The Role of Negative Life Events in Comorbid Reactive Aggression and Marijuana Use Initiation among Latino Adolescents

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The Role of Negative Life Events in Comorbid Reactive Aggression and Marijuana Use Initiation among Latino Adolescents

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Compelling epidemiological evidence shows that marijuana use is highly comorbid with aggressive behavior, particularly among adolescents and young adults; yet the causal nexus between these 2 phenomena remains elusive. To better understand the comorbidity of specific subtypes of aggression and marijuana use, this study evaluated associations between proactive and reactive aggression and marijuana use initiation and examined whether negative life events (NLEs) partially accounted for the link between reactive aggression and marijuana use initiation in a sample of Latino adolescents (N = 144, 54% male, mean age = 16.25 years).
Negative Life Events, Aggression, and Marijuana Use

Results indicated that approximately 43% of participants had tried marijuana. NLEs were associated with both marijuana use initiation and reactive aggression, but were unrelated to proactive aggression, thereby providing support for similar environmental correlates for reactive aggression and marijuana use. Further, a test of indirect effects suggested that NLEs partially accounted for the link between reactive aggression and marijuana use initiation, with NLEs accounting for 14% of the variance in this association. Implications for intervention and future directions for research are discussed.

KEYWORDS aggression, environmental stressors, substance use, youth

A link between aggression and substance use in adolescence has been established in the literature (e.g., Herrenkohl, Catalano, Hemphill, & Toumbourou, 2009), and comorbid aggression and substance use are associated with poorer long-term outcomes than these behaviors in isolation (Thompson, Connelly, Thomas-Jones, & Eggert, 2013). However, not all aggressive youth engage in substance use. Further, there is growing evidence to suggest that subtypes of aggression, particularly proactive (goal-oriented) versus reactive (retaliatory) aggression might be differentially related to specific substance use outcomes (Fite, Schwartz, & Hendrickson, 2012). Thus, a better understanding of the factors that contribute to links between the aggression subtypes and adolescents’ use of various substances is important for the development of targeted and specified prevention and intervention strategies. Negative life events (NLEs), or stressful occurrences that are beyond normal life stressors, have been found to be associated with both substance use and aggressive behavior (e.g., Estrada-Martínez, Caldwell, Schulz, Diez-Roux, & Pedraza, 2013; Low et al., 2012) and reactive aggression in particular (Fite, Wimsatt, Elkins, & Grassetti, 2012). Therefore, NLEs might be a common risk factor that accounts for the association between reactive aggression and substance use.

Given that marijuana is the most commonly used illicit drug among adolescents in the United States (Johnston, O’Malley, Miech, Bachman, & Schulenberg, 2014), it is essential that relationships between the functions of aggression and marijuana use specifically be further examined and the role of NLEs in these associations be evaluated. Indeed, the complex relationship between marijuana use and aggression remains partially unclear, although the association between these phenomena has been extensively documented by multiple epidemiological studies (Ostrowsky, 2011). This study examines whether NLEs account for the association between aggression subtypes and marijuana use initiation in a sample of Latino adolescents, a group of youth
who have been found to be at risk for both NLEs and early substance use, and marijuana use in particular (Johnston et al., 2014; Parsai, Marsiglia, & Kulis, 2010).

