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Changes in Perceived Neighborhood Ethnic Density among Racial and Ethnic Minorities Over Time and Psychotic-like Experiences

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Abstract

Background: Research primarily conducted in Europe find high neighborhood ethnic density (i.e., proportion of own ethnic group) lessens risk of psychotic symptoms among racial and ethnic minorities; however, most studies measure ethnic density through crude demarcations in geographic data only at illness onset which may miss meaningful variation from the perspective of residents. The present study is the first in the U.S. to examine whether changes in perceived ethnic density from childhood are associated with psychotic-like experiences (PLE).

Methods: A Northeastern U.S. urban undergraduate sample of 1330 racial and ethnic minorities completed a self-report inventory of PLE, the Prodromal Questionnaire, and indicated their racial and ethnic neighborhood composition before and after age 12. One way analyses of covariance (ANCOVA) adjusted for age, family poverty, racial and ethnic group, immigrant status, and lifetime cannabis use, compared PLE across ethnic density categories and change.

Results: Racial and ethnic minorities who grew up in a neighborhood (before age 12) predominantly inhabited by a different group of color (e.g., being Black in a predominantly Asian neighborhood) endorsed significantly more PLE than those who grew up in racially concordant, mixed, or predominantly White neighborhoods. In addition, those reporting a change in perceived neighborhood ethnic density after age 12 endorsed significantly more PLE than those reporting no change.

Conclusion: Racial dynamics among people of color in urban neighborhood U.S. contexts may create psychological challenges in the social environment. The developmental timing of demographic changes in neighborhoods may influence stress processes that enhance risk for PLE.

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Keywords

ethnic density; psychotic-like experiences; racial minority; neighborhood; ethnicity

1. Introduction

1.1 Ethnic Density and Psychosis

Neighborhood ethnic density, the degree to which one's racial or ethnic group is represented in their neighborhood (Faris and Dunham, 1939), influences psychosis risk in racial and ethnic minority populations. Research primarily conducted in Europe finds an ethnic density effect whereby higher neighborhood ethnic density is associated with lower risk for psychosis among ethnic minority populations (e.g., Veling et al., 2008; Schofield et al., 2011; Kirkbride et al., 2007) even after accounting for neighborhood-level economic deprivation (Boydell et al., 2001). This ethnic density effect has been shown for psychotic experiences in a nationally representative UK sample (Das-Munshi et al., 2012) and in a recent meta-analysis (Bécares et al., 2018) where each 10 percentage point increase in own ethnic density was associated with a decrease in the relative odds of psychotic experiences [OR=0.82, 95% CI=76-0.89]. Notably, no U.S.-based studies were included in this calculation, leaving open the degree to which this finding holds in the U.S., a country with distinctive social intergroup dynamics and history from European countries (Nazroo et al., 2007).

The U.S. population is more racially heterogeneous and its urban centers more densely populated with people of color than cities in the UK (Bécares et al., 2012). Given documented historical tensions between racial and ethnic minority groups within urban neighborhoods (e.g., Asians in Black neighborhoods in New York City; Kim, 1999; Kim, 2000), residing in a neighborhood primarily comprised of another ethnic minority group may feel ethnically and culturally isolating; and studies show that higher own-group neighborhood ethnic density may protect against such social isolation at the neighborhood-level, even reducing early mortality among racial and ethnic minorities with clinical psychosis (Das Munshi et al., 2019). Kirkbride et al.'s (2012) findings support this notion: segregation from other ethnic minority groups in one's neighborhood was related to increased incidence of psychosis among UK Blacks. Social capital, which captures social cohesion and trust in community networks (Whitley & McKenzie, 2005), may not be equally distributed to racial and ethnic minority groups who are isolated within an ethnic enclave, and loss or lack of such capital in neighborhoods has been implicated in risk for schizophrenia (Kirkbride et al., 2008).

1.2 Perceptions of Ethnic Density

Using objective geographically based census data to capture the psychological experience neighborhood ethnic density approximates may miss relevant variation and some studies find perceived measures of ethnic density are more consistently related to lower morbidity risk than Census-based measures (Stafford et al., 2009). Perceptions of ethnic density may more accurately capture respondents' experiences in their neighborhood (i.e., frequency and intensity of contact with co-ethnics) (Whitley et al., 2006; Das-Munshi et al., 2012; Kearns

and Whitley, 2018), including perceived racial discrimination, which has been associated with psychosis risk (Anglin et al., 2014; Veling, 2013), and feeling specifically excluded from local networks (Whitley et al., 2006). The present study assessed perceptions of ethnic density among different groups of color. The inclusion of measures that are from the perspective of residents has been advocated for in neighborhood ethnic density research (Susser & Kirkbride, 2019).

1.3 Developmental Timing of Ethnic Density Effects

A common criticism of studies linking ethnic density to psychosis is that most studies measure ethnic density only at illness onset and are therefore vulnerable to interpretations of drift across places over time (March et al., 2008). The social drift hypothesis postulates that the repercussions of being ill cause individuals to drift downward socioeconomically over time (Goldberg & Morrison, 1963). It is possible that ethnic minorities who feel ethnically isolated in their neighborhoods as adults accrued other psychosis risks earlier in childhood in ethnically dense neighborhoods, later “drifting” away from their early foundations to ethnically isolated areas due to illness (Dohrenwend et al., 1992). Studies show the middle range of childhood (age 8-13) is the developmental period when children make the strongest and most lasting emotional attachment to the place in which they live (Sobel, 1990; Morgan, 2010). Studies also suggest childhood neighborhood ethnic density (Schofield et al., 2018) and specifically social fragmentation (e.g., proportion of people migrating in or out of the municipality) (Zammit et al., 2010) are developmental risk factors for psychosis.

