

# Mechanisms mediating ethnoracial discrimination and suspiciousness in Asian, Black, and Hispanic United States college students

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## ABSTRACT

**Background:** Despite the robust relationship between ethnoracial discrimination and positive psychotic-like experiences (PLEs) like subclinical suspiciousness in adulthood, the underlying mechanisms remain under-examined. Investigating the mechanisms previously implicated in trauma and positive PLEs - including negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control - may inform whether ethnoracial discrimination has similar or distinct effects from other social stressors.

**Method:** We examined the indirect effects of experiences of discrimination (EOD) to suspicious PLEs and total positive PLEs through negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control in Asian ( $n_{\text{Asian}} = 268$ ), Black ( $n_{\text{Black}} = 301$ ), and Hispanic ( $n_{\text{Hispanic}} = 129$ ) United States college students.

**Results:** Among Asian participants, results indicated a significant indirect effect of EOD to suspicious PLEs and EOD to positive PLEs via perceived stress, and EOD to positive PLEs via negative-self schemas. Among Hispanic participants, results indicated a significant indirect effect of EOD to suspicious PLEs and EOD to positive PLEs via dissociative experiences. No mechanisms appeared significant in Black participants nor were any significant direct effects observed across models, despite them reporting significantly greater experiences of ethnoracial discrimination.

**Conclusions:** Our findings suggest some shared but potentially distinct mechanisms contribute to increased suspicious PLEs and positive PLEs in Asian, Black, and Hispanic college students, with results differing by group, compared to the mechanisms underlying trauma and positive PLEs, with implications for the treatment of PLEs in college students exposed to ethnoracial discrimination.

## 1. Introduction

Ethnoracial discrimination is the experience of being treated unfairly because of one's race, ethnicity, or skin color, which are social constructs created to oppress individuals not perceived to be like a majority ethnoracial group (Anglin, 2023; Krieger et al., 2005). While interpersonal experiences of ethnoracial discrimination may be most proximal to an individual, ethnoracial discrimination is the behavioral manifestation of systemic racism, which pervades multiple levels of society and is often enacted through neighborhoods and institutions (Anglin, 2023). In

the United States, 50–75 % of Asian, Black, and Hispanic individuals report experiencing ethnoracial discrimination regularly (Lee et al., 2019). Growing evidence suggests that ethnoracial discrimination is a chronic social stressor that is associated with a range of poor mental health outcomes (Carter, 2007), similar to sequelae experienced by individuals exposed to repeated stress or trauma (Carter, 2007). Stress and a history of trauma are risk factors for many psychological disorders, including psychosis spectrum disorders (Gibson et al., 2016).

While systemic biases in diagnostic instruments or clinicians misattributing culturally normative experiences as pathological may partly

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explain elevated rates of psychosis spectrum disorders among certain racial/ethnic groups (Bridgewater et al., 2023), numerous studies have linked ethnoracial discrimination with an increased likelihood of experiencing attenuated positive psychotic symptoms (Pearce et al., 2019), which includes a variety of psychotic-like experiences (PLEs) such as unusual beliefs, suspicious beliefs, perceptual abnormalities, and disorganized thinking. This relationship may be especially strong for suspiciousness (Pearce et al., 2019), which may develop as a result of exposure to threatening situations and/or environments, and exists along a continuum ranging from general wariness or mistrust to pathological paranoia among individuals with psychosis spectrum disorders (Freeman, 2016). Asian, Black, and Hispanic individuals who are chronically exposed to ethnorracially hostile environments may experience elevated suspiciousness that may be culturally normative and even an adaptive response to repeated discrimination (Fernando, 2004). However, despite the robust theoretical and empirical relationship between ethnoracial discrimination and suspiciousness, and overall positive psychosis spectrum symptoms, the underlying mechanisms remain underexamined.

In examining the relationship between traumatic life events and positive PLEs, Gibson et al. (2019) previously found that a range of mechanisms implicated in the maintenance of post-traumatic stress and psychosis symptoms simultaneously mediated this relationship, which included negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control (Gibson et al., 2019; Morrison et al., 2003). Given ethnoracial discrimination has been conceptualized as a type of stressful and potentially traumatic event, investigating whether these same mechanisms are involved in ethnoracial discrimination and positive PLEs, particularly suspicious PLEs, may inform whether ethnoracial discrimination has similar or distinct effects as traumatic life events on increased positive PLEs.

While negative-self and negative-other schemas have been well-researched in the relationship between trauma and suspiciousness (Humphrey et al., 2021), as an individual may develop beliefs about themselves as inferior and/or beliefs about others as threatening following a traumatic event, empirical evidence related to ethnoracial discrimination is limited. In individuals at clinical high risk for psychosis, Saleem et al. (2014) found higher levels of perceived discrimination, which included but was not limited to ethnoracial discrimination, was significantly associated with increased negative-self and negative-other schemas. Using individuals drawn from the same population, Michaels et al. (2023) demonstrated increased negative self/other schemas partially mediated the relationship between increased ethnoracial discrimination and suspiciousness. However, these studies did not examine the effects of negative-self compared to negative-other schemas, which may have different effects on suspiciousness, depending on confounding variables like demographic characteristics and other psychological symptoms (Humphrey et al., 2021).

Furthermore, Saleem et al. (2014) and Michaels et al. (2023) did not conduct their analyses separately among different racial/ethnic groups. While collapsing analyses across groups can increase the total sample size and improve power to detect significant results, it does not permit identifying effects within individual racial/ethnic groups. This is particularly problematic when much of a sample identifies with an ethnoracial majority. Additionally, conclusions about what is normative within different racial/ethnic groups are precluded, which are important to investigate separately as various racial/ethnic groups may differentially experience the effects of interpersonal, neighborhood-level, and structural racism.

Though perceived stress, which is the extent to which an event is perceived to be stressful, has been implicated in trauma and PLEs (Gibson et al., 2014), to our knowledge, no studies have yet examined the potential mediational role of perceived stress in the relationship between ethnoracial discrimination and positive psychosis spectrum symptoms. However, Anglin et al. (2014) has suggested it may play a mediating role, and perceived stress has been positively correlated with

increased psychotic symptoms in Black participants (Espinosa et al., 2022). In comparison, dissociation, which is the mental act of becoming disconnected from the self and/or the world, has been associated with ethnoracial discrimination among Asian, Black, and Hispanic individuals (Polanco-Roman et al., 2016) and been found to fully and partially account for associations between trauma and PLEs in Black and Hispanic participants, respectively (Anglin et al., 2015). Finally, locus of control, which is the extent to which an individual believes others versus themselves have control over their lives, has been found to mediate identification with a British majority group and paranoia in African and African-Caribbean individuals (McIntyre et al., 2021), though these results may not be generalizable to individuals living in the United States who have experienced a different legacy of structural racism (Anglin, 2023).