PROACTIVE AND REACTIVE FUNCTIONS OF AGGRESSION AND SUBSTANCE USE

Aggressive behavior is commonly divided into subtypes, which are distinguished according to their underlying function or motivation (e.g., Dodge, 1991; Dodge & Coie, 1987; Fite, Rathert, Colder, Lochman, & Wells, 2012). Proactive aggression is characterized by actions that do not require provocation and are deliberate, offensive, and motivated by anticipated rewards. In contrast, reactive aggression refers to retaliatory behavior that occurs in response to perceived provocations or threats. These aggression subtypes are distinct at a theoretical level. Proactive aggression appears to be best explained by social learning theory, which posits that individuals use aggression after learning that it can help them obtain desired objects and goals (Bandura, 1986; Card & Little, 2006). Reactive aggression, on the other hand, is consistent with the frustration-aggression model, which suggests that aggression is an angry and hostile response directed toward someone or something perceived as a threat (Berkowitz, 1993; Card & Little, 2006). Despite their statistical overlap, exploratory and confirmatory factor analyses have provided ample support for the distinction between proactive and reactive aggression (e.g., Crick & Dodge, 1996; Dodge & Coie, 1987; Fite, Colder, & Pelham, 2006; Poulin & Boivin, 2000). Further, these subtypes of aggression are differentially associated with psychological, behavioral, and social outcomes in childhood and adolescence, with proactive aggression more strongly linked to antisocial outcomes and reactive aggression more strongly linked to internalizing symptoms and peer rejection (Fite, Rathert, et al., 2012; Vitaro & Brendgen, 2011).

From a theoretical perspective, both proactive and reactive aggression could be linked to substance use, including marijuana use. Proactive aggression might be linked to substance use via a developmental model of risk for antisocial behavior, which suggests that engagement in antisocial behavior (including substance use) in early childhood leads to a more chronic display of such behavior that escalates in severity over time (Moffitt, 2003). Although reactive aggression does not appear to follow this same developmental progression of antisocial behavior, there are many reasons this subtype of aggression might be linked to substance use. In particular, impulsivity is a risk factor for substance use (Acton, 2003; Moeller & Dougherty, 2002), and impulsivity is a hallmark characteristic of reactive aggression (Fite, Rathert, et al., 2012). Further, reactive aggression is associated with the experience of negative emotions, including depressive and anxiety-related symptoms (Card
Negative Life Events, Aggression, and Marijuana Use

The Role of Negative Life Events

NLEs are life-altering experiences that require adjustments to manage and cope with the changes that have occurred (Fink, 2010; Nou, 2009), including parental divorce, witnessing or being the victim of a crime or assault, living with a severe illness, attending a new school, a parent going to jail, a parent getting a new job, a parent getting in trouble with the law, and having a family member with a mental, emotional, drug, or alcohol problem (Swearingen & Cohen, 1985). NLEs have been associated with a variety of externalizing behaviors (Buehler & Gerard, 2013; Katz, Esparza, Smith Carter, Grant, & Meyerson, 2012; K. M. King, Molina, & Chassin, 2008; Oliva, Jiménez, & Parra, 2009; Zinzow et al., 2009), including aggression (Estrada-Martínez et al., 2013). However, only two known studies to date have examined associations between NLEs and aggressive subtypes and both found a specific link with reactive aggression (Fite, Wimsatt, et al., 2012; Silvern & Griese, 2012). For example, in a community sample of 147 school-age youth, Fite, Wimsatt, et al. (2012) found a unique association between NLEs and reactive, but not proactive, aggression. These findings are consistent with the

THE ROLE OF NEGATIVE LIFE EVENTS

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stress-process framework, which suggests that NLEs might result in poor behavioral and emotional regulation (Roosa et al., 2010; Thoits, 1983; Turner & Finkelhor, 1996), which is a key component of reactive aggression (Fite, Rathert, et al., 2012).

Similarly, poor emotion and behavioral regulation are linked with substance use, including marijuana use (Bonn-Miller, Vujanovic, Boden, & Gross, 2011; Simons, Gaher, Correia, Hansen, & Christopher, 2005; Wills, Walker, Mendoza, & Ainetett, 2006). The behavioral and emotional regulation deficits resulting from exposure to NLEs could also manifest into the use of substances due to poor impulse control. Indeed, the association between NLEs and substance use is robust (Low et al., 2012; Windle & Wiesner, 2004).

