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Association between residential instability at individual and area levels and future psychosis in adolescents at clinical high risk from the North American Prodrome Longitudinal Study (NAPLS) consortium

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Declaration of competing interest

Dr. Cannon has served as a consultant for Boehringer-Ingelheim Pharmaceuticals and Lundbeck A/S. Dr. Mathalon has served as a consultant for Aptinyx, Boehringer-Ingelheim Pharmaceuticals, Cadent Therapeutics, and Greenwich Biosciences. Dr. Perkins has served as a consultant for Sunovion and Alkermes, has received research support from Boehringer-Ingelheim, and has received royalties from American Psychiatric Association Publishing. Dr. Woods has received investigator-initiated research support from Pfizer and sponsor-initiated research support from Auspex and Teva; he has served as a consultant for Biomedisyn (unpaid), Boehringer-Ingelheim, and Merck and as an unpaid consultant to DSM-5; he has been granted a patent for a method of treating prodromal schizophrenia with glycine; and he has received royalties from Oxford University Press. The other authors report no financial relationships with commercial interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.schres.2021.09.025.

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Abstract

Objective: Accumulating evidence supports an association between residential instability and increased risk for psychosis, but the association between residential instability and conversion to psychosis among adolescents at clinical high risk (CHR) is unclear. In this study, we determined whether individual-level and area-level residential instability and their interaction are associated with conversion to psychosis within two years.

Methods: Data were collected as part of the North American Prodrome Longitudinal Study Phase 2. Individual-level residential instability, defined as having ever moved during lifetime, was derived from the Life Events Scale. Area-level residential instability, defined as the percentage of people who were not living in the same house five years ago, was derived from the U.S. Decennial Censuses.

Results: This study included 285 adolescents at CHR (including 36 subjects who later converted to full psychosis). We found that individual-level residential instability was associated with conversion (adjusted OR = 2.769; 95% CI = 1.037–7.393). The interaction between individual-level and area-level residential instability was significant ($p = 0.030$). In a subgroup of CHR participants who have never moved ($n = 91$), area-level residential instability during childhood was associated with conversion (adjusted OR = 1.231; 95% CI = 1.029–1.473). Conversely, in a subgroup of CHR participants who resided in residentially stable areas during childhood ($n = 142$), the association between individual-level residential instability and conversion remained significant (adjusted OR = 15.171; 95% CI = 1.753–131.305).

Conclusions: These findings suggest that individual-level and area-level residential instability may be associated with conversion to psychosis.

Keywords

Clinical high risk for psychosis; Prodrome; Residential instability

1. Introduction

Frequent moves during childhood and adolescence have been associated with many adverse outcomes, including educational, social, emotional, and health-related problems (Choi and Oishi, 2020; Jelleyman and Spencer, 2008; South and Haynie, 2004). In fact, international migration is one of the few well-established risk factors for psychotic disorders. People who migrated prior to age 18 have nearly twice the risk of psychotic disorder, relative to the native-born population (Anderson and Edwards, 2020; Cantor-Graae and Selten, 2005). Internal migration, also known as residential instability, during childhood and adolescence has also been shown to be associated with multiple adverse mental health outcomes including increased risk for psychosis and schizophrenia (Mok et al., 2016; Paksarian et al., 2015; Price et al., 2018). The most widely accepted explanation for this association is that a change of residence disrupts an individual's ability to form and maintain friendships

or fit within a peer group, increasing vulnerability to stressful life events, which could have a greater impact on negative cognitive schemata, low self-esteem, and cognitive biases associated with psychosis (Selten et al., 2013; Thewissen et al., 2011; Thompson et al., 2011).

