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## The role of perceived discrimination in substance use trajectories in Hispanic young adults: A longitudinal cohort study from high school through emerging adulthood.

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### Abstract

**Purpose:** Associations between discrimination and substance use have been identified cross-sectionally in multiple populations including Hispanics. However, there is limited research exploring this phenomenon longitudinally in Hispanic youth over the transition from adolescence through emerging adulthood (EA).

**Methods:** Hispanic youth in Southern California (n=1457) completed surveys over 11 years, from 2006 to 2017, including three high school collection waves and five EA collection waves. Multinomial logistic regression models were used to explore the associations between perceived discrimination during high school and cigarette and marijuana use in both high school and EA, controlling for gender, socioeconomic status, acculturation, and EA discrimination.

**Results:** Compared with those who never used cigarettes or marijuana in high school and EA, perceived discrimination in high school was a significant predictor of two patterns of use: high school initiators who discontinued use of smoking (RRR=1.677, 95%CI=1.292–2.176) and/or marijuana (RRR=1.464, 95%CI=1.162–1.844), and high school initiators who continued smoking (RRR=1.492, 95%CI=1.196–1.861) and/or marijuana use (RRR=1.249, 95%CI=1.052–1.482) into EA. For late initiators who did not use in high school but started in EA, perceived high school

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#### Contributors

Jennifer B. Unger was the primary investigator who initially designed the study and collected the data. Christopher J. Rogers and Steven Vetrone conducted literature searches and summaries of previous research. Christopher J. Rogers and Myriam Forster conducted the statistical analysis. Christopher J. Rogers wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

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#### Conflict of Interest

The authors declare that there are no conflicts of interest.

Limited research has explored discrimination and substance use in Hispanic youth longitudinally. Adolescent discrimination is associated with substance use in high school and young adulthood. Adolescent discrimination predicted delayed cigarette initiation but not marijuana initiation. Tailored prevention providing training in coping skills may improve Hispanic adolescent health.

discrimination was a significant predictor for cigarette smoking (RRR=1.193, 95%CI=1.036–1.373) but not for marijuana use

**Conclusions:** Perceived discrimination during adolescence is associated with substance use trajectories across both adolescence and EA. Culturally tailored prevention programs that provide training in skills to cope with psychosocial stressors could improve Hispanic adolescent health.

## Introduction:

Discriminatory stressors adversely impact psychological and behavioral health (Ahmed, Mohammed, & Williams, 2007; Forster, Grigsby, Soto, Sussman, & Unger, 2017; Paradies, 2013). Discrimination, a person's perception of receiving differential treatment due to negative attitudes and inflexible stereotypes about membership in a specific racial/ethnic group (e.g. exclusion, restriction, preference, favor, or fairness) (Council, 2004; Hecht, 1998; Sue et al., 2007; Williams, Neighbors, & Jackson, 2003), can strain an individual's internal resources, undermine adaptive coping (Slopen et al., 2012), and increase vulnerability for substance use. Extant research has demonstrated that in comparison to their non-Hispanic White peers, ethnic minority adolescent development and health behaviors are uniquely impacted by acculturative stressors (Romero, Martinez, & Carvajal, 2007; Schwartz et al., 2012; Unger, Schwartz, Huh, Soto, & Baezconde-Garbanati, 2014).

## Background:

Hispanics are the largest ethnic minority group in the U.S. (U.S. Census Bureau, 2011) and Hispanic adolescents report the second highest rates (after non-Hispanic whites) of past 30-day cigarette, alcohol, and marijuana use (Pérez, Fortuna, & Alegria, 2008; Unger et al., 2014). Despite the strong link between discrimination and maladaptive coping responses such as substance use among Hispanic adolescents, most substance use prevention and intervention programs do not address sociocultural stressors (Pérez et al., 2008; Rogers, Forster, & Unger, 2018; Unger et al., 2014).