Moving to an unfamiliar neighborhood or witnessing dramatic changes in one’s neighborhood may undermine important protective psychological factors related to social capital, particularly for school-aged children (Hurd et al., 2013; Simms, 2008). Changes in ethnic density over the life course may therefore impact mental health outcomes, especially in light of marked gentrification of urban inner city centers in the U.S. This type of change in ethnic density may be particularly relevant for Black populations, as many predominantly Black urban inner city neighborhoods have undergone substantial demographic changes in recent decades due to gentrification (Boyd, 2005).

1.4 The present study

The present study assessed perceived neighborhood ethnic density prior to age 12 to capture a critical developmental period before adolescence onset, and assessed whether this density and a change in such density after age 12 was associated with PLE in an urban, predominantly immigrant and racial and ethnic minority undergraduate U.S. sample. PLE are attenuated or subthreshold positive psychotic symptoms that can be transient in healthy individuals, increase risk for clinical psychosis (Cannon et al., 2008, Kaymaz et al., 2012), and impart significant psychological burden even without a psychotic disorder diagnosis (Lewis-Fernandez et al., 2009). Our racially and ethnically diverse sample and U.S.-based social context allowed us to make specific hypotheses among people of color. It is hypothesized that individuals living in neighborhoods predominantly constituted with another ethnic group (i.e. minority) will endorse higher levels of PLE than those living in high own\ethnic group neighborhoods. We expect the magnitude of this difference to be larger for neighborhood ethnic density before age 12 compared to after age 12. Secondly, it

is hypothesized that experiencing a change in ethnic density will yield higher levels of PLE compared to undergoing no change, and that this will be particularly true for the Black subsample. The relationship between type of ethnic density change (e.g., from high own-group density to predominantly White density) and PLE will also be explored.

2. Methods

2.1 Sample

Participants were obtained from a large urban public university system in the northeastern U.S. whose students reflect the demographics of the surrounding urban communities (i.e., commuter students and a high proportion of ethnic minorities and immigrants). Undergraduate students from various courses in multiple disciplines were recruited through an online participant recruitment website from 2011-2016. The students were eligible if they were emerging adults (the period from late adolescence to young adulthood, i.e., 18-29) and self-identified as Black/African American/African descent or as a first- or second-generation immigrant to maximize recruitment of young ethnic minority adults possessing characteristics that have been implicated in psychosis risk (Anglin et al., 2011). A total of 1562 participants completed a battery of self-report questionnaires, including, but not limited to, those described below on computers in a research lab. Of this total, 6 participants were excluded due to missing data on the main ethnic density study variables. Analyses for the present study focused on participants who self-identified with one racial or ethnic minority group (i.e., Black, Asian, Hispanic) yielding an analysis sample of N=1330. The University Institutional Review Board approved the study protocol. Written informed consent was obtained from all participants and course credit was given for their participation.

2.2 Measures

To assess psychotic-like experiences (PLE), participants completed the 45-item positive subscale of the Prodromal Questionnaire-Likert (PQ-Likert) (Loewy et al., 2005; Loewy et al., 2007) which measures attenuated positive psychotic symptoms experienced in the absence of alcohol, drugs, and other medications, over the last month. Respondents also indicate whether experiences endorsed were distressing. The measure has demonstrated moderate concurrent validity with the Structured Interview for Psychosis-Risk Syndromes (SIPS) (Kline et al., 2012; Miller et al., 2003). The PQ-likert has been validated on help-seeking populations with cutoffs based on number of distressing positive PQ items to capture psychosis risk syndrome. For the present study, given the sample was not help-seeking, a dimensional score for total number of PLE was calculated for each participant to capture a continuum of PLE that occurs in the general population. The Cronbach α for the positive subscale was .92. The PQ has been used as a continuous measure in a number of previous studies to capture a full continuum of PLE in healthy populations (e.g., Andorko et al., 2018; Cooper et al., 2016; DeVylder et al., 2015; Mittal et al., 2013).

Self-identified race and ethnicity was assessed using a question in which participants were instructed to "Choose one category that best captures how you see yourself," and given several options. These options included a mixture of racially and ethnically based choices

given the ethnic heterogeneity and high proportion of immigrants in the study population (e.g., Middle Eastern, Hispanic, Asian/Pacific Islander). These answers were grouped into categories corresponding as closely as possible to the racial groupings used in the US Census, and included the Hispanic ethnicity indicator used in the Census. White/Black racial distinctions were not made within the Hispanic/Latino group, as the division was arbitrary to many of the Latinos in our study population, many of whom have multiracial ancestry in the Caribbean (e.g., Dominican). We thus elected to use the term “ethnicity” or “ethnic” in this paper for simplicity. The present analyses utilized a three-level ethnicity variable: 1) Black (includes those born in USA, Africa, and the Caribbean/West Indies); 2) Hispanic/Latino; and 3) Asian and Pacific Islander. Other-identified participants (N=120), which primarily included Middle Eastern and Multiracial individuals, and Whites (N=105) were excluded from the present analyses to focus on monoracial ethnic minorities and Hispanic/Latino ethnic minorities.

The other sociodemographic variables included: immigrant status (first or second generation, non-immigrant), gender, age (years); and a family household income poverty index (< \$20,000) (United States Department of Health and Human Services, 2017).