There has also been growing evidence that social contextual factors, namely area-level social fragmentation, are associated with increased incidence of first-episode psychosis and schizophrenia (Eaton et al., 2019; O'Donoghue et al., 2016; Van Os et al., 2000). Area-level social fragmentation has been defined using the Congdon index as a combination of mobility in the previous year, number of privately rented households, single-person households, and number of unmarried persons (Allardyce et al., 2005). It has also been defined as proportion of children who migrated, moved into a different municipality between ages 8 and 16 years, or were raised in single-parent households (Zammit et al., 2010). Both definitions contain percentage of people who moved or changed addresses, also known as area-level residential instability, as one component of the term.

It has been hypothesized that area-level residential instability may disrupt social cohesion (Cho, 2020; Drukker et al., 2006), defined as the ability of a community structure to realize the common values of its residents and maintain effective social controls (Sampson, 1991). Lack of social cohesion could potentially exacerbate chronic social stress or social defeat among youth, contributing to the development of psychosis. In fact, area-level residential instability has been shown to be associated with higher incidence rates of psychotic disorders (Rotenberg et al., 2021), increased prevalence of schizophrenia (Silver et al., 2002), and earlier age at onset of psychosis among first-episode patients (Ku et al., 2020b). However, due to the cross-sectional nature of these studies, it has been difficult to determine whether individuals developing psychotic disorders either drift into neighborhoods with higher residential instability or whether area-level residential instability contributes to the development of psychosis.

To our knowledge, no studies to date have examined the impact of residential instability at either individual or area levels on adolescents at clinical high risk (CHR) of developing psychosis. CHR youth (i.e., those with sub-threshold "psychotic-like" positive symptoms indicative of elevated risk for developing a psychotic disorder) are a critical population for targeted preventive efforts, the goals of which are to reduce incidence of and disability from psychotic illness.

In this study, we first investigated whether residential instability at the individual and area levels was associated with conversion to psychosis within two years among adolescents at CHR. We also tested the interaction between individual- and area-level residential instability in conversion to psychosis. We hypothesized that both individual-level and area-level residential instability would be associated with conversion and that the presence of both factors would be associated with the highest odds of conversion.

2. Methods

2.1. Subjects

The data were obtained from Phase 2 of the North American Prodrome Longitudinal Study (NAPLS-2), a multi-site, longitudinal study that aimed to enhance the prediction of psychosis among help-seeking CHR participants recruited from November 18th, 2008 to March 11th, 2013 with baseline assessments conducted during this time. Evaluation of subjects, inclusion and exclusion criteria, and data collection methods have been previously described (Addington et al., 2012).

The Structured Interview for Psychosis-Risk Syndromes, administered by experienced clinicians who had undergone specific training, determined CHR status. This study included a subset of adolescents at CHR (n = 285) who were born between 1985 and 2000, were between the ages of 12 and 18, had childhood cities/towns to be geo-coded in the United States (U.S.), and had all sociodemographic characteristics, used in regression analyses, available. The study protocol and consent form were reviewed and approved by the Institutional Review Boards at the 8 data collection sites (University of California at Los Angeles, Emory University, Beth Israel Deaconess Medical Center, Zucker Hillside Hospital, University of North Carolina at Chapel Hill, University of California at San Diego, University of Calgary, Yale University).

2.2. Sociodemographic and clinical characteristics

All sociodemographic and clinical variables were obtained from self-report, interview-based measures, and chart review at the time of baseline assessment, and included age, sex, race/ethnicity, family history of psychosis, general socioeconomic status, total life events, residential instability, and city or town in which participants spent the most time during childhood. Sex was dichotomized with female as the higher value. The Family Interview for Genetics Studies was used to obtain family history of psychosis, and this variable was dichotomized to indicate whether any family members were diagnosed with psychosis or schizophrenia (Georgopoulos et al., 2019). General socioeconomic status was created as the summed z scores of highest maternal education level and childhood poverty (reversed), which was calculated based upon household income and the 2014 U.S. Census poverty line for a family of their size (LoPilato et al., 2021). Total life events variable was the summed total number of life events from the modified version of the Life Events Scale, a standard, 59-item, self-report measure of stress that could potentially occur in adolescence (e.g., being a victim of a crime), excluding measures of individual-level residential instability (Dohrenwend et al., 1978). Individual-level residential instability was dichotomized and indicted moving during lifetime— either to a “better,” “worse,” or “no better or worse” residence or neighborhood.