Given college-age individuals are at peak risk for experiencing psychotic symptoms (American Psychiatric Association, 2013), and with research demonstrating that Asian, Black, and Hispanic United States college students report greater experiences of ethnoracial discrimination compared to their Non-Hispanic White peers (Bravo et al., 2021), studying the mechanisms underlying ethnoracial discrimination and psychotic symptoms in college students is imperative. Thus, building upon previous work by Gibson et al. (2019), the current study examined the indirect effects of ethnoracial discrimination to suspicious PLEs and ethnoracial discrimination to total positive PLEs through negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control, in Asian, Black, and Hispanic college students. Since these mechanisms may be at work simultaneously, studying their effects using a multiple mediation framework allows integration into one model, controlling for co-occurring effects, and allowing for examination of the effects of these mechanisms within each group separately. We hypothesized that negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control, would each significantly mediate the association between ethnoracial discrimination and increased suspiciousness, and therefore total positive PLEs, in Asian, Black, and Hispanic college students. Supplementary analyses examining ethnoracial discrimination and positive PLEs removing suspiciousness items, hereupon referred to as non-suspicious positive PLEs, were conducted to investigate the potentially unique role of suspiciousness compared to other positive PLEs. All analyses were also conducted in Non-Hispanic White college students.

## 2. Material and methods

### 2.1. Participants

College students ages 18–34 participated in a parent study through a racially/ethnically and economically diverse large urban university in Philadelphia, Pennsylvania, United States. Students were recruited from multiple courses between September 2014 and July 2017 through an online research participant system and received course credit. No other exclusion criteria besides an upper age limit of 35 were followed, to exclude individuals beyond peak risk for subclinical psychotic symptoms (American Psychiatric Association, 2013). Written informed consent was obtained from all participants. Participants completed an online battery of self-report questionnaires on a laboratory computer and received a resource list or direct referral to clinical services if indicated.

### 2.2. Measures

Demographic variables were self-reported, including age, gender, race, and ethnicity. Race/ethnicity was reported according to the National Institutes of Health (NIH) racial/ethnic categories (Race: Unknown, American Indian/Alaska Native, Asian, Native Hawaiian or other Pacific Islander, Black or African American, White, More than one Race; Ethnicity: Hispanic, Not Hispanic). All clinical variables were also

self-reported, which included:

**Experiences of Discrimination (EOD) Scale** (Krieger et al., 2005) assesses lifetime experiences of discrimination due to race, ethnicity, or skin color among nine settings (e.g., school, work, housing, medical, public, legal), from which a sum score was obtained. The measure has been administered with Asian, Black, Hispanic, and Non-Hispanic White samples ages 18–64 (Anglin et al., 2016) and validated in Black and Hispanic populations ages 25–64 (Krieger et al., 2005).

**Prodromal Questionnaire (PQ)** (Loewy et al., 2005) assesses the frequency of a range of PLEs within the past month while not using alcohol, drugs, or medications, including 45 items capturing positive symptoms (i.e., unusual beliefs, suspicious beliefs, perceptual abnormalities, and disorganized thinking). An eight-item subset assesses suspicious beliefs, which has previously been confirmed by a factor analysis using the parent study (Cooper et al., 2016). Scores for total number of suspicious PLEs, total number of positive PLEs (including suspicious PLEs), and total number of non-suspicious positive PLEs (excluding suspicious PLEs), were calculated. Measurement invariance among Asian, Black, Hispanic, and Non-Hispanic White college students drawn from the parent study has been demonstrated (Capizzi et al., 2022).

**Brief Core Schema Scale (BCSS)** (Addington and Tran, 2009) is a 24-item questionnaire that assesses positive and negative self/other schemas within the last week on a four-point scale from believe it slightly to believe it totally. Sum scores for the six-item negative-self and six-item negative-other domains were obtained.

**Perceived Stress Scale (PSS)** (Cohen et al., 1983) is a 14-item questionnaire that assesses perceived global stress and coping abilities within the last month on a four-point scale from never to very often, from which a sum score was calculated.

**Dissociative Experiences Scale (DES)** (Bernstein and Putnam, 1986) is a 28-item questionnaire that assesses percentage of time from 0 to 100 % that participants have dissociative experiences and symptoms when not under the influence of substances, from which an average score was obtained.

**Rotter Internal-External Scale (Rotter I-E)** (Rotter, 1966) is a 29-item questionnaire that assesses external/internal locus of control, measured by beliefs about how reinforcement is controlled in the world. Sum scores from the 23 items that pertain to external/internal locus of control were calculated.

### 2.3. Design and statistical analyses

After listwise deletion of missing data, final samples sizes of the groups were: Non-Hispanic Asian ( $n_{\text{Asian}} = 268$ ), Non-Hispanic Black ( $n_{\text{Black}} = 301$ ), and Hispanic ( $n_{\text{Hispanic}} = 129$ ). All planned analyses were conducted separately for Asian, Black, and Hispanic groups. Independent (EOD) and dependent [1] suspicious PLEs and 2) total positive PLEs (PQ)] variables were examined visually and statistically for normality. Residuals of simple linear regressions between the independent variable and each dependent variable were also examined visually and statistically to confirm assumptions of normality and homoscedasticity; these assumptions were met within each ethnoracial group and no transformations were required. Potential mediator variables included negative-self schemas (BCSS), negative-other schemas (BCSS), perceived stress (PSS), dissociative experiences (DES), and external locus of control (Rotter I-E). Differences between groups in demographic and clinical variables were examined with omnibus analysis of variance tests, and if significant, Tukey Honestly Significant Difference (HSD) pairwise comparisons were conducted. Bivariate correlations between all study variables were tested. Age and gender were considered covariates and controlled for in multiple mediation analyses if they were significantly correlated with the independent and dependent variables.

To investigate the simultaneous indirect effects of EOD to suspicious PLEs and total positive PLEs through the five mechanisms, separate multiple mediation analyses were conducted using PROCESS Macro for SPSS Version 4.2 beta (Hayes, 2012). The indirect effect was tested using

bootstrapping with 5000 samples. Significant results for multiple mediation analyses are indicated by the 95 % confidence interval of the indirect effect not including zero (Hayes, 2012).