For example, Roosa and colleagues (2010) identified a significant path between stressful life experiences (e.g., family conflict, financial difficulties) and youth’s externalizing problems (including substance use) in a sample of Latino fifth graders. Additionally, one longitudinal study with the largest group of participants in the sample identifying as Hispanic or Latino (44.8%) found that youth with exposure to family conflict demonstrated greater risk for development of substance use disorders (Skeer, McCormick, Normand, Buka, & Gilman, 2009).

Specific to marijuana use, in a national sample of youth aged 12 to 17 years, findings revealed an increased risk for past-year substance use disorder (marijuana use specifically) as well as an earlier age of substance use onset for youth who witnessed violence or were exposed to assault, physical abuse, or sexual abuse (Kilpatrick et al., 2000). Moreover, findings from a prospective study on marijuana users revealed that NLEs (e.g., separation from someone important, financial crisis, serious injury) independently predicted the change from nondependent marijuana use to marijuana use dependency (van der Pol et al., 2013).

Given the role of NLEs in both reactive aggression and substance use, the association between reactive aggression and marijuana use might be in part due to the experience of NLEs. Accordingly, this study examined whether NLEs partially account for the link between reactive aggression and lifetime marijuana use in a sample of adolescents.

**THIS STUDY**

In sum, more research evaluating the link between aggression subtypes and the use of specific substances is needed due to the negative outcomes associated with their comorbidity. Moreover, it is important to further evaluate factors that contribute to the cooccurrence of aggression subtypes and substance use so that effective prevention and intervention strategies can be developed. The goal of this study was to further evaluate the links between proactive and reactive aggression and marijuana use initiation by evaluating
whether NLEs partially accounted for these associations. NLEs were expected to account for the link between reactive, but not proactive, aggression and marijuana use initiation.

Latino youth appear to be at increased risk of experiencing NLEs (Knight, Virdin, Ocampo, & Roosa, 1994), likely due to factors such as low socioeconomic status and discrimination (Buchanan & Smokowski, 2009; Knight et al., 1994; Wagner et al., 2010). Moreover, the highest rates of marijuana use throughout adolescence are among Latino youth (Johnston et al., 2014). Therefore, associations were examined in a sample of Latino high school students.

METHODS

Participants

Participants included 144 (54% male) Latino adolescents recruited from a charter high school in a large, Midwestern city. Of the 207 students attending the school, 155 (77%) consented to participate. However, due to absences during data collection, only 152 students (98%) completed the survey. The sample used in this study only included the 144 students who self-identified as Latino. Ages of participants ranged from 14 to 19 years ($M = 16.25$, $SD = 1.46$), and the school reported that 95.4% of the students qualified for free or reduced-price lunch, suggesting that the sample was primarily of low socioeconomic status.

Measures

DEMOGRAPHICS

Students were asked a variety of demographic questions including those about gender, age, and ethnicity (e.g., “Hispanic or Latino” or “not Hispanic or Latino”).

PROACTIVE AND REACTIVE AGGRESSION

Dodge and Coie’s (1987) proactive and reactive aggression questionnaire was used to assess adolescent-reported levels of proactive and reactive aggression. The measure includes a total of six items, with three items used to assess proactive aggression (e.g., “I threaten or bully others in order to get my own way”) and three items used to assess reactive aggression (e.g., “When I have been teased or threatened, I get angry easily and strike back”). Participants responded using a 5-point Likert scale ranging from 1 (never) to 5 (almost always). Items were averaged, with higher scores indicating
greater levels of aggressive behavior. Internal consistencies for proactive and reactive aggression were .75 and .84, respectively.

**NEGATIVE LIFE EVENTS**

Students completed a 26-item NLEs questionnaire developed by Swearingen and Cohen (1985). Participants were asked whether or not they had experienced a variety of events over the past year (1 = yes, 0 = no), including “saw crime/accident,” “brother or sister left home,” and “parent went to jail.” A sum score of NLEs was calculated, such that higher scores indicated a greater number of NLEs. Due to the dichotomous nature of the items, an internal consistency of the measure was not calculated (Cohen, Cohen, West, & Aiken, 2003).

