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Examining how social class discrimination is associated with combustible tobacco use, nicotine vaping, and dual use among adolescents in California

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**Examining How Social Class Discrimination is Associated with Combustible Tobacco Use,
Nicotine Vaping, and Dual Use Among Adolescents in California.**

Abstract

Adolescents who are disadvantaged in social class are twice as likely to use tobacco than their counterparts. Despite extensive research showing how social class is associated with using tobacco products, there is limited knowledge about the association between the discrimination that adolescents experience because they are disadvantaged in social class and their use of tobacco products. To provide new knowledge, this cross-sectional study examined the association between social class discrimination and tobacco use among 1,678 adolescents at two public high schools in California. Social class discrimination was measured by assessing adolescents' experiences based on their social class. Tobacco use was measured with lifetime and past month use of combustible tobacco and nicotine vaping products, categorized into groups: no use, combustible tobacco use only, nicotine vaping use only, and dual use of combustible tobacco and nicotine vaping products. Multinomial logistic regression indicated that social class discrimination was positively associated with lifetime combustible tobacco use ($RRR = 1.61$), lifetime dual use ($RRR = 1.42$), and past month dual use ($RRR = 1.81$) compared to no use. Race/ethnicity modified these associations. Findings underscore the need for interventions addressing social class discrimination as a key social determinant of health to reduce tobacco use and mitigate health disparities among adolescents.

Keywords: social class discrimination, adolescents, social class, tobacco, vaping.

Examining How Social Class Discrimination is Associated with Combustible Tobacco Use, Nicotine Vaping, and Dual Use Among Adolescents in California.

Adolescent tobacco use remains a critical public health issue (Johnston, 2020). Nearly one in four high school students have used a tobacco product in the past 30 days (Gentzke, 2020), and 90% of adult users of tobacco begin using tobacco as adolescents (Gentzke, 2020; Johnston, 2020). The rise in nicotine vaping among adolescents has accompanied an increase in dual use of combustible tobacco and nicotine vaping (Abadi et al., 2022; Park-Lee et al., 2022). Moreover, adolescent tobacco use is strongly associated with social class (Green et al., 2016; Simon et al., 2017). Almost twice as many adolescents who were disadvantaged in social class smoked cigarettes or vaped than their counterparts (Johnston, 2020). Given that nearly 11 million children in the United States currently live in poverty (Center for American Progress, 2021), there is a critical need to identify new factors associated with social class and tobacco use among adolescents.

Social class discrimination, in particular, is a key upstream factor that could drive downstream behaviors like tobacco use and exacerbate health disparities among vulnerable groups (Braveman et al., 2011). Social class discrimination refers to adolescents' experiences with bias because they are disadvantaged in social class (Liu et al., 2004; Mello, 2024). Most research on this form of discrimination has focused on adults (Unger, 2018). One exception is a study by Sartor et al. (2021) that showed a positive association between the social class discrimination experienced by mothers and the tobacco use of their adolescent children. Building on this emerging evidence, the present study examined whether social class discrimination is associated with tobacco use among adolescents.

Social Class among Adolescents

For adolescents, social class includes objective (e.g., familial education, occupation, and income) and subjective (e.g., perceived societal position) factors (Currie et al., 1997; Diemer et al., 2013; Duncan & Magnuson, 2003; Goodman et al., 2001). Socioeconomic status (SES) refers to objective factors of social class. We chose to use the term social class rather than SES following guidelines (Diemer et al., 2013). Despite the multidimensional nature of social class, researchers often use parental education in studies with adolescents because this information is reliably reported by adolescents and a key indicator of social class (Diemer et al., 2013). Examining social class among adolescents is important given the large number who are disadvantaged in social class. Globally, about 1.43 billion children are living in poverty and 333 million children are living in extreme poverty (Salmeron-Gomez et al., 2023).

Social Class Discrimination

Social class discrimination is operationalized as the negative treatment individuals experience because of their social class (Langhout et al., 2009; Liu et al., 2004; Lott, 2002). This form of discrimination is sometimes referred to as classism and can occur at multiple levels, such as interpersonal and institutional (Allan et al., 2016; Langhout et al., 2009; Liu et al., 2004). In this paper, we focus on social class discrimination, which is interpersonal. Most research on this topic has been conducted with adults (Cavallieri & Wilcox, 2022; Langhout et al., 2009; Liu et al., 2004; Lott, 2002; Simon et al., 2017). For example, Langhout et al. (2009) highlighted how social class discrimination was experienced by college students. This work emphasized that college students who are disadvantaged in social class experience discrimination on campus. Recently, a new conceptual model of social class discrimination was developed specifically for adolescents (Mello, 2024). This model defines social class discrimination as the interpersonal

bias that adolescents experience who are disadvantaged in social class. The construct is theorized to be multidimensional, including overt (e.g., yelling) and subtle (e.g., exclusion) forms. Multiple sources are hypothesized, such as peers and school personnel.

Social Cognitive Theory (SCT; Bandura, 1986) has been effective in reducing tobacco use among adolescents (McDonald et al., 2003) and may also help explain the link between social class discrimination and tobacco use. SCT outlines how behaviors are shaped by interactions between individual and environmental factors. From this perspective, it is possible that when an adolescent experiences social class discrimination from peers, teachers, and community members, it may shape their beliefs by normalizing class-based biases. Over time, such experiences may reduce the adolescent's self-efficacy. This could lead adolescents to internalize negative messages about their capabilities. This could lead adolescents to internalize negative messages about their capabilities, resulting in an increased likelihood of tobacco use.

Qualitative research has demonstrated that social class discrimination exists among adolescents. For instance, Ayres (2009) observed that high school students were teased because they were disadvantaged in social class. In another study, Kuriloff and Reichert (2003) reported that adolescents experienced derogatory comments about their social class from teachers. Some quantitative research has shown that adolescents who are disadvantaged in social class experience more social class discrimination than their counterparts (Bucchianeri et al., 2013; Fuller-Rowell et al., 2012). However, quantitative studies on social class discrimination with adolescents are limited to its association with physical health, sleep, substance use, and academic achievement (Ahuja et al., 2022; Fernandez & Benner, 2022; Fuller-Rowell et al., 2012; Fuller-Rowell et al., 2023; Simon et al., 2017). New knowledge is needed to understand social class discrimination among adolescents.