Perceived neighborhood ethnic density was calculated for each participant based on a comparison between their self-identified race and ethnicity and the self-reported racial and ethnic composition of their neighborhood, hereafter referred to as neighborhood ethnic density for simplicity. Specifically, participants were asked to report the “racial composition of the primary community in which you were raised prior to age 12,” and “...after age 12...” by indicating one of five options: Mostly Black, Mostly Latino, Mostly Asian, Mostly White, and Mixed. These designations were based on the sociodemographic face sheet of the Cross Racial Identity Scale (CRIS: Cross & Vandiver, 2001). This racial and ethnic composition variable and each participant’s self-identified race and ethnicity were used to determine perceived neighborhood ethnic density before and after age 12. Each participant was assigned one of the following four categories of ethnic density based on the degree of match/mismatch between their self-identified race and ethnicity and the racial and ethnic composition of the primary community indicated: 1) concordant, 2) discordant-other ethnic minority group, 3) discordant-predominantly White, and 4) mixed. All ethnic density groupings were created for the period before and after age 12. Change in ethnic density was assessed by comparing the ethnic density grouping before and after age 12. Answers with the same ethnic density before and after age 12 were coded as “no change in ethnic density” and answers where the ethnic density was different before and after age 12 were coded as “change.”

We explored specific changes in ethnic density by creating a seven-level variable. Participants’ answers regarding the racial and ethnic composition of the primary community in which they were raised prior to age 12 and after age 12, while accounting for respondents’ self-identified race and ethnicity were indicated. If answers were the same, participants were determined to have experienced 1) no change in ethnic density. Discrepant answers were grouped to capture as many different meaningful types of change occurring most frequently in the sample. We prioritized categories that were able to capture ethnic density changes away and towards high own group ethnic densities. Six change categories resulted: 1)

change from mixed or own ethnic group to other ethnic minority group; 2) change from own ethnic group to mixed; 3) change from own ethnic group or mixed to predominantly White; 4) change from mixed or other ethnic minority group to own ethnic group; 5) change from other ethnic minority group or mixed to another ethnic minority group; and 6) change from other ethnic minority group or mixed to predominantly White. As an example, a Hispanic participant who grew up in a predominantly Hispanic neighborhood prior to age 12 but resided in a predominantly White neighborhood after age 12 would be classified as #3. A Black participant who grew up in a predominantly Hispanic neighborhood prior to age 12 but resided in a predominantly Black neighborhood after age 12 would be classified as #4. An Asian participant who grew up in a predominantly Black neighborhood prior to age 12 but resided in a predominantly Hispanic neighborhood after age 12 would be classified as #5.

2.3 Statistical Analyses

Missing data on demographic variables were excluded from analysis using listwise deletion. Prior to conducting the main analyses, all variables were inspected for outliers or excessive skewness and kurtosis as suggested in the literature (West, Finch & Curran, 1995). The PQ positive subscale was not skewed. Bivariate relations between neighborhood ethnic density categories and demographic variables were examined using Chi square analyses for categorical variables (e.g., immigrant status) and one-way analyses of variance (ANOVA) for continuous variables (e.g., age). ANCOVA followed by post hoc Bonferroni-corrected t-tests determined mean differences in PLE across ethnic density categories before and after age 12. Immigrant status, poverty index, age, racial and ethnic group, and lifetime cannabis use were covaried in these multivariate analyses based on the literature. T-tests compared mean level PLE between those who did and did not perceive a change in neighborhood ethnic density in the overall sample and within each racial and ethnic subsample. ANCOVA followed by post hoc Bonferroni-corrected t-tests explored mean differences in PLE across the 6 specific types of ethnic density change. Data was analyzed using IBM SPSS Statistics for Windows, Version 24.

3. Results

3.1 Descriptive Statistics

3.1.1 Sample characteristics—Participant demographic information is presented in Table 1 for the entire sample and by ethnic density categories. Consistent with most college samples, females constituted a higher proportion (63.4%) of the sample. Racial and ethnic minority group categories were sufficiently represented, with Blacks, Asians, and Hispanics each comprising at least 30% of the sample. Mean age was 20 and a little less than 30% of participant family household income was below poverty level. Almost half of participants were second generation immigrants, with 42% identifying as first generation immigrant. About 28% of the sample reported lifetime cannabis use. The majority of the sample reported living in communities with either a high proportion of their own ethnic group or “mixed” neighborhoods with diverse ethnic representation. A little over a third of participants experienced a change in ethnic density (36.7%) after age 12 (See Table 2). Mean number of PLE endorsed on the positive subscale of the PQ was 12.25 (SD=8.7)—slightly

higher than other similar studies that used the PQ with college samples (e.g., Gibson et al., 2018; Mean 9.92 (SD=7.69).

3.1.2 Sample characteristics by ethnic density categories—Ethnic density categories before age 12 did not differ by gender, but did differ by % with family income below poverty level, immigrant status, age and lifetime cannabis use (see Table 1 for details). Specifically, those growing up in predominantly White neighborhoods were less likely than those in the other 3 ethnic density categories to report family income below poverty level. Those growing up in mixed neighborhoods were less likely than those growing up in ethnically concordant neighborhoods to report family income below poverty level. There was a significantly higher percentage of first generation immigrants and lower percentage of second generation immigrants who grew up in ethnically concordant neighborhoods. Mean age was highest among those who grew up in ethnically concordant neighborhoods and lowest among those in predominantly White neighborhoods. Those growing up in discordant neighborhoods characterized as predominantly White or with a different ethnic minority group were more likely to have ever used cannabis than those growing up in concordant and mixed neighborhoods.

Similar to before 12, ethnic density categories after age 12 did not differ by gender, but did differ by % with family income below poverty level, immigrant status, age, and lifetime cannabis use, in a similar fashion (See Table 1 for details). In addition, the distribution of racial and ethnic groups was significantly different across ethnic density categories after age 12. Specifically, there was a higher proportion of Blacks represented in concordant neighborhoods than the other 3 neighborhood ethnic densities and a lower proportion of Asians represented in concordant neighborhoods compared to discordant-other ethnic minority neighborhoods and mixed neighborhoods.

