The effect of minority status and social context on the development of depression and anxiety: a longitudinal study of Puerto Rican descent youth

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Few longitudinal studies have explored to date whether minority status in disadvantaged neighborhoods conveys risk for negative mental health outcomes, and the mechanisms possibly leading to such risk. We investigated how minority status influences four developmental mental health outcomes in an ethnically homogeneous sample of Puerto Rican youth. We tested models of risk for major depressive disorder (MDD) and generalized anxiety disorder (GAD), depressive and anxiety symptoms (DAS), and psychological distress, as Puerto Rican youth (aged 5-13 years) transitioned to early adulthood (15-29 years) in two sites, one where they grew up as a majority (the island of Puerto Rico), and another where they were part of a minority group (South Bronx, New York). At baseline, a stratified sample of 2,491 Puerto Rican youth participated from the two sites. After baseline assessment (Wave 1), each youth participant and one caregiver were assessed annually for two years, for a total of three time points (Waves 1-3). From April 2013 to August 2017, participants were contacted for a Wave 4 interview, and a total of 2,004 young people aged 15 to 29 years participated in the assessment (response rate adjusted for eligibility = 82.8%). Using a quasi-experimental design, we assessed impacts of minority status on MDD, GAD, DAS and psychological distress. Via mediation analyses, we explored potential mechanisms underlying the observed relationships. Data from 1,863 Puerto Rican youth (after exclusion of those with MDD or GAD during Waves 1-3) indicated links between minority status and higher rates of lifetime and past-year GAD, DAS and past 30-day psychological distress at Wave 4, and a marginal trend for MDD, even after adjustments. Childhood social support and peer relationships partially explained the differences, as did intercultural conflict, neighborhood discrimination, and unfair treatment in young adulthood. The experience of growing up as a minority, as defined by context, seemingly elevates psychiatric risks, with differences in social relationships and increased social stress as mediators of this relationship. Our findings suggest that interventions at the neighborhood context rather than at the individual level might be important levers to reduce risks for the development of mood disorders in minority youth.

Key words: Minority status, social context, depression, anxiety, psychological distress, youth, social support, intercultural conflict, neighborhood discrimination, Boricua Youth Study

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Migration between regions, countries and continents has occurred at an unprecedented rate in the past century[1,2]. An important effect of migration processes is that ethnic minority groups are formed in regions that had previously been ethnically homogeneous. Sociologists, political scientists, economists, psychologists and health researchers have written extensively on the social, political, economic, psychological and health implications of being part of an ethnic minority group[3-5]. There is consensus that minority groups often endure discrimination and harassment, tend to be economically disadvantaged, and experience poorer health outcomes[6-10]. In addition, politicians and majority group leaders often propagate negative stereotypes of minority groups that increase maltreatment and dehumanization[11-13].

Any increase in risk for behavioral and mental disorders due to discrimination can become incorporated in the negative stereotypes of a minority group[14,15]. For example, persons who experience stress-related depression may miss work and be characterized as lazy. Stress-related anxiety may be manifested as irascibility or anger that is interpreted as threatening behavior[16]. Once established, these stereotypes create an essentialist explanation for why minority group members might not be thriving, allowing the majority to justify discrimination of those members.

The association between minority group status and mental health problems has been documented in epidemiological surveys[17-20]. For example, previous longitudinal studies have identified links between acculturative stress and both internalizing symptoms and reduced well-being among immigrant-origin youth[21,22]. However, these studies are limited in that they focus on heterogeneous race/ethnicity categories (i.e., Asian and/or Latino), include only school-based samples, do not measure outcomes in adulthood, and lack a majority-context comparison group. Further, the existing literature has often failed to identify the underlying mechanisms for observed relationships. These relationships are likely affected by selection effects (for example, in the case of immigrants, whether healthier individuals are more likely to migrate) or the links between minority status and other variables that may increase or decrease risk, such as poverty. To our knowledge, there are limited prospective studies that clarify the mechanisms behind the association between minority status and mental health risk.

In the present study, we examined whether and how being raised as an ethnic minority could convey differential risk for depression and anxiety as represented by four manifestations: a) presence or absence of major depressive disorder (MDD),

b) presence or absence of generalized anxiety disorder (GAD), c) counts of depressive and anxiety symptoms (DAS), and d) the severity of psychological distress. We focused on depression and anxiety because they are the most common mental disorders[23] and have been shown to be affected by stress[24,25].