Supplementary analyses examining the indirect effects of EOD to non-suspicious positive PLEs through the five mechanisms were conducted. All analyses were also conducted in Non-Hispanic White participants ( $n_{\text{Non-Hispanic White}} = 950$ ), excluding Hispanic participants as research suggests individuals who identify as White and Hispanic may differentially experience ethnoracial discrimination (Findling et al., 2019).

## 3. Results

### 3.1. Demographic and clinical characteristics

Table 1 presents participant demographics and clinical characteristics, as well as group differences and pairwise comparisons between Asian, Black, and Hispanic participants for all study variables. Significant differences in age, gender, EOD, BCSS negative-self schemas, BCSS negative-other schemas, and Rotter I-E existed among groups. Of note, Black participants reported significantly greater EOD compared to Asian and Hispanic participants. No significant differences in suspicious PLEs nor total positive PLEs were evident among groups.

### 3.2. Bivariate correlations

Table 2 presents bivariate correlations among all study variables for each group. Across Asian, Black, and Hispanic groups, neither age nor gender was significantly associated with both EOD and suspicious PLEs or total positive PLEs, thus no covariates were included across these models. Among Asian participants, EOD was positively correlated with both suspicious PLEs and total positive PLEs. EOD was significantly correlated with BCSS negative-self schemas, BCSS negative-other schemas, PSS, and Rotter I-E. Both suspicious PLEs and total positive PLEs were significantly correlated with BCSS negative-self schemas, BCSS negative-other schemas, PSS, and DES.

Among Black participants, EOD was not significantly correlated with suspicious PLEs nor total positive PLEs. EOD was not significantly correlated with any of the five potential mediator variables. Both suspicious PLEs and total positive PLEs were significantly correlated with all five potential mediator variables.

Among Hispanic participants, EOD was positive correlated with both suspicious PLEs and total positive PLEs. EOD was significantly correlated with BCSS negative-self schemas, PSS, and DES. Both suspicious PLEs and total positive PLEs were significantly correlated with all five potential mediator variables.

### 3.3. Multiple mediation results

#### 3.3.1. Suspicious PLEs

Fig. 1 presents results from the full multiple mediation model (Fig. 1A: Asian participants, Fig. 1B: Black participants, Fig. 1C: Hispanic participants). Among Asian participants, we found a significant direct effect between EOD and suspicious PLEs, and a significant indirect effect of EOD to suspicious PLEs through PSS. Among Black participants, no evidence for a significant direct effect between EOD and suspicious PLEs was observed, nor did any of the five mechanisms appear significant. Among Hispanic participants, we found no evidence for a significant direct effect between EOD and suspicious PLEs, but a significant indirect effect of EOD to suspicious PLEs through DES.

#### 3.3.2. Total positive PLEs

Fig. 2 presents results from the full multiple mediation model (Fig. 2A: Asian participants, Fig. 2B: Black participants, Fig. 2C: Hispanic participants). Among Asian participants, we found no evidence for a significant direct effect between EOD and total positive PLEs, but

**Table 1**  
Participant demographics and clinical characteristics.

	Asian (n = 268) Mean (SD) [range]	Black (n = 301) Mean (SD) [range]	Hispanic (n = 129) Mean (SD) [range]	Differences [F(2,695), p] <sup>a</sup>
Age (years)	19.94 (1.79) [18–30]	20.73 (3.21) [18–34]	20.41 (2.75) [18–32]	6.17, 0.002 <sup>a</sup>
Female, n (%)	187, (69.80 %)	245, (81.40 %)	98, (76.00 %)	5.29, 0.005 <sup>a</sup>
Race, n (%)				–
American Indian/Alaska Native	–	–	5, (3.90 %)	
Asian Native	268, (100 %)	–	2, (1.60 %)	
Hawaiian or other Pacific Islander	–	–	2, (1.60 %)	
Black	–	301, (100 %)	23, (17.80 %)	
White	–	–	58, (45.00 %)	
More than one race	–	–	11, (8.50 %)	
Unknown	–	–	28, (21.70 %)	
Hispanic, n (%)	0, (0 %)	0, (0 %)	129, (100 %)	–
EOD	3.99 (4.48) [0–20]	5.73 (6.23) [0–33.50]	3.60 (4.75) [0–18.50]	10.62, <0.001 <sup>a</sup>
Suspicious PLEs	1.99 (1.93) [0–8]	1.88 (1.84) [0–7]	1.74 (1.72) [0–7]	0.81, 0.45
Positive PLEs	10.56 (7.47) [0–37]	9.70 (7.34) [0–44]	9.91 (7.19) [0–35]	1.00, 0.37
BCSS negative-self schema	3.71 (4.57) [0–22]	2.08 (2.99) [0–16]	2.94 (4.24) [0–20]	12.42, <0.001 <sup>a</sup>
BCSS negative-other schema	5.83 (4.81) [0–24]	7.65 (5.59) [0–24]	7.09 (5.99) [0–24]	8.29, <0.001 <sup>a</sup>
PSS	25.79 (7.72) [2–46]	26.04 (8.49) [4–52]	25.09 (8.25) [5–45]	0.62, 0.54
DES	23.61 (13.91) [10–87.14]	25.85 (14.12) [10–85.36]	24.04 (12.16) [10–70]	2.07, 0.13
Rotter I-E	12.01 (3.35) [4–23]	11.98 (3.43) [1–22]	12.91 (3.28) [6–22]	3.87, 0.02 <sup>a</sup>

EOD – Experiences of Discrimination; PLEs – Psychotic-Like Experiences; BCSS – Brief Core Schema Scale; PSS – Perceived Stress Scale; DES – Dissociative Experiences Scale; Rotter I-E – Rotter Internal-External Locus of Control Scale.