3.1.3 Sample characteristics by PLE—Mean number of PLE was significantly different among racial and ethnic groups ($F=4.10(2, 1329)$, $p=.017$), which was driven by higher self-reported PLE among Asians compared to Hispanics. Males endorsed significantly more PLE compared to females ($F=3.82(1, 1329)$, $p=.051$). Mean number of PLE did not differ by immigrant status ($F=1.30(2, 1328)$, $p=.273$) nor by % family income below poverty level ($F=0.10(1, 1307)$, $p=.750$). Mean number of PLE was significantly different by lifetime cannabis use status, as those who had ever used marijuana endorsed significantly more PLE than non-users ($F=18.89(1, 1318)$, $p<.0001$). Age was significantly negatively correlated with PLE ($r=-.081$, $p=.003$), as younger participants endorsed more PLE than older participants.

3.2 Main Results

3.2.1 Perceived neighborhood ethnic density before and after age 12—Table 3 presents results from the ANCOVAs in the overall sample. Mean number of PLE was significantly different across neighborhood ethnic densities before age 12. The overall adjusted model was significant ($F(10, 1295)=7.70$, $p<.0001$) and explained 4.9% of the variance in PLE. Post hoc comparisons using Bonferonni-corrected tests revealed growing up in a neighborhood before age 12 perceived as discordant with a different ethnic minority

group was associated with the highest mean number of PLE, and significantly higher than each of the other ethnic density categories at the $p < .0001$ level. See Table 4 for details. Contrary to our hypothesis growing up in predominantly White neighborhood prior to age 12 was associated with significantly less mean number of PLE than growing up in concordantly dense neighborhoods ($p = .021$).

Mean number of PLE was also significantly different across neighborhood ethnic densities after age 12. The overall adjusted model was significant ($F(10, 1295) = 6.31, p < .0001$) and explained 3.9% of the variance in PLE. Post hoc comparisons using Bonferroni-corrected tests revealed, as with before age 12, residing in a neighborhood after age 12 perceived as discordant with a different racial and ethnic minority group was associated with the highest mean number of PLE, and significantly higher than each of the other ethnic density categories (Table 4). Residing in a predominantly White neighborhood was no longer significantly associated with less mean number of PLE than residing in a concordantly dense neighborhood after age 12 ($p = .163$).

3.2.2 Change in perceived neighborhood ethnic density—A little over a third of the sample (36.7%) perceived a change in neighborhood ethnic density after age 12. There was no significant difference across ethnic group in the proportion of individuals who perceived a change ($X^2(2, N=1330) = 1.99, p = .370$). There were also no age or gender differences or differences between individuals with families above/below poverty level or lifetime cannabis use status. There were significant differences in the proportion of ethnic density change across immigrant status ($X^2(2, N=1329) = 29.33, p < .0001$). Specifically, a higher proportion of first generation immigrants perceived a change in their neighborhood ethnic density (45.0%) compared to second generation immigrants (30.9%) and non-immigrants (28.6%).

Mean number of PLE was significantly different across neighborhood ethnic density change ($F(1, 1329) = 4.32, p = .038$). Specifically, those who perceived a change in ethnic density (Mean PLE = 12.90 (SD = 8.48)) endorsed significantly more PLE than those who did not perceive a change (Mean PLE = 11.88 (SD = 8.74)) and this difference remained significant in an ANCOVA model adjusted for immigrant status (Adjusted B = -1.01 (SE = .50) $t = -2.02, p = .04$).

Ethnic density change and its relationship to PLE were examined in racial and ethnic-stratified ANCOVA models that adjusted immigrant status (See Figure 1). The only significant model was for the Black subsample ($F(1, 425) = 5.08, p = .025$), as mean PLE was significantly higher among those who perceived ethnic density change after age 12 than those who did not perceive such change. Ethnic density change was not significantly related to mean differences in PLE for the Hispanic ($F(1, 428) = 0.005, p = .996$) and Asian ($F(1, 473) = 1.42, p = .234$) subsamples.

We analyzed the 6 different types of perceived neighborhood ethnic density changes within the Black subsample to examine mean differences in PLE between each change type and perceiving no change. Results from a simple linear regression model predicting PLE indicated perceiving a change from discordant- other ethnic minority group or mixed

neighborhood to another ethnic minority group neighborhood (e.g., from mostly Hispanic to mostly Asian) was associated with more PLE ($b = 4.86$ ($se=1.88$), $t = 2.58$, $p = .010$) than perceiving no change. In addition, experiencing a change from discordant-other ethnic group or mixed neighborhood to concordant-own ethnic density neighborhood (i.e., from mostly Hispanic or mixed to Black) was associated with higher PLE ($b = 3.21$ ($se=1.45$), $t = 2.21$, $p = .028$) than no change. Figure 2 shows these unit change differences between each type of change and no change.