Adolescence is a critical period to examine social class discrimination given cognitive advances and identity formation (Blakemore & Choudhury, 2006; Erikson, 1968). Brown and Bigler (2005) demonstrated how cognitive advances underlie age-related changes in children's understanding of discrimination. Research shows that individuals as young as five understand their family's social class and the social class of others (Mistry et al., 2021). As children transition to adolescence, their views on social class and inequality become more complex (Elenbaas et al., 2020; Killen & Stangor, 2001; Mistry et al., 2021). Research on identity formation processes has also articulated how adolescents incorporate social class into their identity (Velez & Spencer, 2018).

Social class discrimination and intersectionality

Drawing from intersectional perspectives (Cole, 2009; Crenshaw, 1991), social class discrimination may be compounded among individuals with marginalized identities. Recent approaches to intersectionality have expanded to include comparisons between groups who are marginalized with those who are not (Bauer, 2014). A study about social class showed that experiences with social class discrimination varied by race/ethnicity (Bucchianeri et al., 2013). Specifically, European Americans experienced the most social class discrimination, followed by adolescents with mixed race/ethnicities, Asian Americans, Hispanics, and African Americans. Relevantly, research indicates that adolescents can differentiate social class discrimination from racial discrimination (Ayres, 2009; Bucchianeri et al., 2013).

Tobacco Use

Globally, nearly 37 million adolescents aged 13-15 years use tobacco products (World Health Organization, 2024). Social class is strongly tied to tobacco use (Johnston, 2020; Ollila et al., 2023; Simon et al., 2017). Data from Monitoring the Future showed that 15% of 10th-grade

adolescents who were disadvantaged in social class, as indicated by parental education, reported cigarette use, compared to only 8% of their advantaged counterparts (Johnston, 2020). High school students from disadvantaged social classes are more likely to engage in polytobacco use and co-use with cannabis (Bello et al., 2019; Green et al., 2016; Simon et al., 2017). Having at least one parent with some college education was associated with lower rates of tobacco use (Ollila et al., 2023). This association continues into adulthood, where adults disadvantaged in social class are up to three times more likely to use tobacco than their counterparts (Cornelius et al., 2019). As a result, tobacco-related diseases are more prevalent among adults disadvantaged in social class than adults who are advantaged in social class (Wheaton et al., 2021).

Nicotine vaping has become the most commonly used tobacco product for adolescents (Park-Lee et al., 2022). Further, e-cigarettes were the most used tobacco product among U.S. adolescents (Morbidity and Mortality Weekly Report, 2024). As a result, the dual use of both combustible tobacco and nicotine vaping products has garnered increasing attention (Abadi et al., 2022; Mantey et al., 2019). Examining dual use is particularly important given its association with greater nicotine dependence (Snell et al., 2020) and reduced cessation in adulthood (Stanton et al., 2020). Notably, some research indicates that dual use is linked to social class. Adolescents who reported dual use had parents with less educational attainment than those who did not engage in dual use (Patel et al., 2023).

Gender and Tobacco Use

Research has identified gender differences in adolescent tobacco use (Dickmann et al., 2009). National data indicate that adolescent girls use tobacco more than boys (Birdsey et al., 2023), although the Monitoring the Future study suggests the opposite (Miech et al., 2019). Adolescent girls develop dependence faster and report stronger cravings during cessation than

boys (Dickmann et al., 2009). However, boys are more likely to engage in dual use (Mattingly et al., 2023). Further, research with adolescent girls indicated a positive association between gender discrimination and tobacco use (Author, Blinded). Studies with adults show that men are more likely to use tobacco than women. The Brazilian Longitudinal Study of Adult Health indicated that men reported more smoking than women (Patrão et al., 2019).

Social Class Discrimination and Tobacco Use

To our knowledge, only one study has examined the association between social class discrimination and tobacco use among adolescents. Sartor and colleagues (2021) surveyed adolescents and their mothers about being hassled because of their social class. Findings showed that adolescents whose mothers experienced social class discrimination were more likely to smoke cigarettes than their counterparts. Research on other risky health behaviors supports this connection. For example, a study on cannabis use among African American adolescents indicated that social class discrimination was linked to cannabis use disorder (Ahuja et al., 2022). These findings align with the social determinants of health (SDH) framework, which underscores how factors like economic disadvantage and discrimination shape health outcomes (Braveman et al., 2011). The SDH framework highlights how disadvantage is associated with poorer health outcomes. It provides a foundation for understanding social class discrimination as a potent determinant of health, contributing to stress and influencing behaviors, such as tobacco use. To advance research in this area, we examined the association between social class discrimination and tobacco use among adolescents.

The Present Study

To generate new knowledge on social class discrimination and its association with tobacco use, we examined the following research questions: First, how is social class

discrimination associated with tobacco use among adolescents? Drawing from existing literature (Sartor et al., 2021), we hypothesized that social class discrimination would be positively associated with tobacco use. Second, how is social class discrimination associated with dual use? Based on prior research (Patel et al., 2023), we expected that social class discrimination would be positively associated with dual use. Third, if these associations are observed, how do they differ across (a) social class, (b) gender, and (c) race/ethnicity? Drawing from intersectional theory (Cole, 2009), we expected that adolescents who were disadvantaged in social class or identified as girls would have a stronger association between social class discrimination and tobacco use than their counterparts. For race/ethnicity, we expected that European Americans would have stronger associations between social class discrimination and tobacco use given prior research (Bucchianeri et al., 2013).

Method

Participants

The sample included 1,678 adolescents aged 13-18 years ($M_{age} = 15.97$; $SD_{age} = 1.23$). One 19-year-old was excluded. Gender identity was measured with “What is your current gender identity?” Response options included man, woman, transgender man, transgender woman, and non-binary/enby. Race/ethnicity was measured with the question “What is your racial/ethnic group? Select all that apply.” This approach is based on guidelines encouraging the consideration of race/ethnicity as similar constructs for adolescents (Rivas-Drake et al., 2014). Response options included: American Indian or Alaskan Native, Asian American, African American/Black, European American/White, Latino/a, Latinx, or Hispanic, Native Hawaiian or Other Pacific Islander, and Other(s). Table 1 shows demographic information. Supplemental Tables 4 and 5 provide a breakdown of multiethnic/racial groups and those who selected the

“Other” option, respectively.