**MARIJUANA USE INITIATION**

Lifetime marijuana use was assessed using an item from the Center for Substance Abuse Prevention Student Survey (Pentz et al., 1989). In this study, one yes–no item was used to evaluate the lifetime use of marijuana (i.e., “Have you ever tried marijuana?”).

**Procedures**

The researchers’ institutional review board as well as the school administration provided approval for the study. During parent–teacher conferences, a table was set up in the main hallway of the school where researchers provided parents with information regarding the study. Due to the large Spanish-speaking population within the school, consent forms were provided in both English and Spanish. Further, school-sanctioned translators were available to answer questions and provide information to parents during recruitment. If the parents were not available during parent–teacher conferences, copies of the consent form were sent home with the student. Students who were 18 or older were able to provide their own written consent.

Adolescents provided verbal assent just prior to participation. Student surveys took approximately 30 minutes to complete and were administered during a required writing course. Only students who had written consent remained in the room during the survey. Further, school personnel were not permitted in the room during survey administration to ensure confidentiality and increase accuracy in reporting. One researcher was assigned to administer the surveys to each classroom. Students were reminded that their name would not be associated with any of their responses. This was emphasized to ease any concerns of those whose families were not legal residents of the United States. All questions were read out loud by the researchers, thereby
eliminating concerns regarding reading level. Further, Spanish surveys were
made available for students who might have difficulty understanding the
English version. However, only three students completed the Spanish version
of the survey. Students were compensated $5.00 for their participation.

Data Analytic Plan
Correlations were first estimated to evaluate bivariate associations. A path
model was then estimated using Mplus statistical software (L. K. Muthén &
Muthén, 2012) to evaluate whether NLEs accounted for the link between
reactive aggression and marijuana use initiation. Specifically, marijuana use
initiation was simultaneously regressed on reactive aggression, NLEs, age,
and gender, and NLEs were regressed on reactive aggression, age, and gen-
der. Due to the dichotomous nature of the marijuana use initiation variable,
weighted least squares estimation with a mean and variance adjusted
chi-square statistic (WLSMV) was used in this study (B. O. Muthén, 1984).

The biased corrected bootstrap method was used to evaluate the role
of NLEs in the link between reactive aggression and marijuana use initiation
(MacKinnon, Lockwood, & Williams, 2004). This method has been found to
provide a more accurate balance between Type I and Type II errors than
other methods used to test for indirect effects (MacKinnon et al., 2004). Five
hundred bootstrap samples and the 95% bias-corrected confidence intervals
(CIs) were used to test the significance of indirect effects. To further evaluate
the magnitude of the indirect effect, we calculated the percentage of the total
effect that was accounted for by NLEs (MacKinnon & Dwyer, 1993).

RESULTS
Descriptive Statistics
Approximately 43% of the sample reported having initiated marijuana use,
and 96.5% of students had experienced at least one NLE within the past
year. Correlations among study variables, along with means and standard
deviations, can be found in Table 1. Proactive and reactive aggression were
strongly positively associated, sharing approximately 37% of their variance.
Both proactive and reactive aggression were moderately positively associated
with marijuana use initiation. NLEs were positively associated with marijuana
use and reactive aggression, but unrelated to proactive aggression.