<sup>a</sup> Significant Tukey HSD Pairwise Comparisons – Age [Black:Asian (mean difference = 0.78,  $p = 0.001$ ); Gender [Black:Asian (mean difference = 0.12,  $p = 0.003$ ); EOD [Black:Hispanic (mean difference = 2.13,  $p < 0.001$ ; Black:Asian (mean difference = 1.73,  $p < 0.001$ ); BCSS negative-self schemas [Asian:Black (mean difference = 1.63,  $p < 0.001$ ); BCSS negative-other schemas [Black:Asian (mean difference = 1.82,  $p < 0.001$ ); Rotter I-E [Hispanic:Black (mean difference = 0.93,  $p = 0.03$ ); Hispanic:Asian (mean difference = 0.90,  $p = 0.04$ ).

significant indirect effects of EOD to total positive PLEs through BCSS negative-self schemas and PSS. Among Black participants, no evidence for a significant direct effect between EOD and total positive PLEs was observed, and none of the five mechanisms appeared significant. Among Hispanic participants, we found no evidence for a significant direct effect between EOD and total positive PLEs, but a significant indirect effect of EOD to total positive PLEs through DES.

### 3.4. Supplementary analyses

#### 3.4.1. EOD and non-suspicious positive PLEs

Among Asian participants, we found no evidence for a significant direct effect between EOD and non-suspicious positive PLEs, but

significant indirect effects of EOD to non-suspicious positive PLEs through BCSS negative-self schemas and PSS. Among Black participants, no evidence for a significant direct effect between EOD and non-suspicious positive PLEs was observed, and none of the five mechanisms appeared significant. Among Hispanic participants, we found no evidence for a significant direct effect between EOD and non-suspicious positive PLEs, but a significant indirect effect of EOD to non-suspicious positive PLEs through DES. See Supplementary Table 1.

#### 3.4.2. Non-Hispanic White participants

Among Non-Hispanic White participants, we found a significant direct effect between EOD and suspicious PLEs and EOD and total positive PLEs, and significant indirect effects of EOD to suspicious PLEs and EOD to total positive PLEs through BCSS negative-other schemas, PSS, and DES. We also found a significant direct effect between EOD and non-suspicious positive PLEs, and significant indirect effects of EOD to non-suspicious PLEs through PSS and DES. See Supplementary Table 2.

## 4. Discussion

This study examined whether the mechanisms previously implicated in the relationship between trauma and positive PLEs also contribute to associations between ethnoracial discrimination and suspicious PLEs, and thus positive PLEs, in Asian, Black, and Hispanic United States college students. Contrary to our hypothesis, all five mechanisms did not each significantly mediate these relationships, with results differing by group. Supplementary analyses exploring the indirect effects of the five mechanisms on non-suspicious positive PLEs revealed similar results to what was found for total positive PLEs, suggesting increased suspiciousness does not entirely drive increased PLEs in Asian, Black, and Hispanic college students exposed to ethnoracial discrimination.

In participants drawn from the parent study, [Gibson et al. \(2019\)](#) found all five mechanisms significantly mediated traumatic life events and total positive PLEs. Though we excluded Non-Hispanic White participants from our main analyses, we did not see similar findings among our groups, suggesting there may be some shared but potentially distinct mechanisms engaged in by United States college students exposed to ethnoracial discrimination compared to those exposed to trauma. That is, whereas Asian and Hispanic students exposed to ethnoracial discrimination may recruit some of the same mechanisms, Black students may engage in other mechanisms, who in our sample, reported significantly greater experiences of ethnoracial discrimination.

For instance, [Anglin et al. \(2016\)](#) found that race-based rejection sensitivity, which includes concerns and expectations of rejection due to race/ethnicity, partially mediated the relationship between ethnoracial discrimination and distressing positive PLEs in Black college students. Additionally, different subgroup identities and degree of identification with an endorsed identity may play a critical role. [Oh and Anglin \(2023\)](#) found that the relationship between everyday discrimination and psychotic experiences in African Americans was strongest among those with high racial group identification, whereas in individuals of Caribbean Black background, everyday discrimination and psychotic experiences was associated with lower racial group identification. Further research examining the differential contributions of different subgroup ethnic/cultural identities among Black individuals may help elucidate the mechanisms engaged in by Black Americans that may contribute to increased PLEs.

Our results suggest that Asian college students exposed to ethnoracial discrimination may engage in some of the same mechanisms as individuals exposed to trauma. While this is the first study to empirically demonstrate that perceived stress plays a role in the relationship between ethnoracial discrimination and both increased suspicious PLEs and positive PLEs, our results expand on previous findings by [Michaels et al. \(2023\)](#) by suggesting that Asian college students exposed to ethnoracial discrimination may uniquely recruit negative-self schemas, though replication of these findings is required. Increased negative-self

**Table 2**  
Bivariate relationships among study variables for Asian, Black, and Hispanic participants (*r*, *p*).

	EOD	Suspicious PLEs	Positive PLEs	BCSS neg-self schema	BCSS neg-other schema	PSS	DES	Rotter I-E	Age	Gender
EOD	1									
Suspicious PLEs	0.240**+ 0.070° 0.257**°	1								
Positive PLEs	0.195**+ 0.106° 0.278**°	0.790**+ 0.795**°	1							
BCSS neg-self schema	0.139**+ -0.013° 0.185**°	0.302**+ 0.268**° 0.284**°	0.426**+ 0.297**° 0.428**°	1						
BCSS neg-other schema	0.131**+ 0.011° 0.015°	0.195**+ 0.183**° 0.183**°	0.244**+ 0.182**° 0.205**°	0.324**+ 0.184**° 0.264**°	1					
PSS	0.203**+ 0.002° 0.354**°	0.344**+ 0.242**° 0.355**°	0.428**+ 0.334**° 0.475**°	0.549**+ 0.423**° 0.532**°	0.283**+ 0.196**° 0.219**°	1				
DES	0.106+ 0.064° 0.219**°	0.282**+ 0.249**° 0.405**°	0.412**+ 0.393**° 0.572**°	0.340**+ 0.133**° 0.310**°	0.303**+ 0.207**° 0.211**°	0.303**+ 0.305**° 0.403**°	1			
Rotter I-E	0.140**+ 0.070° 0.163°	0.079+ 0.189**° 0.276**°	0.104+ 0.172**° 0.357**°	0.226**+ 0.171**° 0.303**°	0.201**+ 0.016° 0.105°	0.284**+ 0.173**° 0.429**°	0.177**+ 0.119**° 0.115°	1		
Age	0.060+ 0.186**° 0.015°	-0.169**+ -0.112° -0.163°	-0.116+ -0.113° -0.214**°	-0.066+ -0.104° -0.104°	-0.139**+ -0.014° -0.177**°	-0.006+ -0.129**° -0.147°	0.018+ -0.125**° -0.149°	-0.025+ -0.184**° -0.128°	1	
Gender	0.035+ -0.094° -0.031°	0.006+ -0.018° 0.022°	-0.023+ -0.021° 0.029°	0.016+ 0.131**° 0.125°	-0.101+ 0.085° 0.124°	0.129**+ 0.177**° 0.249**°	-0.142**+ 0.007° 0.004°	0.094+ 0.144**° 0.201**°	-0.130+ -0.147**° -0.101°	1

EOD – Experiences of Discrimination; PLEs – Psychotic-Like Experiences; BCSS – Brief Core Schema Scale; PSS – Perceived Stress Scale; DES – Dissociative Experiences Scale; Rotter I-E – Rotter Internal External Locus of Control Scale.