4. Discussion

To the authors' knowledge, the present study is the first in the U.S. to find that perceived ethnic density in neighborhoods and changes in perceived ethnic density since childhood were associated with PLE among racial and ethnic minorities. Specifically, growing up in an ethnically discordant neighborhood perceived as primarily represented by a different ethnic minority group before age 12 was associated with the highest endorsement of PLE—significantly higher than all other perceived racial and ethnic neighborhood compositions, including ethnically concordant and predominantly White neighborhoods. These significant differences in PLE were over and above any differences in ethnic density due to immigrant status, family income below poverty level, age, racial and ethnic group, and lifetime cannabis use status. Most European studies on neighborhood ethnic density and psychosis find high own ethnic density to be protective (e.g., Veling et al., 2008; Schofield et al., 2011; Dan-Munshi et al., 2012; Boydell et al., 2001; Kirkbride et al., 2007), such that an increase in percentage of own ethnic density is associated with decreased relative odds for psychotic experiences (Das-Munshi, 2012; Halpern and Nazroo, 1999; Bécares et al., 2009). The present study's main finding is consistent with previous literature in that the highest PLE were associated with discordant ethnic density; however, in a U.S. urban context, the discordant ethnic density composition of significance was residing in a neighborhood primarily composed of a different racial and ethnic minority group (e.g., growing up Black in a predominantly Latino neighborhood). The potential for feeling in the minority can still exist in an ethnically diverse environment if another minority group predominates. Perhaps in ethnically diverse environments where one group predominates, internalized racism and microaggressions among people of color occur and cause psychological harm (Yamamoto, 2000). Living in a neighborhood with a plurality of ethnicities in which no ethnic group feels culturally isolated may yield better outcomes than social contexts in which the culture and practices of a single group predominates.

Our findings diverge from existing literature in that we found growing up in a neighborhood perceived as predominantly White was associated with significantly less PLE than growing up in an ethnically concordant neighborhood. Two studies in a meta-analysis of ethnic density and mental health indicated very high African American ethnic density (e.g., >85%) was associated with greater depression (Bécares et al., 2014) and that generally, high own neighborhood ethnic density was only inconsistently found to be protective for mental health outcomes such as depression and anxiety (Bécares et al., 2018). It is possible that high own ethnic density in U.S.-based contexts do not confer the same protection against PLE as they do in European contexts. This may be reflective of the role that neighborhood area deprivation plays in this association, as some U.S.-based ethnic density research finds high

ethnic density is only protective for racial and ethnic minorities against common mental disorders once the area deprivation of the neighborhood is accounted for (Bécares et al., 2013, 2014, 2018).

Neighborhood deprivation was not accounted for in the present study and may explain the difference in psychotic experiences found between predominantly White and concordant neighborhoods, which are known to differ in neighborhood deprivation indicators (Williams & Collins, 2001). Perhaps individuals growing up in neighborhoods primarily inhabited by a different group of color had the highest PLE because they were more likely to have to cope with neighborhood deprivation as well as social isolation and microaggressions. Predominantly White neighborhoods, which too could be experienced as socially isolating and discriminating for people of color, may not have the additional stress of high neighborhood-level deprivation indicators. This possibility should really be examined in future studies in the U.S.

Our findings regarding high own neighborhood ethnic density may also diverge from the literature because of our large immigrant representation. First generation immigrants in our study were more likely than second generation immigrants to grow up in a neighborhood predominantly inhabited by their own group, and were more likely to experience a change in ethnic density after age 12. Some of this pattern is likely due to migration from developing countries, but in our sample, this did not influence PLE. This is in contrast to several other European-based studies that find differences in risk for psychosis between first and second generation immigrants (Bourque et al., 2011). Studies in Canada and the U.S. find weak evidence that the percentage of immigrants in a neighborhood affects psychosis risk among immigrants (Menezes et al., 2011) or that immigrant status affects psychosis risk at all (Oh et al., 2015), and the present study sample had a high proportion of first and second-generation immigrants. This could have attenuated some of the results particularly regarding whether concordant ethnic density was protective.

Perception of childhood neighborhood ethnic density before age 12 was associated with PLE. While ethnic density after 12 was also associated with PLE, the strength of the relationship was less robust, and changes in ethnic density during childhood were significantly related to PLE, highlighting the role of developmental “critical periods” in mental health outcomes. Social developmental theorists have found attunement to racial difference as well as the attributions associated with such differences begins as early as age 4 (e.g., lighter skin color is more beautiful) (Clark and Clark, 1940; Feagin and Van Ausdale, 2001). One’s sociocultural context is critical to identity formation, especially among racial and ethnic minorities who undergo racial socialization (Stevenson and Arrington, 2009). Being ethnically isolated during school-aged years may have a greater impact than it would later in life because children are still in the process of forming their cultural and racial identities.

Our second main finding was that perceived changes in neighborhood ethnic density since childhood was associated with significantly more PLE than consistent neighborhood ethnic density. Moving to an unfamiliar neighborhood or witnessing dramatic changes in one’s neighborhood may undermine important protective psychological factors, particularly for

school-aged children (Hurd et al., 2013; Simms, 2008). These changes may not feel innocuous and instead could signal possible displacement or substantial change in the neighborhood's value. Ethnic density changes due to gentrification can have a social displacement effect even in the absence of objective residential displacement (Shaw and Hagemans, 2015). While it is not clear from the present findings whether perceived ethnic density change reflects a demographic shift in the same neighborhood or migration to a new neighborhood, both could be experienced as stressful.

The social drift hypothesis may have some relevance here where it seems experiences and possible risks experienced during childhood in neighborhoods predominantly inhabited by a different ethnic minority group had powerful associations with PLE. Specifically, not only was this relation revealed in perceptions of the neighborhood prior to age 12, it was represented in the specific types of neighborhood ethnic density changes significantly related to increased PLE. In the Black subsample, we found that experiencing a change in ethnic density characterized by going from a neighborhood predominantly inhabited by another group of color to a neighborhood inhabited by a different group of color was associated with higher PLE than experiencing no change in ethnic density after age 12. In addition, changing from a neighborhood predominantly inhabited by another group of color to a neighborhood predominantly inhabited by your own group was related to higher PLE than experiencing no change in ethnic density. In both instances, the childhood neighborhood was perceived as inhabited primarily by a different ethnic minority group.