We hypothesized that it is not being a member of a specific minority group *per se* (for example, being Latino), but the cognitive and affective experience of minority status[26,27] that could elevate the risk for psychiatric illness by impacting social interactions. Exposure to discrimination[4,28-30] and racism[31-34], and perception of low social position[35] are consequences of minority status that may lead to psychopathology. This is particularly true in the presence of cumulative exposure to violence (e.g., gangs, urban violence) and other stressors[27]. Elevated risks of mental disorders in the context of such negative experiences might stem from underlying physiological stress responses[36-38] and frequent uncertainty in social circumstances that create a sense of hypervigilance[39]. Minority status could transform one's social interactions and amplify stressors of social disadvantage[27,40-42] that negatively impact mental health[34,35].

By seeking to understand how growing up as part of a minority group can contribute to mental health disorders and symptoms, the present study fills existing research gaps in three respects. First, it represents one of the few longitudinal studies evaluating developmental trajectories of depression and anxiety in early adulthood in a homogeneous Latino subgroup (i.e., Puerto Ricans). Second, it includes two large population-based, rather than school-based, samples. Third, it compares the developmental trajectories of Puerto Rican youth in a minority context to those of Puerto Rican youth in a majority context.

Puerto Rico, a Caribbean island with 3.4 million inhabitants, has been a US territory since 1898, when it was transferred from Spain as war bounty[43]. Although Puerto Ricans obtained US citizenship in 1917, they primarily speak Spanish and do not enjoy all the rights and protections of the US Constitution[44] until they reside in the US[43]. Given high rates of poverty (43.5% of the island population is under the poverty level)[45,46] and lack of social mobility, emigration to the continental US has been common since the 1950s. New York City, and the South Bronx, became a common place of migration for Puerto Ricans in 1950s and 1960s, resulting in the largest population of Puerto Ricans outside of the island[47,48]. Since then, the South Bronx, like the island of Puerto Rico, has experienced high rates of poverty, unemployment, and exposure to violence. In 2010, the South Bronx was classified by the Census Bureau as the poorest district in the US, with 28.4% of the population living below the poverty line[49,50]. Forty percent of children in the Bronx were growing up in poverty in 2010[50], compared to 56.3% of children in Puerto Rico[51].

We studied Puerto Ricans for five main reasons. First, they are free to move between the island and the US mainland without immigration barriers, which minimizes the risk that this is a skewed subgroup of healthy migrants[52]. At the same time, they are treated like other Latino minorities when they migrate or are born in the mainland[2]. Second, our study design provides the opportunity to assess the effect of native and host environments on risk for a condition in a homogeneous ethnic subgroup[53]. For example, if the rate of a disorder in subsequent generations (i.e., in the South Bronx, where many youth are second generation or later) is elevated or lessened in the migrant group, this outcome would strongly suggest that environmental, socio-contextual and cultural factors interact with genetic vulnerability and are responsible for differences in disorder rates[54].

Third, each ethnic subgroup experiences migration and discrimination differently. The focus on one specific subgroup (Puerto Ricans) with a high risk of psychopathology[55] aims to avoid aggregating all Latinos and concealing important subgroup effects[56]. The fact that Puerto Ricans have the highest rates of mental disorders among Latino subgroups in the US[57], but low rates in the island of Puerto Rico[58], suggests that minority status might have a role in the risk for psychopathology. Fourth, in some studies, minority status is confounded with socio-economic status, while here both groups largely experience low status[59]. Fifth, since two-thirds of mental disorders develop between childhood and young adulthood[60], understanding this critical period can tell us about developmental psychopathology for youth growing up as members of minority groups, and help us identify mediators for these developmental pathways. Importantly, though we focus on Puerto Ricans in this study, key determinants and mechanisms of minority status risk could be similar for other minority groups.

To identify the mechanisms that could convey a causal effect of minority status on psychopathology risk, we relied on Garcia-Coll's integrative model in minority children[27], focusing on four classes of mechanisms: environmental and social context, cultural context and minority stress, parent and peer relations, and family/individual vulnerability factors. By "environmental and social context", we mean both the objective characteristics of a neighborhood which have been linked to depression and anxiety risk[61-70] and the subjective experience of living in a specific neighborhood. We also include the cultural context and the minority stress linked to youths' response to their neighborhood and its residents. Evidence suggests that experiences accompanying living as a minority group member in neighborhoods with low socio-economic status during childhood (for example, being perceived as dangerous by strangers) heighten physiological stress reactions and increase the likelihood for youth to perceive neutral interactions with others as hostile[71]. Our model also includes parent and peer social relations (e.g., support, parental warmth) and cultural factors that might impact social behaviors (e.g., intercultural conflict, ethnic identity) as potential mediators of the risk. We also examined social integration factors hypothesized to *protect* from the negative experiences of minority status by facilitating social integration, including positive youth-parent interaction[26], parental social support[72], and positive peer interaction[26,27]. The fourth set of factors posits that certain family/individual vulnerability factors, such as parental history of MDD and other mental disorders, in addition to early youth symptoms of depression and anxiety and exposure to adverse contexts, can exacerbate late