+ Asian (*n* = 268).

° Black (*n* = 301).

° Hispanic (*n* = 129).

\* Indicates *p* < 0.05.

\*\* Indicates *p* < 0.01.

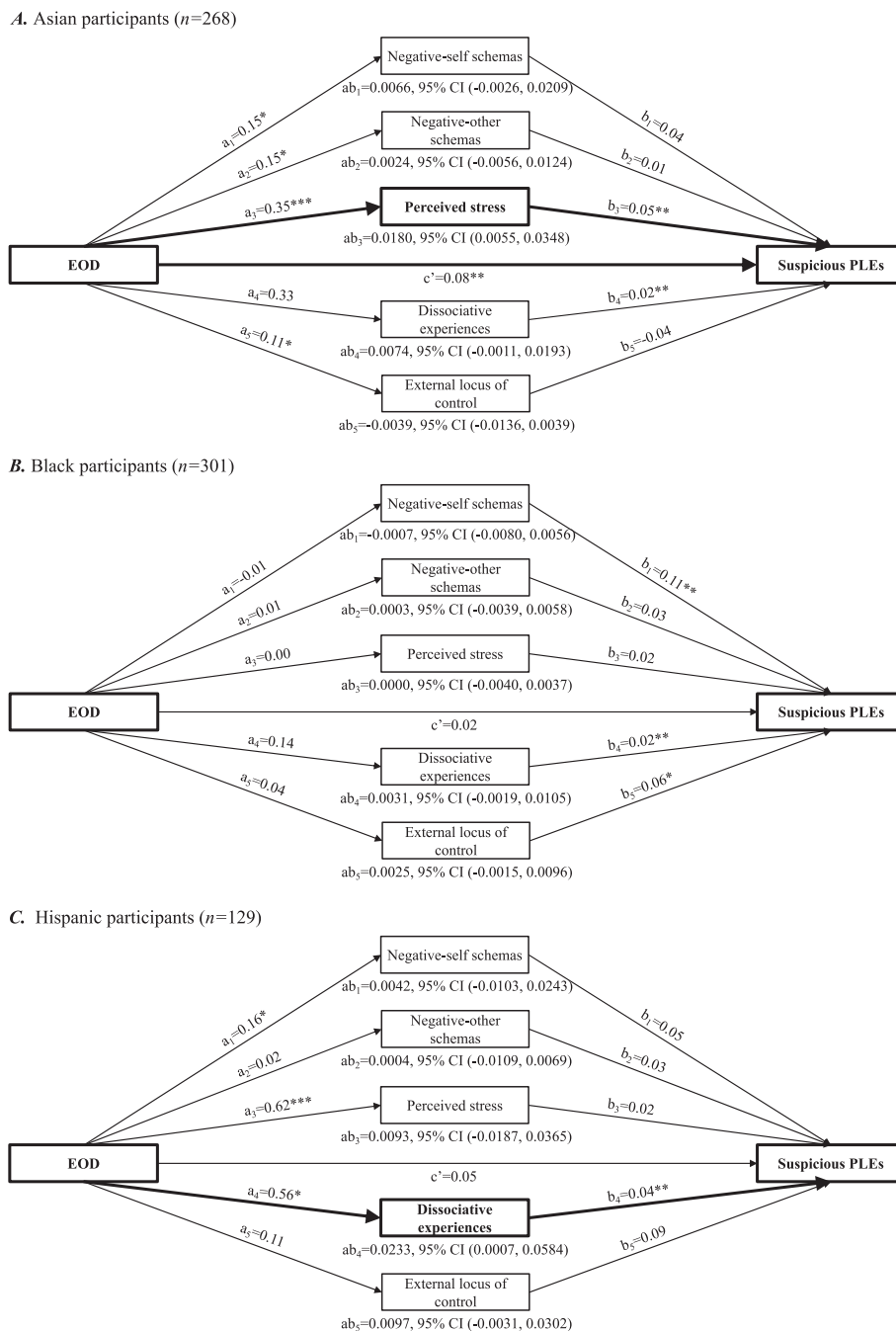
schemas in Asian college students may also be related to the effects of internalized racial stereotypes (Carter, 2007), which may vary for different subgroup identities (e.g., East Asian, South Asian), though empirical studies examining these relationships are needed.

Consistent with Anglin et al. (2015) where they found dissociative experiences partially accounted for the association between trauma and PLEs in Hispanic college students but not Asian participants, our results show dissociative experiences also appear to play a role in the relationship between ethnoracial discrimination and both increased suspicious PLEs and total positive PLEs in Hispanic college students. Together, these findings suggests that Hispanic college students may engage in dissociative experiences in response to stressful and potentially traumatic events, including ethnoracial discrimination, which Anglin et al. (2015) notes may be a normative reaction to stress and trauma in Hispanic individuals. However, these results may not be generalizable across various subgroups of Hispanic students with different cultural identities (e.g., Puerto Rican, Mexican), given the diversity of ethnic backgrounds among Hispanic individuals (Torres, 2004). Indeed, further studies are needed to understand what is normative within various subgroups of Asian, Black, and Hispanic cultures to have a better understanding of the results of this study, which entails comprehensively assessing for the many heterogeneous cultural identities within groups.