Adolescence and early adulthood are critical life stages in which substance-use behaviors emerge (Sussman & Arnett, 2014). Health behaviors adopted during these periods often continue into later adulthood (Kilpatrick et al., 2000; Sussman & Arnett, 2014). Among ethnic minority youth and young adults, there is evidence that discrimination and sociocultural stressors undermine effective self-regulation and increase the risk of tobacco and marijuana use to gain short-term relief from distressing emotions (Koob & Le Moal, 2002; Rogers et al., 2018; Slopen et al., 2013). However, it is unclear whether discrimination is differentially associated with early or later substance use initiation. Considering the importance of the acculturative processes in Hispanic adolescent development and potential gender differences in health outcomes, it is important to assess the association between discrimination and health outcomes accounting for acculturation and demographic differences (Lorenzo-Blanco, Unger, Ritt-Olson, Soto, & Baezconde-Garbanati, 2011).

This study builds upon prior research by exploring the association between discrimination and adolescent and emerging adult substance use initiation (cigarettes and marijuana) longitudinally. The following hypotheses were tested: 1) higher levels of perceived

discrimination during adolescence will be positively associated with initiation of cigarette use during high school and initiation of cigarette use during EA; 2) higher levels of discrimination during adolescence will be associated with initiation of marijuana use during high school and marijuana use initiation during EA. We also explored whether experiencing discrimination during EA was associated with initiation or sustained cigarette and marijuana use.

## Methods:

Data were from Project RED, a longitudinal study of Hispanic youth (Unger, 2018). Adolescents attending seven predominantly Hispanic high schools in Southern California were surveyed in 9<sup>th</sup>, 10<sup>th</sup> and 11<sup>th</sup> grades (Unger, 2018). Respondents were contacted again after high school and those who agreed to participate in the EA waves were followed from 2006 to 2017. The EA sample includes participants who self-identified as Hispanic and provided responses for at least one timepoint during the high school collection period and at least one timepoint during the EA collection period (Unger et al., 2014). The final analytic sample (n=1457) included respondents who provided complete data on all variables in the analysis.

## Measures:

Past-month use of cigarettes and marijuana were assessed in high school and EA. Respondents were classified into one of four groups. *Non-users* were respondents who reported never using in their lifetime at all reported waves. *High school initiators* were respondents who reported any past-month use at any survey wave during high school. *“Late” initiators* were respondents who reported any past-month use at any point during EA but not in high school. *Consistent users* were respondents who reported past-month use during both high school and EA. These categories were coded separately for cigarette and marijuana use (i.e., a respondent could be a non-user of marijuana but a high school initiator of cigarettes).

Discrimination was measured with the Everyday Discrimination Scale, a 10-item measure of self-reported experiences of discrimination (Essed, 1991; Gyll, Matthews, & Bromberger, 2001; Williams, Yu, Jackson, & Anderson, 1997) (Lewis, Yang, Jacobs, & Fitchett, 2012). Discrimination scores were calculated for each survey wave and averaged to produce a single average high school discrimination score (Cronbach’s Alpha=0.898) and EA discrimination score (Cronbach’s Alpha=0.967). Scores were standardized to a mean of 0 and a standard deviation of 1 for meaningful interpretations.

Acculturation was measured with a bidimensional short form Acculturation Rating Scale for Mexican Americans-II (Cuellar, Arnold, & Maldonado, 1995). The U.S. orientation (Cronbach’s alpha =0.77) and Hispanic orientation (Cronbach’s alpha =0.90) subscales were summed from seven and six questions, respectively.

Self-reported demographics included sex at birth coded as female=1 male=0 and nativity measured as US born=1 and non-US born=0. SES was estimated with a composite measure comprised of parental education, number of people per room in the household, and whether the student received school lunch assistance. Consistent with previous work assessing

adolescent self-reported SES, these variables were standardized and summed (Bradley & Corwyn, 2002; Unger, Ritt-Olson, Wagner, Soto, & Baezconde-Garbanati, 2009; Unger et al., 2014).