Table 1 Demographics and unadjusted and adjusted outcome differences between Puerto Rican (PR) and South Bronx (SB) youth (N=1,863)

	Total (N=1,863)	PR (N=1,015)	SB (N=848)	p
Wave 1 demographics				
Age				
5-9 years (%)	53.3	53.8	52.7	0.662
10+ years (%)	46.7	46.2	47.3	
Gender				
Male (%)	51.4	51.6	51.2	0.877
Female (%)	48.6	48.4	48.8	
Biological mother's age (years, mean)	34.4	34.7	34.1	0.166
Biological mother's education status				
Less than high school (%)	33.8	23.5	46.2	<0.001
High school diploma, vocational school, or more (%)	66.2	76.5	53.8	
Unadjusted prevalence rates at Wave 4				
Lifetime diagnosis of MDD (%)	13.8	11.8	16.2	0.017
Lifetime diagnosis of GAD (%)	4.1	2.6	5.9	<0.001
Diagnosis of MDD within last 12 months (%)	8.2	7.0	9.6	0.066
Diagnosis of GAD within last 12 months (%)	2.2	1.1	3.6	<0.001
Depressive and anxiety symptoms (mean)	4.8	4.1	5.7	0.002
K10 symptoms in last 30 days (mean)	15.0	14.2	15.9	<0.001
Adjusted prevalence rates at Wave 4				
Lifetime diagnosis of MDD (%)	13.9	11.9	16.2	0.059
Lifetime diagnosis of GAD (%)	4.0	2.4	5.9	<0.001
Diagnosis of MDD within last 12 months (%)	8.2	6.9	9.6	0.084
Diagnosis of GAD within last 12 months (%)	2.2	1.0	3.6	0.001
Depressive and anxiety symptoms (mean)	4.8	4.1	5.7	0.005
K10 symptoms in last 30 days (mean)	15.0	14.3	15.9	<0.001

The adjusted prevalence rates are based on propensity weighting estimates. MDD – major depressive disorder, GAD – generalized anxiety disorder, K-10 – Kessler-10 scale

adolescents' or young adults' risk of MDD and GAD, and psychological distress[37,38,73].

METHODS

Participants

We drew from the Boricua Youth Study, a longitudinal study with four waves of data from a random household sample of Puerto Rican participants (aged 5-13 years at Wave 1). The study was designed to be representative of the population of Puerto Rican youth in South Bronx (being raised as a minority) and in the San Juan Metropolitan Area of Puerto Rico (being raised as a majority), as defined by the US Census of the year 2000. Up to three children per household of Puerto Rican descent (i.e., having at least one primary caretaker who self-identified as Puerto Rican) were included[74-76], for a total of 2,491 participants (1,353 youth from Puerto Rico and 1,138 from South Bronx) at Wave 1.

After baseline assessment, each youth participant and one caregiver were re-assessed annually for two years, for a total of three time points (Waves 1-3; 2001-2004). From April 2013 to August 2017, participants were contacted for a Wave 4 interview, and a total of 2,004 young people aged 15 to 29 years participated in the assessment (response rate adjusted for eligibility = 82.8%).

Youth who were cognitively or neurologically impaired based on family report, deceased, or in prison during data collection were excluded from Wave 4 assessment (30 participants in South Bronx and 40 in Puerto Rico). The most common reason for exclusion was that the participant was deceased. Also excluded from analyses were participants with missing baseline data or a childhood diagnosis of MDD or GAD, as assessed during Waves 1-3 via the Diagnostic Interview Schedule for Children-IV (DISC-IV)[77] (N=68).