5. Limitations and Future Directions

There are several limitations to the present study. First, while we found statistically significant differences in PLE across ethnic density and ethnic density change, the magnitude of the differences were small and a lack of information from clinical diagnostic interviews limits the degree to which we can know whether the differences are clinically meaningful. Nevertheless, our findings revealed that perceived discordance in ethnic density, even in a "majority minority" neighborhood, may be relevant for experiences in the psychotic spectrum for racial and ethnic minorities living in an urban U.S. context.

Second, while perceptions of ethnic representation in neighborhoods represent subjective realities, they may not reflect objective demographics and so we do not know whether changes in perceived ethnic density reflected demographic shift within a neighborhood or changes due to migration. It is also possible that respondents' perceptions of ethnic density involve other relevant unmeasured variables that reflect individuals' social experience in their environment (Shah et al., 2011). Nevertheless, perceptions reflect experiences that are most salient to an individual and may therefore be more closely associated with relevant mental health outcomes (Brown et al., 2000). Objective measures of density may not accurately reflect the 'natural boundaries' of a neighborhood or capture how people move through and exist within what they perceive as their neighborhood. Nevertheless, future studies should include both perceived and objective indicators of ethnic representation of neighborhoods in U.S. contexts.

Another limitation of this study is its cross-sectional design and retrospective recall of ethnic representation in childhood neighborhoods. It is not possible to determine a causal relationship between ethnic density and PLE, i.e. whether participants' endorsement of PLE were truly due to a change in neighborhood ethnic density during a critical stage of development. It is possible that experiencing PLE influences one's recall and perceptions of one's childhood environment. However, if that were the likelier direction of the relationship between PLE and perceived neighborhood ethnic density, people with higher PLE would be more likely to perceive higher levels of ethnic density discordance overall (i.e., predominantly White in addition to predominantly another ethnic minority group). A prospective design similar to Schofield and colleagues (2018) would increase our ability to conclude that growing up feeling in the minority in a discordant-other ethnic minority neighborhood may enhance psychosis risk. Further investigations should also focus on processes during early childhood and elementary school-aged years that approximate what ethnic density may represent during that period. For example, bullying during school-aged years can have detrimental effects on health, educational attainment, and social relationships (Wolke et al., 2013). Ethnically isolated youth may be more likely to experience these types of negative social interactions (Verkuyten and Thijs, 2002).

The current study used a self-report measure of attenuated positive psychotic symptoms to assess psychotic-like experiences. This is a strength in that the study captures the portion of the psychotic spectrum that speaks the most to *risk* in a young adult sample, but our findings remain limited by the lack of a clinical interview measure. Clinically ill or high risk participants, albeit likely few, may have remained undetected, and so even the use of the term PLE would not best capture the nature of their psychotic phenomenology. Notwithstanding, psychotic symptoms occur on a continuum (Kelleher and Cannon, 2010; van Os et al., 2009); can lead to poorer outcomes in those who later develop a psychotic illness (Rosengard et al., 2019); and are often part of the disorder profile of other common mental disorders.

While our sample comprises college students, which limits generalizability, it is less vulnerable to the selection biases characteristic of "traditional" college samples. This sample was selected from a public university that primarily serves immigrant and ethnic minority working class individuals in the surrounding city, the majority of which commute from home and still live with their parents—an ideal population to study perceptions of neighborhood ethnic density among different groups of color. Future research should examine whether these findings generalize to nationally representative U.S. samples and should include a majority White comparison group with no migration history as well as a more specific examination of specific ethnicities and ethnic densities that were not able to be analyzed in the present study (e.g., Middle Eastern, specific Asian ethnic subgroups).

6. Conclusions

We surmise that groups of color in the U.S. living in ethnically dense communities may have different in- and out-group experiences and face different risks when compared to relatively homogenous immigrant populations living in predominately White communities in Western Europe. Further examination of risk factors for self-identified ethnic minorities growing up

in such communities is needed to better understand the unique inter-racial social experiences in neighborhoods for racial and ethnic minority youth in U.S. contexts. As one of the first studies to examine perceived changes in neighborhood ethnic density in a U.S. population, it yields important results regarding the unique social factors that may affect psychosis risk for racial and ethnic minority groups.

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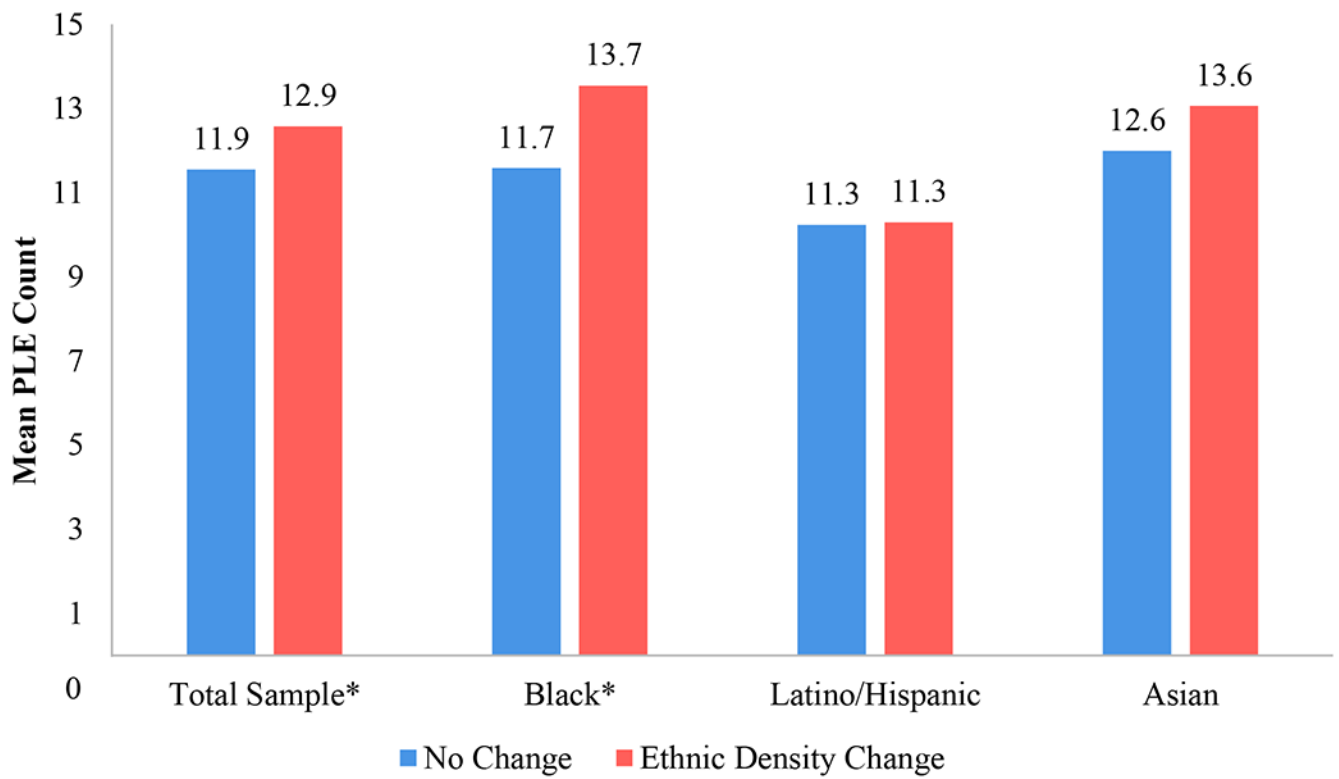