### Analysis:

Two separate multinomial logistic regression models were built using SAS PROC LOGISTIC with the GLOGIT link function to assess the relative risk of respondents being in one of the four mutually exclusive substance-use response categories. Multinomial regression analysis examined the relationship between cigarette and marijuana use initiation and average discrimination in both high school and EA, controlling for sex, acculturation, and SES. Because high school and EA discrimination were moderately intercorrelated ( $r=0.3864$   $p>0.001$ ), each was iteratively entered into the model to assess multicollinearity. Both were left in the model since the findings remained constant. As a sensitivity analysis, the analyses were repeated using lifetime use instead of past 30-day use. The findings were very similar, so the analyses using past 30-day use are reported here to reflect current use. Although nativity is an important predictor of Hispanic health, when controlling for acculturation and other covariates nativity was no longer a predictor of substance use in any wave. To maintain power and parsimony, nativity was removed from the final models.

### Results:

The majority of participants were female (58%) and born in the US (88%). At wave one (high school), the average age was 14 years and at wave 8 (EA), the average age was 26 years. Most participants never used cigarettes (57%), followed by 30% who initiated use in EA, 8% who initiated use in high school and continued use into EA, and 5% who initiated use in high school but did not continue use in EA. Nearly half of the sample never used marijuana (47%), followed by 30% who initiated use in EA, 16% who initiated use in high school and continued use into EA, and 7% who initiated use in high school but did not continue use in EA. When exploring the patterns of marijuana and cigarette use across the entire study, of the 60% that used either marijuana or tobacco half used both.

High school discrimination and sex were significant predictors across initiation categories relative to never using for cigarette and marijuana use. Compared with those who never smoked cigarettes, every standard deviation increase in discrimination scores during adolescence was significantly associated with being a high school initiator of cigarette use, both in the group that quit after high school and the group that continued smoking (RRR=1.677, 95%CI=1.292–2.176; RRR=1.492, 95%CI=1.196–1.861 respectively), while controlling for sex, SES level, acculturation and EA discrimination. Similarly, for late initiation of cigarettes, compared to those who never smoked cigarettes, every standard deviation increase in perceived discrimination scores during high school was significantly associated with no high school use but smoking in EA (RRR=1.193, 95%CI=1.036–1.373), adjusting for the same covariates.

Relative to males, females reported lower risk of high school initiation with continued use and EA initiation (RRR=0.575, 95%CI=0.381–0.867; RRR=0.431, 95%CI=0.337–0.550

respectively) after controlling for SES level, acculturation, and discrimination, across both time periods. Females had lower relative risk of cigarette use than males in EA (Table 1).

As with cigarettes, compared to those who never used marijuana, higher discrimination scores were associated with high school initiation of marijuana use, both in the group that discontinued use after high school and the group that continued using in EA (RRR=1.464, 95%CI=1.162–1.844; RRR=1.249, 95%CI=1.052–1.482 respectively), adjusting for sex, SES, acculturation, and EA discrimination. There was no association between discrimination scores in high school and late initiation of marijuana use or with EA discrimination and marijuana use across any category when controlling for high school discrimination and other covariates. Females reported lower relative risk of late initiation (RRR=0.771, 95%CI=0.600–0.990) for respondents of the same SES level, acculturation level, and level of discrimination than males across both time periods (Table 1), which is consistent with cigarette use.

Relative to those who did not use substances, higher levels of Hispanic orientation were associated with lower risk of initiation in both high school initiators who discontinued use (RRR=0.959, 95%CI=0.921–0.998) and high school initiators who continued use (RRR=0.955, 95%CI=0.924–0.987) but not for initiation in EA. For marijuana use, higher levels of Hispanic orientation were associated with lower relative risk of initiation across all levels: school initiators who discontinued use (RRR=, 95%CI=0.915–0.980), high school initiators who continued use (RRR=0.956, 95%CI=0.932–0.980), and EA initiation (RRR=0.968, 95%CI=0.948–0.988). In contrast, higher levels of U.S. orientation were associated with EA cigarette initiation (RRR=1.051, 95%CI=1.019, 1.084) and high school marijuana initiation with continued use into EA (RRR=1.041, 95%CI=1.001, 1.081) (Table 1).