Table 2 Mediators of Wave 4 mental health outcomes suggested by a-path analyses (N=1,863)

Mediators	Differences between SB and PR, β (SE)
Baseline demographics	
Wave 1 parent-reported education: high school and above	–0.11 (0.03)***
Neighborhood context in childhood (area-level data)	
Proportion of female-headed households with child under 18	0.22 (0.01)***
Proportion of households moved within last 5 years	0.10 (0.01)***
Proportion of Latino residents	–0.33 (0.02)***
Murder rate of year 2002	–0.08 (0.02)***
Neighborhood context in childhood (participant-reported)	
Wave 3 parent report of neighborhood characteristics	4.59 (1.19)***
Wave 3 parent report of neighborhood monitoring	–1.71 (0.31)***
Wave 3 parent-reported parental monitoring	0.57 (0.15)***
Wave 3 youth report of exposure to violence	1.82 (0.24)***
Social context in childhood	
Wave 3 parent report of social support	–0.39 (0.04)***
Wave 3 youth report of social support	–0.17 (0.03)***
Wave 3 youth report of peer relationships	–0.59 (0.06)***
Cultural context and minority stress in childhood	
Wave 3 parent report of familism	–0.10 (0.04)**
Wave 3 parent-reported discrimination	0.55 (0.12)***
Wave 3 parent report of family cultural stress	0.63 (0.19)**
Wave 3 youth report of societal cultural stress	–0.93 (0.08)***
Wave 3 youth report of acculturation	1.88 (0.03)***
Cultural context and minority stress in young adulthood	
Wave 4 youth report of intercultural conflict	0.49 (0.11)***
Wave 4 youth report of neighborhood discrimination	4.38 (0.47)***
Wave 4 youth report of minority stress	2.35 (0.24)***
Wave 4 youth report of unfair treatment	0.49 (0.11)***
Wave 4 youth report of familism	–0.52 (0.24)*
Wave 4 youth report of ethnic identity	–1.15 (0.12)***

Only mediators significant at the p≤0.05 level are reported, SB – South Bronx, PR – Puerto Rico
*p<0.05, **p<0.01, ***p<0.001

Measures

Demographic data (i.e., participant age and gender, maternal age, parent education, family income) were collected via parent report at Wave 1.

Data from the 2000 Census and American Community Survey[78] were used to assess objective environmental context at Wave 3, i.e. to calculate, at the Census block group level, the proportion of individuals living below the poverty level, of female-headed households with a child under 18, of households having moved within the last five years, and of Latino residents. Precinct-level police crime data from 2002 were matched to Census block groups, and 2002 murder rates from each site were used as crime indicators. We used the murder rate as the only crime indicator for this study, as other indicators (e.g., rates of assault, burglary and rape) are subject to variations in reporting and definition between sites.

We characterized subjective environmental context at Wave 3 based on parent and youth report. We assessed four variables: parent-reported neighborhood characteristics, parent-reported assessment of neighborhood monitoring, youth-reported exposure to violence, and parent-reported parental monitoring. Neighborhood characteristics included the parent's perception of neighborhood problems such as vacant lots, crime and pollution. Neighborhood monitoring referred to the extent to which neighbors monitor and intervene in situations where there are safety concerns or problem behaviors that might impact children. Exposure to violence was a continuous measure derived from youth report of exposure to violent events (for each event, the participant was asked if he/she witnessed it directly, saw it happen to someone else or heard about it happening; a weighted sum, in which direct experience was given more weight, was used for the analyses). Parental monitoring referred to the extent to which the parent reported monitoring his/her own children (e.g., direct supervision and curfews).

We assessed cultural context at Wave 3 using two variables: youth-reported level of acculturation (e.g., language preference, ethnicity of close friends, ethnic pride), and parent-reported level of familism (cultural value placed on family cohesion and togetherness). We characterized minority stress at Wave 3 using a cultural stress module which assessed three variables: parent- and youth-reported discrimination in the neighborhood, parent-reported family cultural stress, and parent- and youth-reported societal cultural stress (e.g., having problems due to not speaking English well or to being Puerto Rican, feeling of not belonging in either Puerto Rico or the US).

We assessed youths' social context at Wave 3 using parent-reported maternal warmth/parent-child relationship quality, parent-reported level of social support, youth-reported level of social support, and youth-reported positive peer relationships.

We accounted for three additional psychological risk factors at Wave 3: parent-reported maternal depression (past-year diagnosis from parent report of symptoms), parent-reported overall parental psychopathology (depression, suicide attempts, and substance use), and youth-reported number of stressful life events (e.g., death of a loved one).