Procedure

The procedures for the study were approved by the institutional review board of the first author’s university (#2021-430). Data were collected from two high schools in California in 2022. High School 1 included 1,500 students (50% girls; 7% African American/Black, 8% Asian American, 2% European American, and 83% Latino/a). High School 2 included 1,200 students (50% girls; 5% African American/Black, 31% Asian American, 37% European American, 17% Latino/a, & 10% mixed). High School 1 included 77% of students eligible for free lunch, and School 2 included 20% eligible for free lunch. Recruitment included trained researchers delivering speeches in classrooms and distributing study packets. Each packet contained an assent form, parental consent form, and study survey, available in English and Spanish. Anonymity was ensured by providing separate envelopes for the surveys and forms. Students completed surveys on their own time, and 68% of the packets were returned. Participants received USD 20 in cash as compensation for their involvement.

Measures

Social Class Discrimination

To measure social class discrimination, we adapted the Adolescent Discrimination Distress Index (ADDI; Fisher et al., 2000; See Appendix for the complete scale). Originally designed to assess discrimination based on race/ethnicity, the ADDI has been widely used with adolescents (Fisher et al., 2000). Although race/ethnicity and social class are distinct, there are also parallels among these marginalized identities (Moore-Berg & Karpinski, 2019). To ensure that adolescents were responding to experiences about social class specifically, we developed the prompt: “How often have you experienced each of the following because of the money,

schooling, or jobs your parents have?” We included 13 of the 15 original items because they were relevant to social class. Two items were modified. We changed “given after-school detention” to “you were wrongly disciplined” and “racially insulting names” to “you were called insulting names.” Response options ranged from 1 (*rarely*) to 5 (*often*). A composite score was generated by averaging responses without missing values ($\alpha = .96$).

To evaluate the structure of the adapted measure, we split the original dataset ($N = 1,678$) into two subsets for exploratory factor analysis (EFA; $n = 839$) and confirmatory factor analysis (CFA; $n = 839$). First, the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy determined that the 13-items were adequate for EFA ($KMO_{\text{overall}} = .94$). Bartlett’s test of sphericity indicated the data structure was not an identity matrix, $\chi^2(78) = 6628.808, p < .001$. However, the Mardia test revealed skewness, with a value of 118.26 and a significant kurtosis (13,659.12, $p < .001$). Due to the non-normality of the data, we used a weighted least squares (WLS) estimation. A WLS extraction generated one eigenvalue over 1.00, suggesting a single factor be extracted, which was also supported by Cattell’s scree plot. Second, a series of EFAs with WLS extraction and an oblimin rotation were conducted, forcing an extraction of one, two, and three factors. The one-factor solution explained 58.10% of the total variance. All items loaded above .64 ($\alpha = .95$; Supplemental Table 1). Next, a CFA was performed using the maximum likelihood extraction with a Satorra-Bentler model adjustment, as normality was violated. The one-factor solution was an improvement over the null model, $\chi^2(65) = 190.049, p < .001$ (Supplemental Table 2). Last, we determined if the scale was invariant across social class. Configural and metric models indicated invariance (Supplemental Table 3).

Tobacco Use

Tobacco use included the assessment of combustible tobacco and nicotine vaping with

multiple items. Items were treated separately for lifetime and past month use. For combustible tobacco, the following four items were used to assess lifetime and past month use: (a) *Have you ever tried smoking cigarettes, even just a few puffs?* (b) *Have you ever tried smoking cigars, cigarillos, blunts, or little cigars, even just a few puffs?* (c) *During the past 30 days, on how many days did you smoke cigarettes?* (d) *During the past 30 days, on how many days did you smoke cigars, cigarillos, blunts, or little cigars?* For nicotine vaping, the following two items were used to assess lifetime and past month use: (a) *Have you ever used an e-cigarette or vape device—such as an e-pen, vape pen, cigalike, e-hookah, personal vaporizer, or mod—to get nicotine?* (b) *During the past 30 days, how many days did you use an e-cigarette or vape device to get nicotine?* For analyses, four groups were used: 0 = no use (reference category), 1 = combustible tobacco use only, 2 = nicotine vaping use only, and 3 = dual use.

Social Class

We measured social class with maternal education. Adolescents are reliable reporters of maternal education, and parental education is a commonly used indicator of social class (Diemer et al., 2013). Adolescents responded to the question: “What is your mother’s highest level of education?” Responses and proportions included: 1 = (*No High School Diploma or GED*, 24.5%), 2 = (*High School Diploma or GED*, 25.02%), 3 = (*Associate’s Degree*, 8.78%), 4 = (*Bachelor’s Degree*, 17.69%), 5 = (*Master’s Degree*, 17.43%), and 6 (*Doctorate*, 6.60%). Following field guidelines (Crosnoe et al., 2021), maternal education was categorized as a binary variable. The sample included 50.5% advantaged (mothers who earned a college degree or more) and 49.5% disadvantaged (mothers who earned less than a college degree).

Statistical Analyses

Analyses were conducted using Stata (2021). Separate analyses were performed for

lifetime and past month. First, we employed multinomial logistic regressions to examine differences among the tobacco use groups (no use [reference category], combustible tobacco use only, nicotine vaping use only, and dual use). Results from multinomial logistic regression produce relative risk ratios (*RRRs*), which reflect the probability of events occurring. Covariates included social class, age, gender, and race/ethnicity. Due to sample size constraints, only cisgender girls and cisgender boys were included for gender, and only Asian American and Pacific Islander, European American/White, African American/Black and Latino/a participants were included for race/ethnicity. Second, effect modification analyses determined if observed associations differed by social class, gender, and race/ethnicity. For these analyses, African American/Black adolescents were excluded due to their small sample size. Finally, to account for multiple comparisons, we applied the Benjamini and Hochberg (1995) correction with a false discovery rate of 5%. The adjusted *p*-value was 0.007.

Examination of Missing Data

The percentage of missing data was 11% for the social class discrimination scale, 10% for social class, and 5% for the remaining demographics. Little's Missing Completely at Random test (1988) indicated data were not missing completely at random ($\chi^2 = 1317.43$, $df = 612$, $p = .000$). Adolescents missing responses on the social class discrimination scale had mothers with less education ($M = 2.65$, $SD = 0.12$) than their counterparts [$(M = 3.03$, $SD = 1.64$); $t(1,514) = 2.96$, $p < 0.01$, $d = 0.15$], though the effect was small. Per guidelines, missing data were handled using listwise deletion to accommodate multinomial logistic regression (Howell, 2007).