2.3. Area-level variables

Area-level characteristics including residential instability were derived from county-level characteristics from the 1990 and 2000 U.S. Decennial Censuses (United States Census Bureau). Cities/towns where individuals lived for the longest time during childhood, along with states, were linked to the primary county 5-digit FIPS codes (United States Cities

Database). Then, 1990 and 2000 county-level characteristics were linked to these FIPS codes for those born between 1985 and 1994 and between 1995 and 2000, respectively. There were 62 unique counties in this study across eight sites. The median and interquartile range of land area of the counties in square miles is 654.4 with an interquartile range (IQR) of 421.2 to 886.6. Censuses from these two time periods were chosen to capture the effects of area (county) characteristics during childhood. Area-level residential instability was defined as the percentage of people in a county who reported not living in the same house five years ago. Area-level urban living was defined as the percentage of people in a county living within a block group of at least 50,000 people (United States Census Bureau). Area-level unemployment was defined as the percentage of people aged 16 or above in the civilian labor force who were unemployed. Area-level poverty was defined as the percentage of people over the age of 18 who lived below the poverty line. Area-level general socioeconomic status was the summed *z* score of area-level unemployment (reversed) and area-level poverty (reversed). Area-level characteristics were chosen due to prior studies showing urbanicity and economic deprivation as environmental risk factors for the development of psychosis (Kirkbride et al., 2014).

The Congdon Index has been frequently used in prior studies to measure area-level social fragmentation and found to be associated with higher incidence of first-episode psychosis (Allardyce et al., 2005; Eaton et al., 2019; O'Donoghue et al., 2016). This index combines four variables including area-level residential instability, percentage living alone, percentage owner-occupied housing (reversed), and percentage married (reversed). We conducted a sensitivity analysis using the Congdon Index instead of area-level residential instability in its relation to conversion to psychosis (Supplementary Table 1).

2.4. Conversion

Conversion to psychosis is based upon meeting the Presence of Psychotic Symptoms criterion (Addington et al., 2017) within a 2-year follow-up determined by a trained clinician. Transition criterion is that at least one of the five Scale of Prodromal Symptoms positive symptoms reached a psychotic level of intensity (rated 6) for a frequency of >1 h per day for 4 days per week during the past month or that symptoms seriously impacted functioning.

2.5. Data analyses

Sociodemographic comparisons used chi-square and independent-samples median tests for categorical and continuous measures, respectively. We also calculated the correlations between all independent variables to rule out multicollinearity. Then, individual- and area-level characteristics were entered as independent variables and conversion to psychosis as the dependent variable in logistic regression models. These models adjusted for individual-level characteristics including age, sex, race/ethnicity, family history of psychosis, general socioeconomic status, total life events, residential instability as well as area-level characteristics including urban living, general socioeconomic status, and residential instability. The interaction term of individual-level x area-level residential instability was then entered as an independent variable along with individual- and area-level residential instability and then adjusted with other individual- and area-level variables. If the adjusted

interaction term was significant, then the following subgroup analyses would be conducted: (1) the association between area-level residential stability and psychosis conversion among individuals who have moved and those who have never moved and (2) the association between individual-level residential instability and psychosis conversion among individuals living in counties that are residentially unstable and those that are residentially stable. Counties considered residentially stable would have less than the median value, 43.8%.

The IBM SPSS 24.0.0 statistical software package was used for all analyses.