Path Analysis
A path model within a structural equation modeling framework was then esti-
mated to determine if NLEs partially accounted for the link between reactive
TABLE 1  Correlations, Means, and Standard Deviations

<table>
<thead>
<tr>
<th>Variables</th>
<th>Gender</th>
<th>Age</th>
<th>Negative life events</th>
<th>Proactive aggression</th>
<th>Reactive aggression</th>
<th>Marijuana use initiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative life events</td>
<td>.15</td>
<td>-.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proactive aggression</td>
<td>-.08</td>
<td>.02</td>
<td>.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactive aggression</td>
<td>.02</td>
<td>-.05</td>
<td>.19**</td>
<td>.61**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marijuana use initiation</td>
<td>-.12</td>
<td>.11</td>
<td>.27**</td>
<td>.29**</td>
<td>.24**</td>
<td></td>
</tr>
</tbody>
</table>

\( M \)  —  16.25  7.90  1.42  2.43  —  
\( SD \)  —  1.46  5.04  0.76  0.86  —

Note. Gender: 1 = male, 2 = female; Marijuana use: 0 = no, 1 = yes.
*p < .05.  **p < .01.

TABLE 2  Results of Path Analysis

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Negative life events</th>
<th>Marijuana use initiation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Path estimate</td>
<td>Standard error</td>
</tr>
<tr>
<td>Age</td>
<td>-.22</td>
<td>.27</td>
</tr>
<tr>
<td>Gender</td>
<td>1.33</td>
<td>.84</td>
</tr>
<tr>
<td>Reactive aggression</td>
<td>.96*</td>
<td>.46</td>
</tr>
<tr>
<td>Negative life events</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*p < .05.

aggression and marijuana use initiation. Reactive aggression was positively associated with NLEs (see Table 2). Further, as expected, when marijuana use initiation was simultaneously regressed on reactive aggression and NLEs, both variables were significantly associated with marijuana use initiation (see Table 2). The test of indirect effects suggested that NLEs partially accounted for the link between reactive aggression and marijuana use initiation \((B = .06, 95\% \text{ CIs } [.01, .15])\), with NLEs accounting for approximately 14% of the variance in this association.

**DISCUSSION**

A better understanding of factors that influence the cooccurrence of specific subtypes of aggressive behavior and the use of various substances is necessary for more effective prevention and intervention, as the comorbidity of these behavioral difficulties is associated with more severe long-term prognoses (e.g., Thompson et al., 2013). Accordingly, this study examined whether NLEs partially accounted for the link between aggression subtypes and marijuana use initiation in a sample of Latino youth.
Consistent with expectations and previous research (Fite et al., 2008; Fite et al., 2010), proactive aggression was positively associated with marijuana use initiation. Proactive aggression is likely associated with marijuana and other substances due to a developmental model of risk, suggesting that those who engage in aggressive behavior are on a trajectory to engage in further and more serious antisocial behavior, which includes early substance use (Moffitt, 2003).

Also, as expected and congruent with previous research (Fite et al., 2008; Fite et al., 2010), reactive aggression was positively associated with marijuana use initiation. Reactive aggression is likely associated with substance use for a variety of reasons, including underlying impulsivity (Acton, 2003; Moeller & Dougherty, 2002) and use of substances for coping and self-medicating purposes (Hussong & Hicks, 2003; S. M. King et al., 2004; Measelle et al., 2006).

Further, NLEs were positively associated with both marijuana use initiation and reactive aggression, but were unrelated to proactive aggression. The link between NLEs and marijuana use initiation and reactive aggression but not proactive aggression is consistent with previous findings (Fite, Wimsatt, et al., 2012; van der Pol et al., 2013). These associations appear to suggest a unique common risk factor for reactive aggression and marijuana use initiation. Indeed, the test of indirect effects suggested that NLEs partially accounted for the link between reactive aggression and marijuana use initiation. In line with the stress-process framework, which posits that NLEs result in poor behavioral and emotional regulation (Roos et al., 2010; Thoits, 1983; Turner & Finkelhor, 1996), it appears that both reactive aggression and substance use are likely outcomes of the poor regulation stemming from NLEs. That is, poor behavioral and emotional regulation is associated with both reactive aggression and marijuana use (e.g., Bonn-Miller et al., 2011; Fite, Rathert, et al., 2012; Simons et al., 2005), and NLEs appear to be one of the causes of poor regulation that contributes to both reactive aggression and marijuana use initiation.