## Discussion:

This study contributes to the limited longitudinal research exploring the relationship between discrimination and substance-use trajectories among Hispanics from adolescence through EA. Higher levels of discrimination in high school were associated with initiation of both cigarette smoking and marijuana use during high school, as compared to respondents who have never used either substance. These effects persisted after controlling for EA discrimination, SES, sex, and acculturation.

Minority groups, including Hispanic adolescents, experience discriminatory stress that can have negative health effects linked to key biomarkers of stress (Flores et al., 2008; Pascoe & Smart Richman, 2009; Zeiders, Doane, & Roosa, 2012). That perceived discrimination was a significant predictor of cigarette and marijuana use is consistent with literature demonstrating that discrimination based stressors can undermine self-regulation and lead youth to use marijuana to gain short-term relief from distressing emotions (Chavez, Ornelas, Lyles, & Williams, 2015; Koob & Le Moal, 2002; Rogers et al., 2018; Slopen et al., 2013). This finding aligns with stress-coping research that suggests Hispanic adolescents may use substances to attenuate the uncomfortable feelings caused by discrimination based stressors (Borrell et al., 2007; Otiniano Verissimo, Gee, Ford, & Iguchi, 2014; Wagner, Myers, &

McIninch, 1999; Wills & Shiffman, 1985). Our results confirm that higher levels of discrimination early in the life course (high school) is associated with adolescent substance use initiation but we also demonstrate that this association increases substance use initiation in EA. Such findings are consistent with the depression and substance use literature; however, because research has shown that Hispanic youth's acculturation patterns are uniquely associated with depression, continued research into the interplay between acculturation, discrimination, and substance use becomes particularly important among Hispanics, nearly half of whom report experiencing discrimination (Brody, Kogan, & Chen, 2012; Finch, Kolody, & Vega, 2000; Sanchez & Espinosa, 2016). Although beyond the scope of this study, future work should examine the mediational effect of depression in the relationship between discrimination and substance use to further disentangle these predictors (Christie et al., 1988). The lack of statistical significance of EA discrimination as a predictor of substance use initiation in EA, when controlling for high school discrimination, may be related to EA's coping abilities that develop as response to contending with cumulative discrimination over time; however, this does not discount the effects of EA discrimination as a predictor of risky behaviors.

In sum, our results support theoretical arguments that early life course stressors are associated with adolescent tobacco and that this relationship persists into adulthood (Sussman & Arnett, 2014). However, for marijuana use, higher levels of high school discrimination were associated with high school use but not with later initiation. This may be related to the adoption of effective coping skills or resilience, which warrants further investigation. Prevention and cessation programs for Hispanic youth should address adolescent racial/ethnic discrimination specifically and consider discrimination as a means to identify at-risk young people. Continued research is needed to identify potential moderators of these relationships that disrupt substance-use trajectories among Hispanic youth.

### **Limitations:**

The sample was comprised of Hispanic students in the Los Angeles area and our results can only be generalized to populations with similar demographic distribution. Data are based on self-reports, which typically yield reliable results (Rutherford, Cacciola, Alterman, McKay, & Cook, 2000). As with most long-term longitudinal analyses, there were missing observations; however, there were no unique patterns in the missing responses across the main effects. The only tobacco product measured across all waves was cigarette smoking and future studies will need to assess effects across a broad range of nicotine/tobacco products. Although the effect sizes were relatively small; even minor decreases in rates of change projected over a growing subpopulation may have a lasting public health significance. Over time the denormalization of substance use behaviors, even at a slow rate may contribute to additional success in cessation and prevention efforts. Finally, longitudinal prediction of cigarette and marijuana use is limited to changes that occur between high school and emerging adulthood. Future studies may consider including base line acculturation status to assess initiation in high school. Although not the focus of the present paper, future studies may also consider controlling for both past and current SES to further disentangle these effects from other emerging adulthood stressors.