Figure 1.
Mean PLE for Ethnic Density Change vs. No Change Across Racial and Ethnic Group
*p<.05

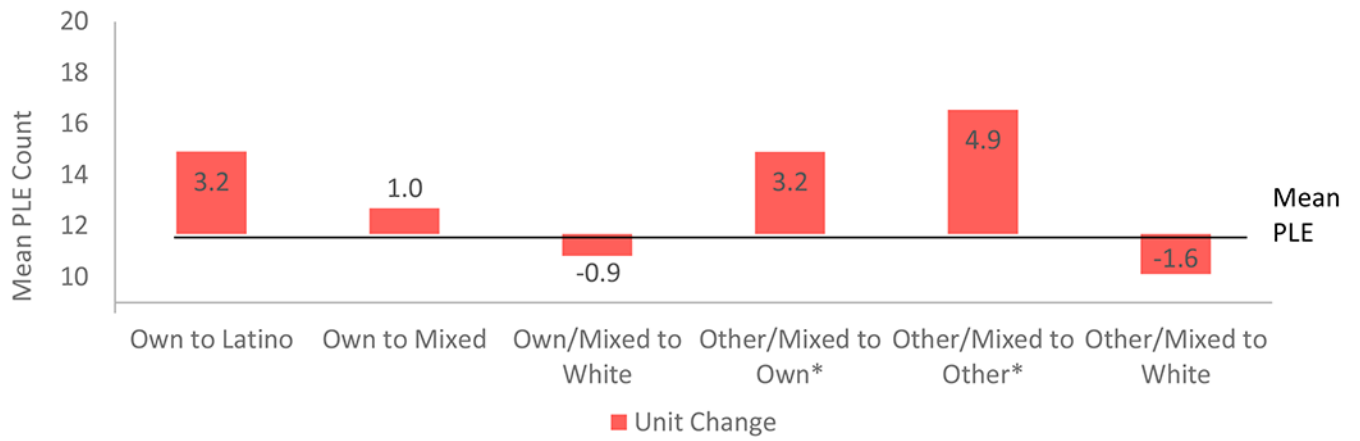


Figure 2.
Mean PLE Count by Ethnic Density Change Category for Black SubSample (N=427)
Other= Other ethnic minority group ethnic density
*p<.05

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Table 1

Demographic Descriptives of Total Sample and Ethnic Density Categories.