Participants in this study were asked to self-report their racial/ethnic identification according to NIH racial/ethnic categories, which are arguably narrow and consolidate across many, often dissimilar groups. Critically, the current NIH racial/ethnic categories do not allow reporting of the many heterogeneous identities within groups that may differentially experience ethnoracial discrimination (e.g., East Asian compared to South Asian individuals, as well as regional differences

within Asian countries), and may also cause participants who would not otherwise identify with one of the NIH racial/ethnic categories to inappropriately report their racial/ethnic identities. As another example, individuals of Middle Eastern or North African backgrounds may need to identify as Non-Hispanic White under the current NIH categories, though they may differentially experience ethnoracial discrimination due to their skin color or aspects of appearance and dress related to their culture (e.g., wearing a hijab). While we were unable to assess participants’ degree of identification or affiliation with the endorsed NIH racial/ethnic category, future studies could consider adding additional questions to assess diverse within-group cultural identities, which will allow researchers to gain a better understanding of the effects of ethnoracial discrimination on different racial/ethnic identities. Relatedly, assessing for and parsing apart discrimination related to intersectional identities including race, ethnicity, gender, sexuality, age, religion, disability, native language, dialect, and immigration status is critical (Anglin, 2023) as acts of prejudice can discriminate against multiple identities simultaneously. This will require future studies to recruit larger sample sizes, especially of traditionally underrepresented racial/ethnic groups in psychological research.

Inconsistent with previous findings, neither negative-other schemas nor external locus of control appeared significant in Asian, Black, or Hispanic college students in our sample. While Michaels et al. (2023) found negative self/other schemas partially mediated ethnoracial discrimination and suspiciousness, the majority of their sample identified as Non-Hispanic White, and as previously mentioned, they did not examine the differential contributions of negative-self compared to negative-other schemas. Previous studies implicating locus of control in ethnoracial discrimination and suspiciousness used a different measure



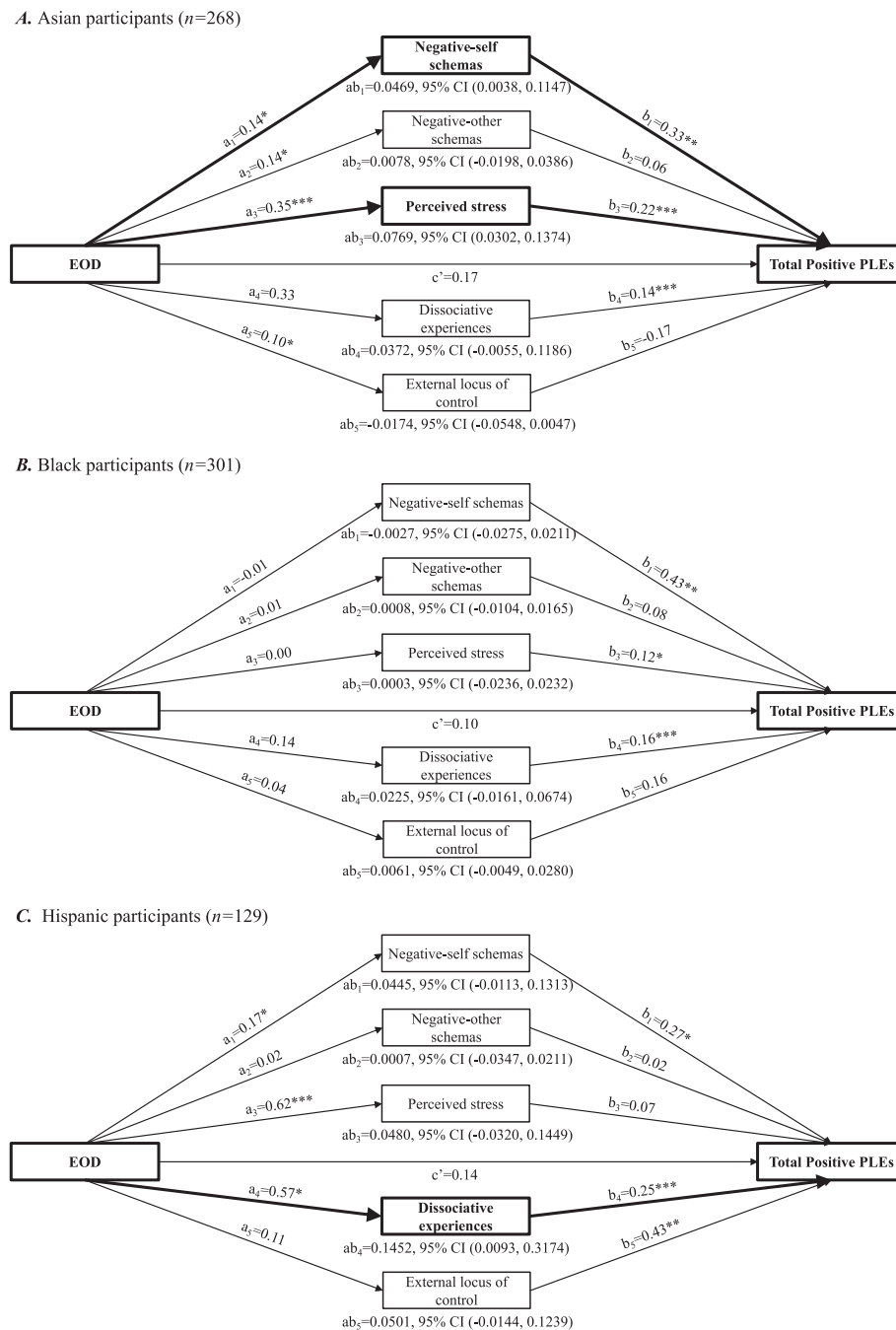
**Fig. 1.** Multiple mediation model of the relationship between experiences of discrimination (EOD) and suspicious psychotic-like experiences (suspicious PLEs) through negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control. Legend: “a” indicates the effect of EOD on a mechanism, “b” indicates the effect of a mechanism on suspicious PLEs, “c'” indicates the direct effect of EOD on suspicious PLEs, “ab” indicates the indirect effect of EOD on suspicious PLEs through a mechanism. \* indicates  $p < 0.05$ , \*\* indicates  $p < 0.01$ , \*\*\* indicates  $p < 0.001$ . Values are unstandardized coefficients. Significant indirect effect indicated by the 95 % confidence interval (CI) not including zero.

that assessed perceived power dynamics (McIntyre et al., 2021), which may be critical when assessing experiences of ethnoracial discrimination which involve inequalities in power.