Several late adolescence/young adulthood cultural variables collected concurrently with outcome data at Wave 4 were also examined as potential mediators. These factors included two youth-reported measures of cultural context (familism, ethnic identity) and six youth-reported measures of stress (unfair

Table 3 Wave 3 mediators of the effect of minority status on Wave 4 mental health outcomes (N=1,863)

Outcome	Lifetime MDD	Past-year MDD	Lifetime GAD	Past-year GAD	DAS	K10
c (no mediator)	0.22	0.21	0.98***	1.28***	1.20*	1.39***
Wave 3 proportion of households moved within last five years						
Mediation effect	-	-	-	-	-	0.31 (0.03-0.63)
a	-	-	-	-	-	0.09***
b	-	-	-	-	-	3.45*
Wave 3 youth report of exposure to violence						
Mediation effect	-	-	-	-	-	0.14 (0.02-0.29)
a	-	-	-	-	-	1.63***
b	-	-	-	-	-	0.09*
Wave 3 youth-reported social support						
Mediation effect	-	0.08 (0.02-0.18)	-	-	0.18 (0.01-0.40)	-
a	-	–0.17***	-	-	–0.17***	-
b	-	–0.46*	-	-	–1.04*	-
Wave 3 youth-reported peer relationships						
Mediation effect	-	0.12 (0.01-0.26)	-	-	0.50 (0.17-0.83)	0.38 (0.20-0.58)
a	-	–0.59***	-	-	–0.59***	–0.59***
b	-	–0.18*	-	-	–0.74**	–0.64***

Unstandardized regression coefficients and 95% bias-corrected confidence intervals are reported. a – effect of the independent variable (minority status) on the mediator, b – effect of the mediator on the dependent variable when controlling for independent variable, c – effect of the independent variable on the dependent variable, MDD – major depressive disorder, GAD – generalized anxiety disorder, DAS – depressive and anxiety symptoms, K10 – Kessler-10 scale
*p<0.05, **p<0.01, ***p<0.001

treatment, cultural stress, intercultural conflict, minority stress, heightened vigilance, neighborhood discrimination).

As outcome variables at Wave 4, we examined lifetime and past-year diagnosis of MDD and GAD, lifetime DAS, and past 30-day psychological distress. MDD and GAD diagnoses were derived from the Composite International Diagnostic Interview (CIDI)[79]. Lifetime DAS was calculated as a composite score derived from questions included in the CIDI modules for depression and anxiety. Past 30-day psychological distress was measured by the K-10 symptom scale[80].

Statistical analyses

We assessed unadjusted prevalence rates for MDD, GAD, DAS and psychological distress in the South Bronx and Puerto Rican samples at Wave 4.

We then assessed adjusted differences in prevalence rates using rescaled Boricua Youth Study sampling weights, that were further adjusted using propensity score weights. The sampling weights accounted for the probability that households and individuals would be selected based on each site's sampling design; were post-stratified to represent the age and gender distribution of Puerto Rican youth in both sites at baseline using 2000 US Census data; and accommodated non-response and attrition rates at Wave 4. These sampling weights were then rescaled so that each sample was weighted proportionally to the nearly equal sample size at each site. The last adjustment used the predicted probability (or propensity score) of living in Puerto Rico or in the South Bronx using baseline youth age, gender, maternal age, and maternal education, to account for baseline differences. This approach mimics randomly assigning participants to live in one or the other location. To assess site differences, we regressed each outcome variable on site and baseline characteristics. We fit weighted linear models for continuous outcomes and logit models for binary outcomes and used heteroskedasticity-robust clustered standard errors to account for intra-neighborhood and intra-family correlation.

We evaluated potential pathways that could explain observed differences following Garcia Coll's integrative model[27]. As already mentioned, we focused on four potential mechanisms: environmental and social context (objective characteristics and

Table 4 Wave 4 mediators of the effect of minority status on Wave 4 mental health outcomes (N=1,863)