## Conclusion:

Perceived discrimination during adolescence is a robust predictor of cigarette and marijuana use trajectories across adolescence and EA. Culturally tailored interventions that teach strategies to cope with discrimination could improve overall Hispanic adolescent health and reduce substance use initiation. For secondary prevention efforts, intervening in early life course cigarette and marijuana use is critical and such strategies should consider the impact of sociocultural risk and protective factors.

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**Table 1.**

Multinomial logistic regression assessing factors associated with past 30-day cigarette and past 30-day marijuana use (N=1457)

Outcome Category	Variable	Cigarette Use RRR 95% CI	Marijuana Use RRR 95% CI
Use in high school but no use in emerging adulthood Cigarette Use (n=74) Marijuana Use (n=103)	HS Discrimination	<b>1.677<sup>***</sup></b> <b>(1.292, 2.176)</b>	<b>1.464<sup>**</sup></b> <b>(1.162, 1.844)</b>
	EA Discrimination	0.797 (0.607, 1.045)	0.834 (0.657, 1.058)
	Hispanic Orientation	<b>0.959<sup>*</sup></b> <b>(0.921, 0.998)</b>	<b>0.947<sup>**</sup></b> <b>(0.915, 0.980)</b>
	Scale	0.983 (0.928, 1.042)	1.012 (0.961, 1.067)
	U.S. Orientation	1.264 (0.747, 2.137)	1.152 (0.741, 1.789)
	Female	<b>1.492<sup>***</sup></b> <b>(1.196, 1.861)</b>	<b>1.249<sup>*</sup></b> <b>(1.052, 1.482)</b>
Use in high school and use in emerging adulthood Cigarette Use (n=112) Marijuana Use (n=229)	EA Discrimination	0.969 (0.778, 1.207)	1.163 (0.986, 1.373)
	Hispanic Orientation	<b>0.955<sup>**</sup></b> <b>(0.924, 0.987)</b>	<b>0.956<sup>***</sup></b> <b>(0.932, 0.980)</b>
	Scale	1.006 (0.957, 1.056)	<b>1.042<sup>*</sup></b> <b>(1.001, 1.083)</b>
	U.S. Orientation	<b>0.575<sup>**</sup></b> <b>(0.381, 0.867)</b>	0.806 (0.589, 1.102)
	Female	<b>1.193<sup>*</sup></b> <b>(1.036, 1.373)</b>	1.098 (0.960, 1.257)
	EA Discrimination	1.006 (0.882, 1.148)	1.110 (0.970, 1.269)
No use in high school but use in emerging adulthood Cigarette Use (n=436) Marijuana Use (n=436)	HS Discrimination	0.984 (0.965, 1.004)	<b>0.968<sup>**</sup></b> <b>(0.948, 0.988)</b>
	Scale	<b>1.052<sup>**</sup></b> <b>(1.020, 1.085)</b>	1.028 (0.997, 1.060)
	U.S. Orientation	<b>0.431<sup>***</sup></b> <b>(0.337, 0.550)</b>	<b>0.771<sup>*</sup></b> <b>(0.600, 0.990)</b>
	Scale		
	Female		

All models adjust for sex and high school SES. Reference group=those who did not use in both HS and EA years (n=835 for cigarette use and n=689 for marijuana use), EA= emerging adulthood, HS=high school, RRR= relative risk ratio, 95%CI= 95% Confidence interval,

\* =p<0.05,

\*\* =p<0.01,

\*\*\* =p<0.001,