**4.1. Limitations**

The results of this study should be considered within the context of some methodological limitations. Even though utilizing a large college student sample enabled us to examine individuals at peak risk for psychotic symptoms, as well as provided sufficient sample sizes to conduct our planned analyses, the results may not be generalizable to other non-

clinical samples. Additionally, research suggests that individuals exposed to discrimination may underreport these experiences for a variety of reasons (Kaiser and Major, 2006), though participants in our sample endorsed a wide frequency of lifetime experiences of discrimination. Capizzi et al. (2022) also identified several questions from the positive symptom subscale of the PQ, including ones capturing suspiciousness, that were highly endorsed by a sample of college students from the parent study, suggesting potential over-endorsement of PLEs. It is also important to note that all the measures used in the current study relied on retrospective self-report from a cross-sectional study, limiting understanding of the directionality among variables. Prospective,



**Fig. 2.** Multiple mediation model of the relationship between experiences of discrimination (EOD) and total positive psychotic-like experiences (total positive PLEs) through negative-self schemas, negative-other schemas, perceived stress, dissociative experiences, and external locus of control. Legend: “a” indicates the effect of EOD on a mechanism, “b” indicates the effect of a mechanism on total positive PLEs, “c” indicates the direct effect of EOD on total positive PLEs, “ab” indicates the indirect effect of EOD on total positive PLEs through a mechanism. \* indicates  $p < 0.05$ , \*\* indicates  $p < 0.01$ , \*\*\* indicates  $p < 0.001$ . Values are unstandardized coefficients. Significant indirect effect indicated by the 95 % confidence interval (CI) not including zero.

longitudinal studies assessing the developmental sequelae of ethnoracial discrimination are needed. Further, to what extent the results found within each ethnoracial group survive multiple comparisons was not examined, thus, these findings should be interpreted as preliminary.

Additionally, we were unable to assess levels of “cultural paranoia” or “healthy suspiciousness,” concepts that posit that increased suspiciousness among various racial/ethnic groups may be a normative and even adaptive response to chronic discrimination (Fernando, 2004; Whaley, 2002). While further research operationalizing these phenomena is required, neighborhood and city-level issues pertaining to race and ethnicity may play a role (Anglin et al., 2020). Thus, these results

may not be generalizable to individuals living in other locations in the United States. Additionally, while research on how current assessments may distinguish “healthy” suspiciousness from more distressing levels of suspiciousness will be invaluable, it is important to consider that increased suspiciousness among certain racial/ethnic groups may not be pathological.

#### 4.2. Future directions

Future studies should replicate these results in other non-clinical and clinical samples, especially within the last decade as Asian, Black, and

Hispanic communities in the United States are experiencing exacerbated discrimination-based stress and increased mental health disparities with nationwide increases/changes in race-based hate crimes and police brutality (Edwards and Rushin, 2018; Fisher et al., 2023; Gover et al., 2020; Howard et al., 2023). Our results also have important clinical implications for treatment and assessment, which should be further studied in terms of how clinicians and researchers can incorporate anti-racist practices, as well as potential interventions for those exposed to ethnoracial discrimination who have developed clinical symptoms.

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### CRedit authorship contribution statement

**Zeeshan M. Huque:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Stephanie A. Korenic:** Formal analysis, Supervision, Writing – review & editing. **Arielle Ered:** Formal analysis, Supervision, Writing – review & editing. **Thomas M. Olino:** Conceptualization, Formal analysis, Methodology, Supervision, Writing – review & editing. **Deidre M. Anglin:** Conceptualization, Writing – review & editing. **Lauren M. Ellman:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

### Declaration of competing interest

None.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.schres.2024.07.017>.