3. Results

3.1. Sample characteristics

This study included 285 CHR participants, 36 (12.6%) of whom converted to psychosis within two years. Among these participants, 207 (72.6%) were between the ages of 16 and 18, 171 (60.0%) were male, and 179 (62.8%) were identified as white non-Hispanic. In this study, 32 (11.2%) had a family history of psychosis, and 194 (68.1%) had moved during their lifetime. Individuals who converted to psychosis were more likely to have a family history of psychosis (22.2% versus 9.6%, respectively; $p = 0.025$) and to have moved during their lifetime (83.3% versus 65.9%, respectively; $p = 0.036$) compared to those who did not convert. The sociodemographic characteristics are summarized in Table 1.

Correlations among individual- and area-level characteristics showed that age was positively correlated with total life events and individual-level residential instability. Individual-level general socioeconomic status was positively correlated with area-level general socioeconomic status, and negatively correlated with individual-level residential instability. Area-level residential instability was positively correlated with individual-level residential instability, and negatively correlated with area-level general socioeconomic status. The correlations of sociodemographic characteristics are shown in Table 2.

3.2. Main effect of residential instability on conversion to psychosis among adolescents at CHR

In the main analysis, individual-level residential instability was associated with a more than a twofold increase in the odds of conversion in comparison to those who had not moved in their lifetime (unadjusted OR = 2.591; 95% CI = 1.038–6.469; $p = 0.041$), even after adjusting for other individual- and area-level characteristics (adjusted OR = 2.769; 95% CI = 1.037–7.393; $p = 0.042$) (Table 3). Family history of psychosis was also associated with psychosis conversion even after adjusting for individual- and area-level characteristics (adjusted OR = 2.989; 95% CI = 1.141–7.831; $p = 0.026$).

Area-level residential instability was not significantly associated with conversion (unadjusted OR = 1.029; 95% CI = 0.990–1.071; $p = 0.150$). However, the interaction between individual-level and area-level residential instability was significant (unadjusted OR = 0.865; 95% CI = 0.759–0.985; $P = 0.029$), even after adjusting for individual- and area-level factors (adjusted OR = 0.867; 95% CI = 0.762–0.986; $p = 0.030$) as shown in Supplementary Table 2. To further interpret the interaction, we conducted the following stratified analyses.

3.3. Area-level residential instability and conversion to psychosis among subgroups of residentially stable versus unstable individuals

Among those who had never moved (n = 91), area-level residential instability was associated with conversion (unadjusted OR =1.156; 95% CI = 1.023–1.307; p = 0.021) (Table 4). After adjusting for both individual- and area-level factors, area-level residential instability remained significantly associated with conversion (adjusted OR = 1.231; 95% CI = 1.029–1.473; p = 0.023). For the subgroup of those who had moved (n = 194), area-level residential instability was not significantly associated with conversion (unadjusted OR = 1.000; 95% CI = 0.958–1.044; p = 0.995).

3.4. Individual-level residential instability and conversion to psychosis among subgroups of individuals who lived in residentially stable versus unstable counties

Among those who lived in residentially stable counties (n = 142), individual-level residential instability was associated with conversion (unadjusted OR =10.771; 95% CI =1.368–84.809; p =0.024) (Table 5). After adjusting for both individual- and area-level factors, individual-level residential instability remained significantly associated with conversion (adjusted OR = 15.171; 95% CI = 1.753–131.305; p = 0.014). For the subgroup of those who resided in residentially unstable counties (n = 143), individual-level residential instability was not significantly associated with conversion (unadjusted OR = 0.977; 95% CI = 0.330–2.890; p = 0.966).

4. Discussion

We found that individual-level residential instability was significantly associated with conversion to psychosis within two years among adolescents at CHR even after controlling for individual- and area-level characteristics. This finding builds on previous literature showing that individual-level residential instability during childhood and adolescence is associated with increased risk of developing psychosis (Mok et al., 2016; Paksarian et al., 2015; Price et al., 2018).