Results

Preliminary Analyses

On average, adolescents reported experiencing social class discrimination between “rarely” and “sometimes.” Table 1 shows how social class discrimination was associated with demographic groups. As expected, social class was associated with social class discrimination [$t(1434) = 6.90, p < .001$]. Adolescents disadvantaged in social class experienced more social class discrimination than adolescents who were advantaged in social class, and this effect was moderate in size. Gender was associated with social class discrimination [$F(4, 1489) = 8.27, p < 0.001$]. Multiple comparisons indicated that non-binary/enby individuals experienced more social class discrimination than cisgender girls ($d = 0.41$). Transgender boys and transgender girls were excluded due to sample size constraints.

Race/ethnicity was associated with social class discrimination [$F(7, 1499) = 13.07, p < 0.001$]. Pairwise comparisons indicated that African American/Black adolescents experienced more social class discrimination than Asian American ($d = 0.64$), European American/White ($d = 0.77$), and Multi-ethnic/racial adolescents ($d = 0.62$). Latino/a participants experienced more social class discrimination than Asian American ($d = 0.39$), European American/White ($d = 0.50$), and Multi-ethnic/racial ($d = 0.38$) adolescents. Native Hawaiian/Other Pacific Islanders and other racial/ethnic groups were excluded due to sample size constraints. Relatedly, African American/Black and Latino/a adolescents did not differ in experiences with social class discrimination based on levels of social class (values not shown). Further, social class varied across racial/ethnic groups use [$\chi^2 = 546.719, p < .001, V = 0.60$]. Latino/a and Native Hawaiian/Pacific Islanders were the most disadvantaged, followed by American Indian or Alaska Native, African American/Black, other racial/ethnic group, Asian American, Multi-ethnic/racial, and European American/Whites.

The sample reported the following lifetime use: 8.42% combustible tobacco use only, 5.72% nicotine vaping use only, 16.23% dual use, and 69.63% no use. Past month use was: 2.37% combustible tobacco use only, 4.02% nicotine vaping use only, 5.96% dual use, and 87.65% no use. The prevalence of tobacco use for demographic groups is presented in Table 1. Social class was associated with lifetime use [$\chi^2 = 16.83, p < .001, V = 0.11$]. Adolescents disadvantaged in social class were less likely to use either tobacco or nicotine vaping or to dual use than advantaged adolescents. Gender was associated with lifetime use [$\chi^2 = 21.34, p < .001, V = 0.13$]. Cisgender boys were least likely to use, followed by cisgender girls, and nonbinary individuals.

Race/ethnicity was associated with lifetime use [$\chi^2 = 54.13, p < .001, V = 0.12$]. Asian Americans were the least likely to not use, and European Americans were the most likely to use nicotine vaping. Race/ethnicity was also associated with past month use [$\chi^2 = 34.87, p < .001, V = 0.12$]. Latino/a adolescents were the least likely to use, whereas Native Hawaiian or Pacific Islander were the most likely to use combustible tobacco only and Alaskan Native were the most likely to use nicotine vaping. Dual use was most common among adolescents who identified as Other racial/ethnic group.

Social Class Discrimination and Tobacco Use

Results from the multinomial logistic regression analyses indicated an association between social class discrimination and tobacco use (See Table 2). For lifetime use, social class discrimination was positively associated with a greater relative risk of combustible tobacco use ($RRR = 1.61, p = 0.004$) and dual use ($RRR = 1.42, p < 0.001$) compared to no use. For past month, social class discrimination was positively associated with the relative risk of dual use compared to no use ($RRR = 1.81, p < 0.001$). These associations remained even after controlling

for social class, age, gender, and race/ethnicity. No other associations were observed.

Effect Modification by Social Class, Race/Ethnicity, and Gender

Effect modification analyses using multinomial logistic regression tested if the association between social class discrimination and tobacco use varied by social class, gender, and race/ethnicity. For effect modification analyses, social class, age, gender, and race/ethnicity variables were included as covariates. Contrary to our hypotheses, neither social class nor gender modified the association between social class discrimination and tobacco use (values not shown). However, regarding race/ethnicity (Table 3), the association between social class discrimination and lifetime combustible tobacco use was weaker for Asian American and Pacific Islanders ($RRR = 0.16, p < 0.001$) and Latino/as ($RRR = 0.14, p < 0.001$) than European American/Whites. For past month, race/ethnicity was not a modifier.

Discussion

Adolescents continue to use tobacco despite its long-term health consequences (Johnston, 2020; Singh et al., 2016). The dual use of combustible tobacco and nicotine vaping is an important area of research given its increasing prevalence (Abadi et al., 2022; Vidaña-Pérez et al., 2024; Xia et al., 2024). Although tobacco use is more likely among adolescents who are disadvantaged in social class (Johnston, 2020; Shaikh & Saikia, 2022), the degree to which tobacco use is associated with social class discrimination is largely unknown. Our findings reveal that social class discrimination is positively associated with both combustible tobacco use and dual use among adolescents and that these associations are modified by race/ethnicity.

Social Class Discrimination and Tobacco Use

This study extends research on social class discrimination and tobacco use among adults (Patrão et al., 2019; Unger, 2018; Vinci, 2021) by focusing on adolescents. We showed that

social class discrimination was positively associated with a greater risk of lifetime combustible tobacco use, lifetime dual use, and past month dual use. These findings supplement the limited literature on adolescents. One prior study reported a connection between mothers' experiences of social class discrimination and tobacco use among their adolescent children (Sartor et al., 2021). Further, our results indicate how social class discrimination is associated with the dual use of combustible tobacco and nicotine vaping products. This finding is crucial for prevention efforts, as dual use has been linked to higher nicotine dependence and adverse health outcomes in adulthood (Park-Lee et al., 2022; Sreeramareddy et al., 2022).

