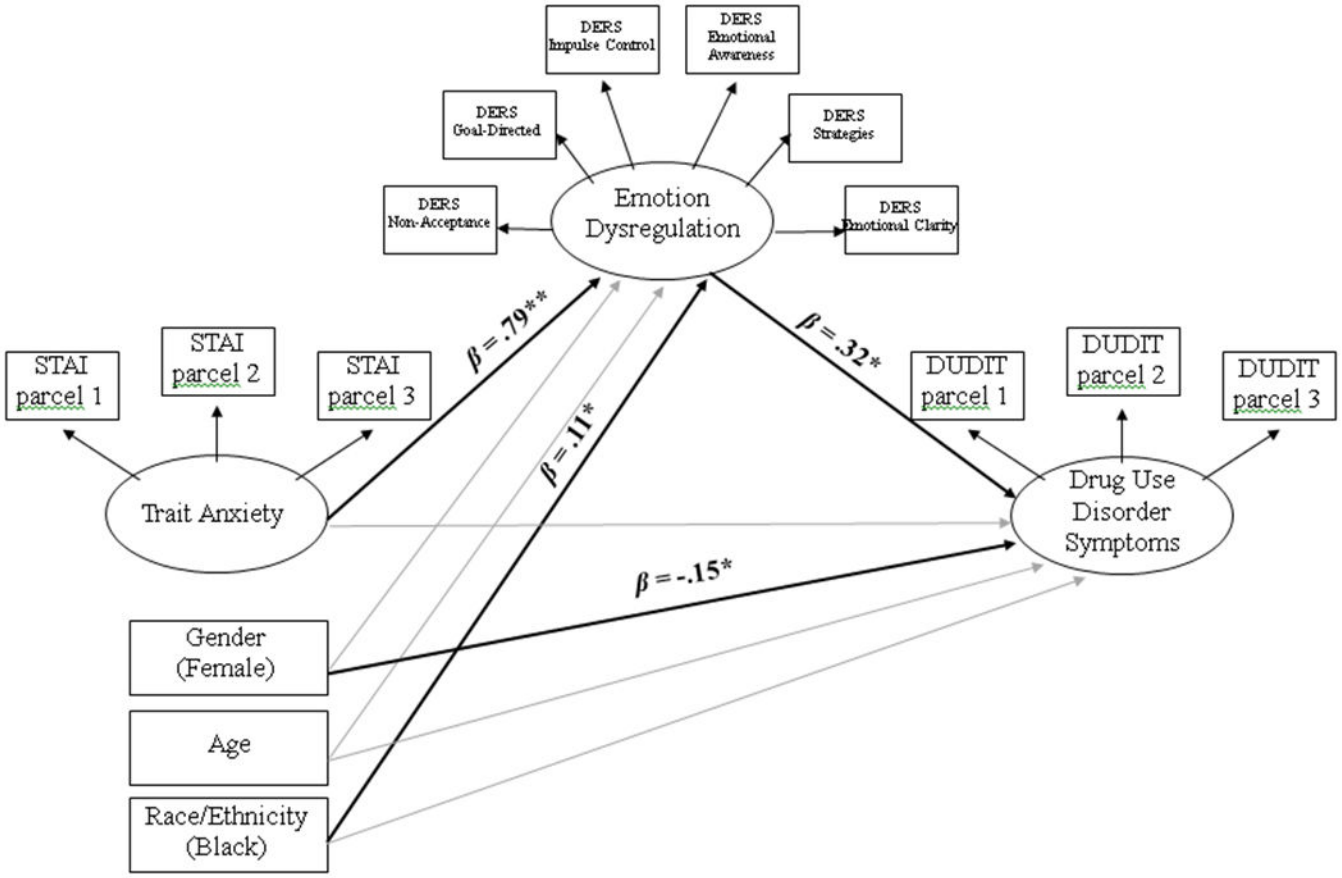

Figure 1.

Standardized estimates for indirect effects model.

Note. Paths represented in bold are significant. STAI = State Trait Anxiety Inventory; DERS = Difficulties in Emotion Regulation Scale; DUDIT = Drug Use Disorders Identification Test. *$p < .05$, **$p < .01$

Table 1.

Intercorrelations among Emotion Dysregulation, Trait Anxiety, and Drug Use Disorder Symptoms

Variable	1.	2.	3.	4.	5.	6.
1. Gender	---					
2. Age	0.040	---				
3. Black Race	−0.002	0.271**	---			
4. Trait Anxiety	0.085	−0.084	−0.138*	---		
5. Drug Use Disorder Symptoms	−0.152*	0.033	0.029	0.165*	---	
6. Emotion Dysregulation	0.061	−0.048	−0.011	0.718**	0.217**	---

*Note. $p < 0.05$,

**$p < 0.01$.

Black Race and female gender coded as 1. Emotion Dysregulation was measured with the Difficulties in Emotion Regulation Scale (Gratz and Roemer, 2004), Trait Anxiety with the State-Trait Anxiety Inventory for Trait Anxiety (Spielberger, 1989), and Drug Use Disorder Symptoms with the Drug Use Disorders Identification Test (Berman, Bergman, Palmstieran & Schlyter, 2005).

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