Outcome	Lifetime MDD	Past-year MDD	Lifetime GAD	Past-year GAD	DAS	K10
c (no mediator)	0.22	0.21	0.98***	1.28***	1.20*	1.39***
Wave 4 intercultural conflict						
Mediation effect	0.13 (0.07-0.22)	0.13 (0.06-0.24)	0.11 (0.04-0.25)	0.18 (0.06-0.39)	0.67 (0.37-1.06)	0.46 (0.26-0.72)
a	0.48***	0.48***	0.48***	0.48***	0.48***	0.48***
b	0.23***	0.21***	0.22***	0.29***	1.40***	0.96***
Wave 4 neighborhood discrimination						
Mediation effect	0.21 (0.11-0.32)	0.21 (0.09-0.34)	0.19 (0.05-0.34)	0.25 (0.06-0.45)	1.00 (0.63-1.42)	0.80 (0.55-1.07)
a	4.42***	4.42***	4.42***	4.42***	4.42***	4.42***
b	0.04***	0.04***	0.04**	0.04**	0.23***	0.18***
Wave 4 minority stress						
Mediation effect	0.11 (0.03-0.20)	0.16 (0.05-0.26)	-	0.17 (0.02-0.36)	0.49 (0.25-0.81)	0.61 (0.40-0.86)
a	1.26***	1.26***	-	1.26***	1.26***	1.26***
b	0.09*	0.13**	-	0.14*	0.38***	0.48***
Wave 4 ethnic identity						
Mediation effect	0.13 (0.02-0.24)	0.14 (0.02-0.26)	-	-	0.47 (0.09-0.84)	0.21 (0.01-0.43)
a	–1.23***	–1.23***	-	-	–1.23***	–1.23***
b	–0.10*	–0.11*	-	-	–0.38**	–0.17*
Wave 4 unfair treatment						
Mediation effect	-	-	-	-	0.47 (0.08-1.25)	0.27 (0.04-0.76)
a	-	-	-	-	0.42***	0.42***
b	-	-	-	-	1.10*	0.64*

Unstandardized regression coefficients and 95% bias-corrected confidence intervals are reported. a – effect of the independent variable (minority status) on the mediator, b – effect of the mediator on the dependent variable when controlling for independent variable, c – effect of the independent variable on the dependent variable, MDD – major depressive disorder, GAD – generalized anxiety disorder, DAS – depressive and anxiety symptoms, K10 – Kessler-10 scale
*p<0.05, **p<0.01, ***p<0.001

subjective experience of neighborhood), cultural context and minority stress factors (cultural stress, acculturation, experiences of discrimination), parent and peer social relationships (social support, parental warmth), and family/individual vulnerability factors (parental psychopathology, child exposure to adverse events)[37,38,73].

We used mediation analyses to investigate potential mechanisms underlying site differences, starting with a-path analysis (regressing each mediator on minority status) to narrow down possible mediators. We tested each candidate's mediated effect on each outcome and used the counterfactual framework approach[81,82] to estimate the remaining direct effect of minority status and the indirect/mediated effect. We bootstrapped the sample to account for stratification and resampling in the original study, and used non-imputed data to circumvent computational constraints imposed by simulation of both bootstrap and imputed samples. Further details on measures and analyses are available upon request.

RESULTS

In total, 2,004 youth participants (921 in South Bronx, 1,083 in Puerto Rico) and 1,180 caregivers (490 in South Bronx, 690 in Puerto Rico) completed Wave 4 interviews. Among eligible Wave 1 participants, 82.8% of young adults and 73.6% of caregivers participated. For this study, we removed 68 participants who met criteria for depression and/or anxiety disorders during Waves 1-3 and 73 participants with missing baseline information, resulting in a final sample of 1,863 youth.

As shown in Table 1, unadjusted rates of MDD, GAD, DAS and psychological distress were higher in South Bronx compared to Puerto Rican youth (five of six differences were statistically significant and one failed to reach statistical significance), despite MDD and GAD prevalence rates having been similar across sites during the first three waves (results available upon request). Risk ratios for anxiety and depressive disorders ranged from 3.3 (past-year GAD) to 1.4 (lifetime MDD). Table 1

shows that, across sites, participants were similar in baseline age, gender and mother's age, but differed in mother's education (lower in South Bronx youth).

After propensity score adjustments, results were largely similar, although lifetime MDD (p=0.059) and past-year MDD (p=0.084) failed to reach statistical significance. However, given a trend toward site differences in these outcomes, we still examined them in subsequent mediation analyses to avoid missing small effects[83].

To determine whether minority status explained increased depression and anxiety risk, we tested a series of mediation models[84], as described above. Table 2 shows the 23 variables that were significantly related to site, from 35 potential variables. South Bronx youth resided, during their late childhood and early adolescence, in neighborhoods associated with substantially more female-headed households and greater geographic mobility than their counterparts in Puerto Rico. Parents living in South Bronx reported poorer neighborhood characteristics and neighborhood monitoring, and engaged in higher parental monitoring. Consistent with parents' reports, youth in South Bronx reported experiencing more exposure to violence in their neighborhood. Regarding social context, both parents and youth living in South Bronx reported less social support. In addition, youth respondents in South Bronx reported having worse peer relationships. Parents living in South Bronx reported lower familism level, more discrimination and greater family cultural distress. In early adulthood, respondents recruited from South Bronx reported experiencing more intercultural conflicts, neighborhood discrimination, minority stress, and unfair treatment than those growing up in Puerto Rico. These respondents also reported having lower levels of familism and weaker ethnic identity as compared to their Puerto Rican counterparts.