### References

- Addington, J., Tran, L., 2009. Using the brief core schema scales with individuals at clinical high risk of psychosis. *Behav. Cogn. Psychother.* 37 (2), 227–231.
- American Psychiatric Association, 2013. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. <https://doi.org/10.1176/appi.books.9780890425596>
- Anglin, D.M., 2023. Racism and social determinants of psychosis. *Annu. Rev. Clin. Psychol.* 19, 277–302.
- Anglin, D.M., Lighty, Q., Greenspoon, M., Ellman, L.M., 2014. Racial discrimination is associated with distressing subthreshold positive psychotic symptoms among US urban ethnic minority young adults. *Soc. Psychiatry Psychiatr. Epidemiol.* 49, 1545–1555.
- Anglin, D.M., Polanco-Roman, L., Lui, F., 2015. Ethnic variation in whether dissociation mediates the relation between traumatic life events and attenuated positive psychotic symptoms. *J. Trauma Dissociation* 16 (1), 68–85.
- Anglin, D.M., Greenspoon, M., Lighty, Q., Ellman, L.M., 2016. Race-based rejection sensitivity partially accounts for the relationship between racial discrimination and distressing attenuated positive psychotic symptoms. *Early Interv. Psychiatry* 10 (5), 411–418.
- Anglin, D.M., Lui, F., Schneider, M., Ellman, L.M., 2020. Changes in perceived neighborhood ethnic density among racial and ethnic minorities over time and psychotic-like experiences. *Schizophr. Res.* 216, 330–338.
- Bernstein, E.M., Putnam, F.W., 1986. Development, Reliability, and Validity of a Dissociation Scale, pp. 727–735.
- Bravo, A.J., Wedell, E., Villarosa-Hurlocker, M.C., Looby, A., Dickter, C.L., Schepis, T.S., Stimulant Norms and Prevalence (SNAP) Study Team, 2021. Perceived racial/ethnic discrimination among young adult college students: prevalence rates and associations with mental health. *J. Am. Coll. Health* 1–12.
- Bridgwater, M.A., Petti, E., Giljen, M., Akouri-Shan, L., DeLuca, J.S., Rakhshan Rouhakhtar, P., Millar, C., Karcher, N.R., Martin, E.A., DyVlyder, J., Anglin, D., Williams, R., Ellman, L.M., Mittal, V.A., Schiffman, J., 2023. Review of factors resulting in systemic biases in the screening, assessment, and treatment of individuals at clinical high-risk for psychosis in the United States. *Front. Psych.* 14, 1117022.
- Capizzi, R., Pierce, K.M., Olino, T.M., Ellman, L.M., 2022. Item-level endorsement on the Prodromal Questionnaire in a large non-clinical sample. *Schizophr. Res.* 248, 309–319.
- Carter, R.T., 2007. Racism and psychological and emotional injury: recognizing and assessing race-based traumatic stress. *Couns. Psychol.* 35 (1), 13–105.
- Cohen, S., Kamarck, T., Mermelstein, R., 1983. A global measure of perceived stress. *J. Health Soc. Behav.* 385–396.
- Cooper, S., Klugman, J., Heimberg, R.G., Anglin, D.M., Ellman, L.M., 2016. Attenuated positive psychotic symptoms and social anxiety: along a psychotic continuum or different constructs? *Psychiatry Res.* 235, 139–147.
- Edwards, G.S., Rushin, S., 2018. The Effect of President Trump's Election on Hate Crimes (Available at SSRN 3102652).
- Espinosa, A., Anglin, D.M., Pandit, S., 2022. Emotional self-efficacy informs the interrelation between discrimination, ethnic identity and psychotic-like experiences. *Emotion* 22 (6), 1347.
- Fernando, S., 2004. *Cultural Diversity, Mental Health and Psychiatry: The Struggle against Racism*. Routledge.
- Findling, M.G., Bleich, S.N., Casey, L.S., Blendon, R.J., Benson, J.M., Sayde, J.M., Miller, C., 2019. Discrimination in the United States: experiences of Latinos. *Health Serv. Res.* 54, 1409–1418.
- Fisher, C.B., Tao, X., Yip, T., 2023. The effects of COVID-19 victimization distress and racial bias on mental health among AIAN, Asian, Black, and Latinx young adults. *Cult. Divers. Ethn. Minor. Psychol.* 29 (2), 119.
- Freeman, D., 2016. Persecutory delusions: a cognitive perspective on understanding and treatment. *Lancet Psychiatry* 3 (7), 685–692.
- Gibson, L.E., Anglin, D.M., Klugman, J.T., Reeves, L.E., Fineberg, A.M., Maxwell, S.D., Kerns, C.M., Ellman, L.M., 2014. Stress sensitivity mediates the relationship between traumatic life events and attenuated positive psychotic symptoms differentially by gender in a college population sample. *J. Psychiatr. Res.* 53, 111–118.
- Gibson, L.E., Alloy, L.B., Ellman, L.M., 2016. Trauma and the psychosis spectrum: a review of symptom specificity and explanatory mechanisms. *Clin. Psychol. Rev.* 49, 92–105.
- Gibson, L.E., Reeves, L.E., Cooper, S., Olino, T.M., Ellman, L.M., 2019. Traumatic life event exposure and psychotic-like experiences: a multiple mediation model of cognitive-based mechanisms. *Schizophr. Res.* 205, 15–22.
- Gover, A.R., Harper, S.B., Langton, L., 2020. Anti-Asian hate crime during the COVID-19 pandemic: exploring the reproduction of inequality. *Am. J. Crim. Justice* 45, 647–667.
- Hayes, A.F., 2012. PROCESS: a versatile computational tool for observed variable mediation, moderation, and conditional process modeling 1. *Psychology* 4–6.
- Howard, L.C., Krueger, E.A., Barker, J.O., Boley Cruz, T., Cwalina, S.N., Unger, J.B., Barrington-Trimis, J.L., Leventhal, A.M., 2023. Young adults' distress about police brutality following the death of George Floyd. *Youth Soc.* 55 (6), 1173–1190.
- Humphrey, C., Bucci, S., Varese, F., Degnan, A., Berry, K., 2021. Paranoia and negative schema about the self and others: a systematic review and meta-analysis. *Clin. Psychol. Rev.* 90, 102081.
- Kaiser, C.R., Major, B., 2006. A social psychological perspective on perceiving and reporting discrimination. *Law Soc. Inq.* 31 (4), 801–830.
- Krieger, N., Smith, K., Naishadham, D., Hartman, C., Barbeau, E.M., 2005. Experiences of discrimination: validity and reliability of a self-report measure for population health research on racism and health. *Soc. Sci. Med.* 61 (7), 1576–1596.
- Lee, R.T., Perez, A.D., Boykin, C.M., Mendoza-Denton, R., 2019. On the prevalence of racial discrimination in the United States. *PLoS One* 14 (1), e0210698.
- Loewy, R.L., Bearden, C.E., Johnson, J.K., Raine, A., Cannon, T.D., 2005. The prodromal questionnaire (PQ): preliminary validation of a self-report screening measure for prodromal and psychotic syndromes. *Schizophr. Res.* 79 (1), 117–125.
- McIntyre, J.C., Elahi, A., Barlow, F.K., White, R.G., Bentall, R.P., 2021. The relationship between group identity and Paranoid ideation among people from African and African Caribbean backgrounds. *Psychol. Psychother. Theory Res. Pract.* 94 (1), 16–32.
- Michaels, T.I., Carrión, R.E., Addington, J., Bearden, C.E., Cadenhead, K.S., Cannon, T.D., Keshavan, M., Mathalon, D.H., McGlashan, T.H., Perkins, D.O., Seidman, L.J., Stone, W.S., Tsuang, M.T., Walker, E.F., Woods, S.W., Cornblatt, B.A., 2023. Ethnoracial discrimination and the development of suspicious symptoms in individuals at clinical high-risk for psychosis. *Schizophr. Res.* 254, 125–132.
- Morrison, A.P., Frame, L., Larkin, W., 2003. Relationships between trauma and psychosis: a review and integration. *Br. J. Clin. Psychol.* 42 (4), 331–353.
- Oh, H., Anglin, D.M., 2023. Discrimination, psychotic experiences, and racial identity among Black Americans: findings from the National Survey of American life. *Schizophr. Res.* 253, 14–21.
- Pearce, J., Rafiq, S., Simpson, J., Varese, F., 2019. Perceived discrimination and psychosis: a systematic review of the literature. *Soc. Psychiatry Psychiatr. Epidemiol.* 54, 1023–1044.
- Polanco-Roman, L., Danies, A., Anglin, D.M., 2016. Racial discrimination as race-based trauma, coping strategies, and dissociative symptoms among emerging adults. *Psychol. Trauma Theory Res. Pract. Policy* 8 (5), 609.



- Rotter, J.B., 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychol. Monogr. Gen. Appl.* 80 (1), 1.
- Saleem, M.M., Stowkowy, J., Cadenhead, K.S., Cannon, T.D., Cornblatt, B.A., McGlashan, T.H., Perkins, D.O., Seidman, L.J., Tsuang, M.T., Walker, E.F., Woods, S.W., Addington, J., 2014. Perceived discrimination in those at clinical high risk for psychosis. *Early Interv. Psychiatry* 8 (1), 77–81.
- Torres, V., 2004. The Diversity among us: Puerto Ricans, Cuban Americans, Caribbean Americans, and Central and South Americans. *New Dir. Stud. Serv.* 2004 (105), 5–16.
- Whaley, A.L., 2002. Confluent paranoia in African American psychiatric patients: an empirical study of Ridley's typology. *J. Abnorm. Psychol.* 111 (4), 568.