We offer the field another domain to apply the Social Determinants of Health Framework (Braveman et al., 2011). This perspective emphasizes how social disadvantage, including experiences of discrimination, can act as an upstream determinant of health. The stress related to social class discrimination may exacerbate mental health challenges and contribute to risky behaviors like tobacco use. Indeed, studies show that social class discrimination is associated with poor health outcomes in adolescents (Song et al., 2020). Supporting this notion, research has highlighted the link between social class discrimination with physical health and sleep quality (Fuller-Rowell et al., 2012; Fuller-Rowell et al., 2023).

We extend scholarship on socioeconomic disparities in tobacco use among adolescents by incorporating social class discrimination. Studies show that economically disadvantaged youth face a greater risk of tobacco use (Johnston, 2020; Moor et al., 2015). Smoking is more prevalent among socioeconomically disadvantaged groups (Kim-Mozeleski & Pandey, 2020). Further, food insecurity disproportionately affects individuals with limited income, and is also linked to tobacco use (Kim-Mozeleski & Pandey, 2020). Our study highlights the need to consider social class discrimination as a potential stressor contributing to these disparities.

Our study also makes theoretical contributions. We show that adolescence represents an important developmental period to examine social class discrimination and supports recent theorizing (Mello, 2024). Our findings highlight social class discrimination as an understudied form of discrimination. Most research on this topic has included adults (Langhout et al., 2009; Liu et al., 2004) who are developmentally distinct from adolescents. We provide further support for longstanding theories that link external factors to health behaviors among adolescents (Bandura, 1986). Further, we provide information about measuring social class discrimination among adolescents. We adapted the Adolescent Discrimination Distress Index (ADDI: Fisher et al., 2000) by modifying the prompt and items to address social class. Separately, Fuller-Rowell et al. (2023) developed the Social Class Discrimination Scale (SCDS). The SCDS asks participants to report how often particular social class-related experiences have occurred. However, the SCDS also includes items that might be related to social status rather than social class, such as having popular items. Other efforts have sought to measure subjective forms of social class, such as the MacArthur Scale of Subjective Social Status (Goodman et al., 2001). Future research should continue to develop measures that assess social class discrimination among adolescents.

Intersectional Perspectives on Social Class Discrimination and Tobacco Use

Findings indicated that African American/Black and Latino/a adolescents experienced more social class discrimination than Asian American and Pacific Islander or European American/White adolescents. This pattern is consistent with intersectional theory (Bauer, 2014; Cole, 2009) and aligns with a study that found that Black adolescents experienced more social class discrimination than White adolescents (Fuller-Rowell et al., 2023). However, our findings diverge from some prior research that indicated social class discrimination was most frequently

reported by European Americans/Whites than other racial/ethnic groups (Bucchianeri et al., 2013). Discrepancies may be due to measurement differences across the studies.

With regards to associations between social class discrimination and tobacco use, results indicated stronger effects for European Americans/Whites than other racial/ethnic groups. One explanation stems from racial socialization (Burt & Simons, 2015; McHale et al., 2006; Wang et al., 2020). Adolescents who are racial/ethnic minorities might develop strategies for coping with racial/ethnic discrimination to facilitate their ability to face social class discrimination. This might mitigate the impact of these experiences on behaviors such as tobacco use, leading to weaker associations in these groups. Given that research on social class discrimination is emerging, it will be important to continue to examine differences in tobacco use between marginalized versus non-marginalized groups (Mantey et al., 2024; Webb et al., 2024).

Findings did not support effect modification for either social class or gender, indicating that the association between social class discrimination and tobacco use was similar across these groups. This may have been due to the measurement of these constructs. In this study, social class was assessed using maternal education. Despite research showing that adolescents reliably report maternal education and that it correlates strongly with other social class indicators, such as familial income and occupation (Diemer et al., 2013), incorporating a broader assessment of social class would provide more comprehensive information. Further, gender did not modify the association between social class discrimination and tobacco use in our study. Although this is inconsistent with intersectional perspectives (Cole, 2009), it aligns with research showing that there are no gender differences in the association between discrimination and tobacco use (Unger, 2018).

Implications

This study highlights several critical implications for future research and interventions. Reducing social class discrimination is crucial for promoting health among adolescents. Consistent with perspectives emphasizing upstream social determinants (Braveman et al., 2011), our study underscores the need to focus on social class discrimination as a new source of health risks. Programs that raise awareness among educators, peers, and community members about the harmful effects of exclusionary practices can help address classist attitudes. Schools and communities should develop policies and practices that prevent discrimination. Anti-discrimination training for adolescent-serving professionals should focus on recognizing and mitigating biases based on social class. Targeting the root causes of social class discrimination can cultivate health among adolescents.

Limitations and Future Directions

Several limitations should be noted. First, although the sample was large and diverse, certain racial/ethnic groups were too small for analysis. Future research with more representative samples should be conducted. Second, maternal education was the sole indicator of social class, which may not fully capture the complexities of the construct. This issue may explain why tobacco use not associated with disadvantaged social class. Future research should incorporate multiple indicators, such as household income, parental occupation, neighborhood socioeconomic status, and access to resources. Third, the measure of social class discrimination was adapted from a measure that assessed racial discrimination. Although there is some conceptual overlap, our measure may not fully capture the unique aspects of social class discrimination. Further, it is possible that the measure captured both downward and upward social class discrimination given that the prompt did not target disadvantaged social class. However, social class discrimination was experienced more often by adolescents disadvantaged

in social class than their advantaged counterparts. Future research is needed that includes the development of scales that measure disadvantaged social class specifically.

A fourth limitation concerns our treatment of race/ethnicity. Race and ethnicity were ascertained in a single item that prevents the separation of the two constructs. Researchers have discussed how classification methods can influence the complexities of substance use patterns among multiracial and Hispanic/Latino/a/x youth (Mantey et al., 2024; Webb et al., 2024). In support, research has shown that the way that race and ethnicity are measured can impact findings (Moon et al., 2022). Future studies should refine measurement approaches that better reflect the complexity of race and ethnicity. Fifth, our study did not collect data on immigrant status and body mass index, which may confound the observed associations. Last, the cross-sectional nature of the study limits our ability to infer causality between social class discrimination and tobacco use. Longitudinal research is needed to examine the directionality of these associations over time.