Table 3 presents all significant Wave 3 mediators. The relationship between minority status and greater psychological distress reported at Wave 4 was partially mediated by greater residential mobility (mediation effect: 0.31, 95% CI: 0.03-0.63) and greater exposure to violence (mediation effect: 0.14, 95% CI: 0.02-0.29) in South Bronx. Less social support from family and friends among South Bronx youth mediated the relationship between minority status and both past-year MDD diagnosis and DAS at Wave 4. Finally, poor peer relationships at Wave 3 mediated the relationship between minority status and past-year MDD diagnosis, DAS and psychological distress reported at Wave 4.

We performed additional mediation analyses with data collected at Wave 4. As shown in Table 4, intercultural conflict (i.e., between Puerto Rican/Latino and American customs) mediated higher lifetime (mediation effect: 0.11, 95% CI: 0.04-0.25) and past-year GAD (mediation effect: 0.18, 95% CI: 0.06-0.39) among South Bronx respondents. In fact, greater intercultural conflict and youth-reported neighborhood discrimination helped explain differences between South Bronx and Puerto Rico youth for all Wave 4 outcome variables. Increased minority stress (perceiving neighbors' negative attitudes/treatment toward minorities), weaker ethnic identity, and more unfair treatment (perceiving neighbors' negative attitudes/treatment toward self) among South Bronx youth partially accounted for effects of minority status on some, but not all, of examined outcomes.

Lastly, we tested the joint effect of multiple Wave 4 mediators on the relationship between site and GAD, DAS and psychological distress. For lifetime GAD, 21% of the total site effect was mediated by the combined effect of intercultural conflict and neighborhood discrimination. For past-year GAD, 30% of the total site effect was mediated by the combined effect of intercultural conflict, minority stress, and neighborhood discrimination. For both lifetime and past-year GAD, neighborhood discrimination had the largest effect of all the mediators. For DAS and psychological distress, site differences disappeared after incorporating all five mediators, with neighborhood discrimination and intercultural conflict accounting for the greatest proportion of the mediated effect.

We also observed protective effects of growing up in South Bronx, suggesting that the effect of minority status on mental health outcomes could have otherwise been larger. For instance, youth-reported level of acculturation at Wave 3 protected against past-year major depressive disorder at Wave 4 ($b=-0.37$, $p<0.05$) and was positively correlated with minority status ($a=1.88$, $p<0.001$). The direct effect of minority status increased once we incorporated acculturation level as a mediator. Similar protective effects were observed for lower neighborhood murder rate and greater proportion of female-headed households in South Bronx youth. Further details on all analyses are available upon request.

DISCUSSION

To our knowledge, this is the only longitudinal study with four waves of data from an ethnically homogeneous sample of youth living in two contexts (one in which they are the majority and another in which they are a minority) that examines the potential impact of minority status and social context on the development of internalizing symptoms and disorders in early adulthood. It is also the first large longitudinal study that sought to better understand what leads to augmented psychiatric risks as minority youth transition from childhood to early adulthood.

We investigated not only if, but also how, experiences of minority status confer a risk for MDD, GAD, DAS and psychological distress. The study's importance lies in demonstrating that it is not individual risk, but rather the environmental and social context that plays a prominent role in the development of internalizing disorders. Results demonstrated that Puerto Rican youth growing up as minorities in South Bronx were more at risk for these challenges than similar youth growing up as part of the majority in Puerto Rico, even under similar conditions of poverty.

Findings are consistent with other work suggesting that social stress related to discrimination and low perceived social position may contribute to anxiety and depressive disorders and symptoms over time[85], moving the focus from individual youth

to the social context as a meaningful lever for intervention. As children confront a negative social mirror within the context of their minority status, with worse peer experiences and less social support, they become more at risk for internalizing disorders.

These findings might have implications for immigrant youth in their host environment and highlight the importance of positive social relations to ensure that youth flourish, even under conditions of poverty. Experiences of "othering" rather than integrating those whose culture, physical characteristics, language or accent may be different, or whose affiliation is linked to reduced political, economic or social power is to our societal detriment and might convey greater risk for future illness.