Variable	n (%)	Ethnic Density Prior to Age 12				Ethnic Density After Age 12						
		Total Sample (n=1330)	Concordant	Discordant	Other REM	Mixed	White	Concordant	Discordant	Other REM	Mixed	White
Demographics												
Gender			$X^2=.88$ (3, N=1330), $p=.833$				$X^2=.94$ (3, N=1330), $p=.816$					
Male	487 (36.6)	250 (35.9)	48 (39.7)	149 (36.3)	40 (38.8)	167 (36.1)	52 (35.6)	212 (36.6)	56 (39.9)			
Female	843 (63.4)	447 (64.1)	73 (60.3)	260 (63.7)	63 (61.2)	296 (63.9)	94 (64.4)	370 (63.4)	83 (60.1)			
Family Income			$X^2=18.78$ (3, N=1308), $p<.0001$				$X^2=11.65$ (3, N=1308), $p=.010$					
% Below Poverty	381 (28.6)	231 (33.6)	32 (26.9)	102 (25.4)	16 (15.8)	148 (32.2)	38 (26.6)	171 (29.9)	24 (17.8)			
Race/Ethnicity			$X^2=10.72$ (6, N=1330), $p=.100$				$X^2=32.65$ (6, N=1330), $p<.0001$					
Black	427 (32.2)	231 (33.1)	37 (30.6)	130 (31.8)	29 (28.2)	192 (41.5)	45 (30.8)	152 (26.1)	38 (27.3)			
Hispanic	429 (32.1)	244 (35.0)	34 (28.1)	121 (29.6)	30 (29.1)	140 (30.2)	46 (31.5)	194 (33.3)	49 (35.3)			
Asian	474 (35.7)	222 (31.9)	50 (41.3)	158 (38.6)	44 (42.7)	131 (28.3)	55 (37.7)	236 (40.5)	52 (37.4)			
Immigrant Status			$X^2=100.57$ (6, N=1329), $p<.0001$				$X^2=28.55$ (6, N=1329), $p<.0001$					
First Generation	560 (42.2)	380 (54.5)	37 (30.6)	123 (30.1)	20 (19.6)	217 (46.9)	45 (30.8)	261 (44.8)	37 (26.8)			
Second Generation	657 (49.4)	264 (37.9)	77 (63.6)	247 (60.4)	69 (67.6)	209 (45.1)	88 (60.3)	277 (47.6)	83 (60.1)			
Non-Immigrant	112 (8.4)	53 (7.6)	7 (5.8)	39 (9.5)	13 (12.7)	37 (8.0)	13 (8.9)	44 (7.6)	18 (13.0)			
Lifetime Cannabis Use			$X^2=15.18$ (3, N=1319), $p=.002$				$X^2=12.26$ (3, N=1319), $p=.007$					
% Cannabis Use	369 (28)	180 (26.1)	48 (39.7)	103 (25.3)	38 (37.3)	129 (28.0)	53 (36.6)	140 (24.2)	47 (34.6)			
Mean(SD) [range]												
Age (years)	19.99(2.3) [18-36]	20.30(2.5)	19.68(2.1)	19.69(2.0)	19.39(1.6)	20.16(2.4)	19.74(2.0)	19.98(2.3)	19.68(2.0)			
PQ Positive	12.25(8.7) [0-43]	12.23(8.6)	16.14(9.5)	11.71(8.4)	10.01(7.9)	12.30(8.8)	14.86(9.4)	11.96(8.3)	10.58(8.4)			

REM = racial and ethnic minority.

N's vary on immigrant status, age, poverty index, and cannabis use due to missing data that was deleted listwise.

Some participants were over the desired age range of 18-29.

Table 2

Ethnic Density Before and After Age 12 Stratified by Racial and Ethnic Group.

	Overall Sample (n=1330)	Blacks (n=427)	Hispanics (n=429)	Asians (n=474)
Ethnic density before 12, n (%)				
Concordant-own ethnic group	697 (52.4)	231(54.1)	244(56.9)	222(46.8)
Discordant-other REM group	121 (9.1)	37(8.7)	34(7.9)	50(10.5)
Mixed	409 (30.8)	130(30.4)	121(28.2)	158(33.3)
Predominantly White	103 (7.7)	29(6.8)	30(7.0)	44(9.3)
$X^2 = 10.72$ $df=6$ $p=.100$				
Ethnic density after 12, n (%)				
Concordant-own ethnic group	463 (34.8)	192(45.0)	140(32.6)	131(27.6)
Discordant-other REM group	146 (11.0)	45(10.5)	46(10.7)	55(11.6)
Mixed	582 (43.8)	152(35.6)	194(45.2)	236(49.8)
Predominantly White	139 (10.5)	38(8.9)	49(11.4)	52(11.0)
$X^2 = 32.65$ $df=6$ $p<.0001$				
Change in ethnic density, n (%)				
No change	843 (63.3)	279(65.3)	275(64.1)	289(61.0)
Total PQ Positive Score, mean (SD)	12.25(8.68)	12.40(8.57)	11.33(8.03)	12.96(9.22)
[range]	[43-0]	[36-0]	[38-0]	[43-0]

Note. REM = racial and ethnic minority

Table 3

Analyses of Covariance for Mean Differences in PLE for Ethnic Density Categories Before and After Age 12.

	Mean # PLE	SE	Unstandardized Beta (SE)	Df	Statistical Comparison F/t	p-value
Ethnic density before 12				(10,1295)	7.70	<.0001
Concordant-own ethnic group	12.68	0.42	2.77 (.94)		2.93	0.003
Discordant-other REM group	15.90	0.82	5.99 (1.16)		5.18	<.0001
Mixed	11.95	0.51	2.04 (.96)		2.13	0.033
Predominantly White	9.91	0.90	-- (ref group)		--	--
Ethnic density after 12,				(10,1295)	6.31	<.0001
Concordant-own ethnic group	12.61	0.49	1.90 (.86)		2.21	0.027
Discordant-other REM group	14.82	0.76	4.11 (1.03)		3.99	<.0001
Mixed	12.33	0.45	1.62 (.83)		1.95	0.052
Predominantly White	10.71	0.78	-- (ref group)			

Covariates include % below poverty, immigrant status, racial and ethnic group, lifetime cannabis use, and age. Missing data on covariates were deleted from analyses using listwise deletion. REM = racial and ethnic minority

Matrix of Pairwise Mean Differences (SE) in PLE across Ethnic Densities before Age 12 Using Bonferroni-corrected t-tests.

Table 4

	1	2	3	4
1. Concordant-Own Ethnic Group	-			
2. Discordant-Other REM group	3.220(.86)**	-		
3. Mixed	-729(.56)	-3.949 (.89)***	-	
4. Predominantly White	-2.769 (.94)*	-5.989 (1.16)***	-2.040 (.96)	-

Matrix of Pairwise Mean Differences (SE) in PLE across Ethnic Densities after Age 12 Using Bonferroni-corrected t-tests.

	1	2	3	4
1. Concordant-Own Ethnic Group	-			
2. Discordant-Other REM group	2.209(.83)**	-		
3. Mixed	-.283(.54)	-2.492(.80)*	-	
4. Predominantly White	-1.903(.86)	-4.112 (1.03)***	-1.620 (.83)	-

Note. Statistical significance at the

* p<.05

** p<.01

*** p<.0001 level

REM = racial and ethnic minority