Conclusion

Our study demonstrated that social class discrimination was associated with tobacco use among adolescents. We showed that adolescents who reported lifetime combustible tobacco use, lifetime dual use, and past month dual use experienced more social class discrimination than adolescents who reported no use. We also observed variations in the strength of this association across racial/ethnic groups, supporting an intersectional perspective on discrimination among adolescents. Social class discrimination represents a new mechanism for understanding social determinants of health among adolescents. This research underscores a novel way of understanding the association between social class and risky health behaviors among adolescents. We advance the limited literature examining the association between social class

discrimination and adolescent health. Overall, this research emphasizes the need for targeted strategies to address social class discrimination to support healthier outcomes among youth.

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Table 1*Social Class Discrimination and Tobacco Use Prevalence by Social Class, Gender, and Race/Ethnicity*

	Sample Size		Social Class Discrimination		Lifetime Tobacco Use					Monthly Tobacco Use		
	<i>n</i>	%	<i>M</i>	<i>SD</i>	<i>No Use</i>	<i>Combustible Tobacco Use Only</i>	<i>Nicotine Vaping Use Only</i>	<i>Dual Use</i>	<i>No Use</i>	<i>Combustible Tobacco Use Only</i>	<i>Nicotine Vaping Use Only</i>	<i>Dual Use</i>
<i>Social Class</i>												
Disadvantaged	398	40.41%	1.66	0.84	68.09%	9.05%	5.78%	17.09%	87.94%	2.01%	3.77%	6.28%
Advantaged	587	59.59%	1.38	0.70	64.50%	5.72%	6.11%	23.67%	80.08%	3.94%	5.72%	10.26%
<i>Gender</i>												
Cisgender Boys	445	47.14%	1.53	0.79	71.69%	6.52%	3.37%	18.43%	86.07%	3.82%	3.82%	6.29%
Cisgender Girls	456	48.31%	1.46	0.71	63.38%	7.68%	8.33%	20.61%	83.33%	2.63%	5.48%	8.55%
Nonbinary/Enby	30	3.18%	1.84	1.10	56.67%	10.00%	3.33%	30.00%	73.33%	0.00%	6.67%	20.00%
Transgender Boys	7	0.74%	2.50	1.72	28.57%	0.00%	0.00%	71.43%	57.14%	0.00%	0.00%	42.86%
Transgender Girls	6	0.64%	2.21	0.89	50.00%	16.67	0.00%	33.33%	66.67%	0.00%	0.00%	33.33%
<i>Race/Ethnicity^a</i>												
African American/Black	46	4.83%	1.81	0.91	56.52%	8.70%	6.52%	28.26%	80.43%	4.35%	2.17%	13.04%
American Indian or Alaskan Native	6	0.63%	1.86	1.15	50.00%	0.00%	0.00%	50.00%	83.33%	0.00%	16.67%	0.00%
Asian American	206	21.62%	1.35	0.67	79.13%	4.85%	4.85%	11.17%	88.83%	1.94%	3.40%	5.83%
European American/White	162	17.00%	1.27	0.61	56.79%	4.94%	8.62%	29.63%	73.46%	3.70%	8.64%	14.20%
Latino/a	361	37.88%	1.66	0.83	68.70%	10.53%	5.54%	15.24%	89.75%	2.77%	2.22%	5.26%
Mult-ethnic/racial	132	13.85%	1.50	0.83	56.91%	4.07%	6.50%	32.52%	76.52%	5.30%	9.09%	9.09%
Native Hawaiian or Other Pacific Islander	6	0.63%	2.35	1.10	50.00%	50.00%	0.00%	0.00%	75.00%	25.00%	0.00%	0.00%
Other racial/ethnic group	34	3.57%	1.36	0.64	67.65%	2.94%	0.00%	29.41%	76.47%	0.00%	5.88%	17.65%

Note. *M* = Mean, *SD* = Standard Deviations. Multiple comparisons exclude < 30 participants.

^aPost-hoc comparisons:

Nonbinary/enby > Cisgender Girls***

African American/Black > Asian Americans***

African American/Black > European Americans/Whites***

African American/Black > Multi-Ethnic/Racial***

Latino/a > Asian Americans***

Latino/a > European Americans/Whites***

Latino/a > Multi-Ethnic/Racial***

*** $p < 0.001$.

Table 2*Associations between Social Class Discrimination and Tobacco Use Among Adolescents*

	Lifetime Use (N = 1015)			Past Month Use (N = 881)		
	<i>Likelihood Ratio χ^2 (21) = 64.21***</i>			<i>Likelihood Ratio χ^2 (21) = 53.88***</i>		
	Combustible Tobacco Use Only	Nicotine Vaping Use Only	Dual Use	Combustible Tobacco Use Only	Nicotine Vaping Use Only	Dual Use
	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>
Social Class Discrimination	1.61 (1.25, 2.07)**	1.42 (1.00, 2.00)	1.42 (1.12, 1.80)***	1.43 (0.84, 2.42)	1.03 (0.50, 2.12)	1.81 (1.30, 2.54)***
Social Class (college or more)	1.19 (0.69, 2.08)	0.94 (0.47, 1.88)	1.56 (0.97, 2.51)	3.57 (1.11, 11.5)	0.36 (0.12, 1.08)	1.65 (0.75, 3.63)
Age	1.15 (0.96, 1.38)	1.00 (0.80, 1.24)	1.33 (1.14, 1.55)***	1.35 (0.93, 1.95)	1.12 (0.82, 1.54)	1.25 (0.99, 1.58)
Gender (cisgender girls)	1.12 (0.73, 1.74)	3.69 (2.04, 6.67)**	1.71 (1.19, 2.47)**	0.75 (0.31, 1.81)	1.80 (0.80, 4.07)	1.52 (0.87, 2.67)
Race/Ethnicity						
AAPI	0.43 (0.19, 0.97)	0.36 (0.16, 0.82)	0.25 (0.14, 0.43)***	0.61 (0.17, 2.21)	0.23 (0.08, 0.65)**	0.36 (0.17, 0.79)
BLK	0.87 (0.30, 2.56)	0.35 (0.09, 1.36)	0.59 (0.27, 1.28)	1.11 (0.20, 6.35)	0.14 (0.02, 1.21)	0.76 (0.28, 2.12)
LAT	1.02 (0.47, 2.22)	0.37 (0.16, 0.89)	0.40 (0.22, 0.71)**	1.24 (0.31, 4.97)	0.06 (0.01, 0.23)***	0.29 (0.11, 0.75)

Note. *RRR* = Relative risk ratio. *CI* = 95% confidence intervals. No use was the reference category. Social Class = college or more versus less than college. Gender = cisgender girls versus cisgender boys. AAPI = Asian American and Pacific Islander. BLK = African American/Black. LAT = Latino/a. European American/Whites were the base category for comparisons. $R^2 = .03$

** $p < 0.007$, *** $p < 0.001$

Table 3

Race/Ethnicity Effect Modification Analyses on the Associations between Social Class Discrimination and Tobacco Use Among Adolescents.