Current findings need to be evaluated in light of study limitations. First, this study relied solely on adolescent report of study measures. Although adolescents have been found to be accurate informants of their externalizing behavior (Dolcini, Adler, & Ginsberg, 1996; Rosenbaum, 2009), future research should aim to include multiple informants of adolescent behavior (e.g., parents, teachers) to correct for mono-informant biases. Also note that marijuana use initiation was assessed using only a single item. Although this is a common approach to assessing lifetime use, future research more extensively evaluating marijuana use would be useful. It is also important to note that only initiation was assessed, and therefore it is not clear how many of these youth continue to use. There is likely a wide range of use patterns represented within the 43% of youth who indicated marijuana use initiation. Future research examining marijuana use frequency would be useful.
in understanding comorbid aggression and marijuana use. Further, this study is cross-sectional in nature. Thus, bidirectional and causal relations could not be examined. Additionally, the sample was comprised of Latino youth attending a charter school aimed specifically at improving the academic, occupational, and social outcomes of the youth who attend. Accordingly, the findings need to be replicated in various populations to establish the generalizability of results.

Despite these limitations, this study provides further empirical evidence to suggest that proactive and reactive aggression are associated with substance use through different mechanisms and pathways. In particular, findings indicate that NLEs play a role in comorbid reactive, but not proactive, aggression and marijuana use initiation. The experience of NLEs likely elicits negative emotions that warrant intervention for the prevention of these problem behaviors. Although cognitive behavioral interventions have been found to reduce negative emotions among adolescents (David-Ferdon & Kaslow, 2008), further research is needed to determine if these strategies can be effective in preventing reactively aggressive behavior and marijuana use for youth who experience NLEs.

There are many avenues in need of pursuit in this line of research, including the examination of additional factors that might account for and contribute to comorbid aggression and substance use, to further inform intervention. For example, issues of acculturation have been found to contribute to problem behavior, including both aggression and substance use (e.g., Gonzales, Knight, Morgan-Lopez, Saenz, & Siroli, 2002; Vega, Sribney, Aguilar-Gaxiola, & Kolody, 2004), and future research examining the role of acculturation in these associations is warranted.

Another interesting area for future research is the interplay between genetic and environmental influences on these associations. Indeed, ample evidence has established that the vulnerability for reactive aggression is heritable (Baker, Raine, Liu, & Jacobson, 2008; Brendgen, Vitaro, Boivin, Dionne, & Pérusse, 2006; Di Lalla, 2002). The multiple genetic factors implicated in this predisposition appear to be primarily related to the functional regulation of monoaminergic neurotransmitters, such as serotonin and dopamine (Bortolato et al., 2013; Coccaro, 1989; Lesch & Merschdorf, 2000; Nelson & Trainor, 2007). Neurodevelopmental alterations in the homeostasis of these systems are likely to produce endophenotypical perturbances that might facilitate the ontogeny of reactive aggression and marijuana use in response to NLEs or other environmental adversities. In particular, the gene encoding for monoamine oxidase A (MAOA)—the primary enzyme catalyzing monoamine degradation in the brain (Bortolato, Chen, & Shih, 2008)—has been consistently highlighted as a key genetic moderator of the interplay between early trauma and reactive aggression (Caspi et al., 2002; Fergusson, Boden, Horwood, Miller, & Kennedy, 2011; Kim-Cohen et al., 2006; Williams et al., 2009). Notably, recent findings indicate that the interaction of stressful
life experiences and polymorphic MAOA variants influences the likelihood of marijuana initiation in males (Stogner & Gibson, 2013). Further studies are warranted to reveal how MAOA and other genetic factors might interact with NLEs to influence the predisposition to the comorbidity of marijuana use and aggression. A greater understanding of the molecular bases underpinning these interplays might lead to the development of tailored interventions with greater efficacy for the prevention or early treatment of reactive aggression and substance abuse.

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