Our findings highlight the importance of childhood social relationships and supports, as these factors partly explain poorer outcomes linked to minority status. Consistent with previous research, peer rejection appears to contribute to internalizing symptoms, whereas positive family support may protect against this outcome[86,87]. Youth from minority backgrounds may face contexts in which it is unclear who they can trust; thus, they become more likely to judge social situations as threatening and react accordingly, diminishing their opportunities for positive peer relationships[88]. Despite observed benefits of cultural dynamics on Latino youth mental health, cultural resources may not always be adequate to protect against psychological effects of peer-based discrimination[89]. Poorer peer relationships reported in South Bronx may also reflect a lack of available social networks or increased isolation because of community violence[90].

Our findings also suggest that residential mobility and neighborhood violence mediate the effect of minority status on negative mental health outcomes. Community violence can create an environment where people are afraid to go outside and interact with others[91]. This might limit options to relate with peers and socially congregate. Importantly, South Bronx had a lower murder rate than Puerto Rico – our findings indicate that, if not for this difference, South Bronx youth would have experienced even stronger negative outcomes. Other neighborhood factors (e.g., neighborhood monitoring) may play protective roles at younger ages but appear less relevant to mental health outcomes in adulthood. As children grow older, they might have more independence, and parental monitoring might not be as effective in protecting youth from negative interactions.

Parent-adolescent intercultural conflict mediated the relationship between minority status and poor mental health, while acting as a strong longitudinal risk factor for internalizing symptoms[92]. As Latino youth grow older in an environment that might require integration to US norms, this might raise conflict with parents and other family members that want to maintain Puerto Rican norms and values. Acculturation can help youth navigate and adapt to norms and values of their social context, becoming an asset for social integration and mobility, but create tensions in the family environment. However, links between acculturation and mental health outcomes are difficult to establish across sites, because the construct of acculturation can mean different things in Puerto Rico versus the mainland US. More work is needed to better comprehend how youth acculturate within host and native environments and how this varies by developmental period.

Within our ecological perspective, perceived discrimination (neighborhood discrimination, minority stress, unfair treatment) and cultural factors (ethnic identity, intercultural conflict) reported at Wave 4 also explained site differences in the risk for depression and anxiety disorders. The link between discrimination and internalizing symptoms may be related to physiological changes in the body's natural stress response (e.g., hypothalamic-pituitary axis, elevated cortisol levels[40]) similar to that induced by depression and anxiety[93]. Although using concurrently collected mediator and outcome data may raise questions about the direction of the relationship between these variables – for example, youth with depression or anxiety at Wave 4 might also perceive more discrimination at Wave 4 – the fact that this pattern was observed among South Bronx youth but not as strongly among Puerto Rican ones seems to suggest otherwise. Thus, it appears that discrimination experiences in a minority context contribute to increased psychopathology risk.

Our results suggest the relevance of parental and peer supports as stress-buffering mechanisms that can ameliorate toxic experiences of discrimination and worries of rejection in a minority context[91,94]. They may facilitate a sense of belonging and fitting, counteracting the social mirror in other daily experiences. Cultural factors also require attention, as intercultural conflict with family can have deleterious effects in this context, where sources of assistance are limited. For Latino youth, families often serve as a source of connection, identity, and anchoring of cultural customs; thus, familial disruption could leave youth feeling marginalized and unattached[95-97].

We acknowledge study limitations. Chiefly, we cannot disentangle the effects of site from the effects of minority status – therefore, we seek replication of results in other sites. Though we adjusted for age in our analysis, the wide age range (15-29 years) among Wave 4 participants might obscure important age-minority status interactions – this possibility will be examined in future work. Finally, participants may have been affected by larger sociopolitical changes taking place during data collection. In Puerto Rico, this study coincided with a worsening financial crisis; in South Bronx, increasing cost of living and gentrification led to increased mobility. Of note, 90.9% of the Puerto Rico sample remained in the island at Wave 4, while 85.8% of the South Bronx sample remained within 100 miles of South Bronx.

Our findings suggest the importance of addressing toxic stress related to anticipating and experiencing discrimination as a minority adolescent[98]. Results highlight the importance of social support and strong peer relationships, indicating that community interventions might focus on social relations rather than individual youth to help combat the epidemic of depression and anxiety affecting young people[91,99]. Public health approaches that target social interactions rather than clinically based interventions may have a better opportunity to address the lack of inclusion and the "othering" that create a negative social mirror and jeopardize mental health.

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