Social Class Discrimination X Race/Ethnicity	Lifetime Use (<i>N</i> = 1015)			Past Month Use (<i>N</i> = 881)		
	<i>Likelihood Ratio χ^2 (9) = 95.71***</i>			<i>Likelihood Ratio χ^2 (9) = 83.57***</i>		
	Combustible Tobacco Use Only	Nicotine Vaping Use Only	Dual Use	Combustible Tobacco Use Only	Nicotine Vaping Use Only	Dual Use
	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>	<i>RRR (CI)</i>
WHT ^b vs. AAPI	0.16 (0.05, 0.55)***	0.57 (0.10, 3.14)	0.83 (0.27, 2.59)	1.36 (0.15, 12.8)	0.20 (0.01, 4.75)	0.49 (0.13, 1.81)
AAPI ^b vs. LAT	0.91 (0.44, 1.88)	1.53 (0.56, 4.18)	1.06 (0.58, 1.93)	0.19 (0.05, 0.69)	1.50 (0.07, 3.28)	0.78 (0.34, 1.77)
WHT ^b vs. LAT	0.14 (0.05, 0.44)***	0.86 (0.19, 3.94)	0.88 (0.30, 2.55)	0.26 (0.03, 2.60)	0.30 (0.03, 2.64)	0.38 (0.11, 1.88)

Note. *RRR* = Relative risk ratio. *CI* = 95% confidence intervals. ^b = base category. AAPI = Asian American and Pacific Islander. WHT = European American/White. LAT =

Latino/a. No use = reference category. Only Asian Americans and Pacific Islanders, European Americans/Whites, and Latino/a were included. Race/ethnicity was categorically coded. For brevity, only interaction terms are presented. $R^2 = .03$.

** $p < 0.007$, *** $p < 0.001$.

Adolescents who are disadvantaged in social class are twice as likely to use tobacco than their counterparts. Despite extensive research showing how social class is associated with using tobacco products, there is limited knowledge about the association between the discrimination that adolescents experience because they are disadvantaged in social class and their use of tobacco products. To provide new knowledge, this cross-sectional study examined the association between social class discrimination and tobacco use among 1,678 adolescents at two public high schools in California. Social class discrimination was measured by assessing adolescents' experiences based on their social class. Tobacco use was measured with lifetime and past month use of combustible tobacco and nicotine vaping products, categorized into groups: no use, combustible tobacco use only, nicotine vaping use only, and dual use of combustible tobacco and nicotine vaping products. Multinomial logistic regression indicated that social class discrimination was positively associated with lifetime combustible tobacco use ($RRR = 1.61$), lifetime dual use ($RRR = 1.42$), and past month dual use ($RRR = 1.81$) compared to no use. Race/ethnicity modified these associations. Findings underscore the need for interventions addressing social class discrimination as a key social determinant of health to reduce tobacco use and mitigate health disparities among adolescents.

Electronic Supplementary Materials

Supplemental Table 1

Factor Structure and Reliability Statistics for the Modified Fisher et al. (2000) Scale to Assess Social Class Discrimination

Items		Response Options					Mean (SD)	Factor Loadings for Single Factor Structure
		<i>Rarely</i>	<i>Sometimes</i>		<i>Often</i>			
1.	You were discouraged from joining an advanced level class.	☐	☐	☐	☐	☐	1.47 (0.97)	0.69
2.	*You were wrongly disciplined.	☐	☐	☐	☐	☐	1.45 (0.89)	0.76
3.	You were given a lower grade than you deserved.	☐	☐	☐	☐	☐	1.49 (0.95)	0.76
4.	You were discouraged from joining a club.	☐	☐	☐	☐	☐	1.45 (0.93)	0.77
5.	Others your age did not include you in their activities.	☐	☐	☐	☐	☐	1.50 (0.97)	0.77
6.	People expected less of you than they expected of others your age.	☐	☐	☐	☐	☐	1.57 (1.02)	0.75
7.	You were hassled by police.	☐	☐	☐	☐	☐	1.34 (0.82)	0.80
8.	You were hassled by a store clerk or store guard.	☐	☐	☐	☐	☐	1.36 (0.83)	0.81
9.	*You were called insulting names.	☐	☐	☐	☐	☐	1.45 (0.92)	0.76
10.	You received poor service at a restaurant or store.	☐	☐	☐	☐	☐	1.44 (0.90)	0.81
11.	People acted as if they thought you were not smart.	☐	☐	☐	☐	☐	1.54 (1.00)	0.80
12.	People acted as if they were afraid of you.	☐	☐	☐	☐	☐	1.45 (0.94)	0.82
13.	You were threatened.	☐	☐	☐	☐	☐	1.40 (0.91)	0.81

Note. The survey question prompt was changed to: “How often have you experienced each of the following because of the money, schooling, or jobs your parents have?” Response options ranged from 1 (*rarely*) to 5 (*often*). *SD* = Standard Deviation. Cronbach's Alpha (α) = 0.95. * = Items created for the current study. A maximum likelihood extraction generated one eigenvalue over 1.00, suggesting we extract 1-factor based on Kaiser’s criterion. Cattell’s scree plot also supported extracting one factor.

Supplemental Table 2

Confirmatory Factor Analysis for the 1-Factor AADI Model using the Satorra-Bentler Correction

Model	χ^2	<i>df</i>	χ^2/df	<i>CFI</i>	<i>TLI</i>	<i>RMSEA (90% CI)</i>	<i>SRMR</i>
Null	2047.793***	78	-				
1-factor	190.049***	65	-	0.942	0.931	.096 (0.079, 0.114)	0.042

Note. χ^2 = Chi-Square Test Statistic. *df* = Degrees of Freedom. *CFI* = Robust Comparative Fit Index

Score. *TLI* = Robust Tucker-Lewis Index. *RMSEA* = Root Mean Sum Error Approximation. *CI* =

Confidence Interval. *SRMR* = Standardized Root Mean Square Residual.