Proposed mechanisms underlying the association of individual-level residential instability and adverse mental health outcomes include social stress resulting from having to change school, disruption of peer relationships, and increased social isolation (Newbury et al., 2018; Winsper et al., 2016). According to research on the impacts of moving during childhood and adolescence, moving is associated with increased behavioral disturbance, poorer emotional adjustment, increased drug-related problems, earlier illicit drug use, and teenage depression (Jelleyman and Spencer, 2008). And the stress of relocating may have greater adverse effects during childhood and adolescence compared with adulthood (Price et al., 2018). Other studies suggest that moving could be related to living in poverty or having family members with mental illnesses and being forced to move due to financial difficulties or family circumstances (Bramson et al., 2016; Paksarian et al., 2020). Even after controlling for potential confounders by adjusting for age, sex, race/ethnicity, family history of psychosis, general socioeconomic status, total life events, and area-level characteristics, individual-level residential instability remained significantly associated with psychosis conversion.

Although area-level residential instability did not have a significant main effect on conversion, the interaction between individual-level and area-level residential instability was statistically significant. Among the subgroup of CHR youth who had never moved in their lifetime, living in a county that was more residentially unstable was significantly associated with higher odds of conversion, but this association was not significant among the subgroup who had moved. In another subgroup analysis, moving was statistically significant for individuals who lived in residentially stable communities. Although the confidence interval of this association became wider likely due to the smaller sample size, the increase in magnitude of the odds ratio and significant interaction term indicates that the association of moving and psychosis conversion may be stronger among those who lived in communities with a lesser proportion of people moving.

In both stratified analyses, the associations between both individual- and area-level residential instability and conversion to psychosis were significant only among subgroups with less residentially mobile areas and individuals, respectively. The reason for this finding may be multifactorial. First, moving could have a worse impact on the adolescents in places where people do not frequently move because it is more deviant from normative behavior. Moreover, social groups in residentially stable community could be more entrenched and more difficult to infiltrate. Second, communities with high residential instability may be less prosocial and social networks may be more transient (Sampson and Groves, 1989), which could make it more difficult for CHR adolescents, who have never had the experience of moving, to access resources in the community.

Interestingly, these subgroup analyses suggest that in contrast to our hypothesis that residential instability at individual and community levels together would produce the highest odds of conversion, the *difference* between individual-level and area-level residential instability, notably individual-level residential instability among those who lived in residentially stable counties, produced the highest odds of conversion. Perhaps, characteristics that may be deviant from the social norm and wider community context, such as differences of spoken language from that of one's community could predispose one to greater likelihood of social maladjustment, which has been shown to predict conversion (Tarbox et al., 2013). In addition, most study participants resided in urban areas and there might be a greater possibility of interacting with others compared to living in less densely populated communities. Also, it may be that fitting in with peers or neighbors in one's community may be more relevant in more densely populated compared with rural settings.

It is also possible that personality traits could moderate the association between residential moves and conversion. A prior study showed that the negative association between childhood residential moves and adult well-being was stronger among introverts than extraverts, which may be explained by the moderating effect of long-term social relationships (Oishi and Schimmack, 2010). Residential moves make it difficult to maintain long-term close relationships, and this problem could more adversely impact introverts. Certain schizotypal traits among individuals with CHR such as introvertive anhedonia, which is associated with greater rejection sensitivity (Premkumar et al., 2018), could moderate the association between residential instability and conversion. This association might also be, at least in part, mediated by earlier initiation of drug use (DeWit, 1998; Lee,

2007; Stabler et al., 2015), reduced engagement with health, social, and education services (Chen, 2013; Jelleyman and Spencer, 2008; Ku et al., 2020a), or higher exposure to toxins, infectious agents, and air pollution (Dean and Murray, 2005; Horsdal et al., 2019), which have been implicated in the etiology of psychotic disorders.