*** $p < 0.001$.

Supplemental Table 3

Invariance Analyses for Social Class Across the 1-Factor, Configural and Metric Models of the Modified AADI using the Satorra-Bentler Correction

Model	χ^2	<i>df</i>	<i>CFI</i>	<i>TLI</i>	<i>RMSEA (90% CI)</i>	<i>SRMR</i>	ΔCFI
1-factor	190.049***	65	0.942	0.931	0.096 (0.079, 0.114)	0.042	
Configural	223.770***	130	0.944	0.933	0.095 (0.076, 0.113)	0.042	
Metric	233.250***	142	0.944	0.940	0.090 (0.075, 0.109)	0.049	0.001

Note. χ^2 = Chi-Square Test Statistic. *df* = Degrees of Freedom. *CFI* = Robust Comparative Fit Index Score.

TLI = Robust Tucker-Lewis Index. *RMSEA* = Root Mean Sum Error Approximation. *CI* = Confidence

Interval. *SRMR* = Standardized Root Mean Square Residual. ΔCFI = Delta Robust Comparative Fit Index Score.

*** $p < 0.001$

Supplemental Table 4*Racial/Ethnic Combinations for Adolescents Who Identified as Multi-Ethnic/Racial*

Sample Size		Racial/Ethnic Groups						
Combination	N (%)	American Indian or Alaskan Native	African American/Black	Asian American	European American/White	Latino/a	Native Hawaiian or Other Pacific Islander	Other Ethnic/Racial Group
1.	1 (0.76%)	1	1		1			
2.	1 (0.76%)	1	1			1		
3.	1 (0.76%)	1		1				
4.	1 (0.76%)	1		1	1	1	1	1
5.	1 (0.76%)	1		1		1		
6.	2 (1.52%)	1			1			
7.	2 (1.52%)	1			1	1		
8.	2 (1.52%)	1				1		
9.	1 (0.76%)	1				1	1	
10.	4 (3.03%)		1	1				
11.	2 (1.52%)		1	1	1			
12.	1 (0.76%)		1	1	1			1
13.	1 (0.76%)		1	1		1		
14.	1 (0.76%)		1	1			1	
15.	1 (0.76%)		1	1				1
16.	6 (4.55%)		1		1			
17.	2 (1.52%)		1		1	1		
18.	3 (2.27%)		1			1		
19.	1 (0.76%)		1			1		1
20.	4 (3.03%)		1					1
21.	30 (22.73%)			1	1			
22.	7 (5.30%)			1	1	1		
23.	1 (0.76%)			1	1	1	1	

Sample Size		Racial/Ethnic Groups						
Combination	<i>N (%)</i>	American Indian or Alaskan Native	African American/Black	Asian American	European American/White	Latino/a	Native Hawaiian or Other Pacific Islander	Other Ethnic/Racial Group
24.	1 (0.76%)			1	1	1	1	1
25.	2 (1.52%)			1	1		1	
26.	6 (4.55%)			1		1		
27.	6 (4.55%)			1			1	
28.	3 (2.27%)			1				1
29.	12 (9.09%)				1	1		
30.	1 (0.76%)				1	1	1	
31.	1 (0.76%)				1	1		1
32.	2 (1.52%)				1		1	
33.	13 (9.85%)				1			1
34.	5 (3.79%)					1	1	
35.	4 (3.03%)				1			1

Note. This table displays the distribution of adolescents who identified as belonging to more than one racial/ethnic group. There were 35 different racial/ethnic combinations reported by 132 adolescents. *N (%)* = count of multi-ethnic/racial adolescents identifying with each racial/ethnic combination and the percentage of multi-ethnic/racial participants who identified with this combination.

Supplemental Table 5*Other Ethnic/Racial Groups Reported by Adolescents*

	<i>Other-Ethnic/Racial Group</i>	<i>n (%)</i>
1.	Arabian	1 (1.61%)
2.	African	1 (1.61%)
3.	American African (North African)	1 (1.61%)
4.	Ashkanazi Jew/ Ashkanazi Jewish	2 (3.23%)
5.	Asian	1 (1.61%)
6.	Asian (Eastern)	1 (1.61%)
7.	Asian Indian	2 (3.23%)
8.	Biracial (White/Black)	1 (1.61%)
9.	British American	1 (1.61%)
10.	Central Asian	1 (1.61%)
11.	Ecuadorian, Arab, White, Filipino	1 (1.61%)
12.	European	1 (1.61%)
13.	European Asian Mixed	1 (1.61%)
14.	European/Jewish	1 (1.61%)
15.	Indian (Asian) & German (White)	1 (1.61%)
16.	Iranian	2 (3.23%)
17.	Italian/Greek/Irish	1 (1.61%)
18.	Jewish	7 (11.29%)
19.	Jewish/Middle Eastern	1 (1.61%)
20.	Jewish/Russian/European	1 (1.61%)
21.	Latina & White	1 (1.61%)
22.	Mexican	1 (1.61%)
23.	Mexican/ Salvadorian	1 (1.61%)
24.	Middle Eastern	13 (20.97%)
25.	Middle Eastern/Iranian	1 (1.61%)
26.	Mixed	2 (3.23%)
27.	Muslim	2 (3.23%)
28.	Nepali	1 (1.61%)
29.	Persian	1 (1.61%)
30.	Filipino, Japanese, & Mexican	1 (1.61%)
31.	Puerto Rican	1 (1.61%)
32.	South Asian	2 (3.23%)
33.	Tibetan	1 (1.61%)

	<i>Other-Ethnic/Racial Group</i>	<i>n (%)</i>
34.	White	3 (4.84%)
35.	Response left blank	2 (3.23%)

Note. This table reports the responses that adolescents provided to the “other” race/ethnic group response option. There were 35 different responses to “other” reported by 62 adolescents.

Highlights

- Social class discrimination positively linked to tobacco use in adolescents.
- Social class discrimination associated with the dual use of tobacco and vaping.
- Race/ethnicity moderated the link between social class discrimination & tobacco use.
- Interventions should target social class biases to improve adolescent health.

**Examining How Social Class Discrimination is Associated with Combustible Tobacco Use,
Nicotine Vaping, and Dual Use Among Adolescents in California**

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