While reverse causation is unlikely to explain our findings, it remains possible that subthreshold or prodromal symptoms during childhood or early adolescence could lead families to move neighborhoods as an emerging body of literature highlights gene-environment correlations between genetic risk for schizophrenia and neighborhood environments (Paksarian et al., 2018; Solmi et al., 2019). It may also be plausible that this process occurs across generations and that the findings of this study could be confounded by increased genetic risk among parents leading families to move more frequently rather than symptomatology in the child (Pedersen and Mortensen, 2006).

This study has several limitations. A possible reason for the lack of statistical significance between area-level residential instability and conversion in the main analysis could be due to measurement errors. The time spent in a particular city/town where the participant spent the longest time during childhood is shorter among those who moved, and the more they move, the shorter time they spent there. In addition, moving would expose children to the environments of other cities/towns. Because the participants' entire residential history was not known, our main analysis may not have captured the entire cumulative environmental exposure among those who had moved. Another limitation could be misclassification for cities that cross county lines even though towns, cities, and states were all used to geo-code to counties. Due to limited data, we used county-level factors instead of more granular data (i.e. census tract-level characteristics), which would have more precisely captured environmental exposures and minimized misclassification. We also could not determine the number of moves or how recently the individual had moved. Another limitation was the relatively small sample, which may also partially explain the wide confidence intervals for several associations. There may also be selection bias as this study excluded those participants who did not provide childhood towns to be geo-coded and excluded those who were born before 1985 due to lack of county-level residential instability data in prior U.S. Census. There may also be other confounding factors such as trauma, cannabis use, and social cohesion that were not included in this study.

We showed that not only were individual-level and area-level residential instability associated with conversion to psychosis, but that there was also a significant interaction between these two levels of residential instability and conversion among CHR individuals. More research is needed to further examine the mechanisms of these associations in both urban and rural settings, which may include the effect such moves have on fitting into peer groups or adjusting to a new social environment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Sociodemographic characteristics among youth at clinical high risk for psychosis.

		Total (%) (*n* = 285)	CHR-NC (%) (*n* = 249)	CHR-C (%) (*n* = 36)	*p*
Age					0.794
	12.0 to 14.0	78 (27.4)	67 (26.9)	11 (30.6)	
	14.1 to 16.0	101 (35.4)	90 (36.1)	11 (30.6)	
	16.1 to 18.0	106 (37.2)	92 (36.9)	14 (38.9)	
					0.827
Sex	Male	171 (60.0)	150 (60.2)	21 (58.3)	
	Female	114 (40.0)	99 (39.8)	15 (41.7)	
					0.552
White non-Hispanic race/ethnicity	Yes	179 (62.8)	158 (63.5)	21 (58.3)	
	No	106 (37.2)	91 (36.5)	15 (41.7)	
					0.025
Family history of psychosis	Yes	32 (11.2)	24 (9.6)	8 (22.2)	
	No	253 (88.8)	225 (90.4)	28 (77.8)	
					0.212
Maternal education level	Completed high school	246 (88.2)	212 (87.2)	34 (94.4)	
	Did not complete high school	33 (11.8)	31 (12.8)	2 (5.6)	0.762
Childhood poverty	Yes	42 (20.0)	36 (20.1)	6 (19.4)	
	No	168 (80.0)	143 (79.9)	25 (80.6)	
					0.175
Total life events	Fewer than 15	150 (52.6)	137 (55.0)	13 (36.1)	
	15 or more	135 (47.4)	112 (45.0)	23 (63.9)	
					0.036
Residential instability	Moved	194 (68.1)	164 (65.9)	30 (83.3)	
	Never moved	91 (31.9)	85 (34.1)	6 (16.7)	
Median (IQR)					
Area-level urban living		96.1 (92.2, 99.6)	96.1 (92.3, 99.6)	95.7 (87.5, 99.1)	0.675
Area-level unemployment		5.9 (5.1, 7.6)	5.9 (5.1, 7.6)	5.7 (4.8, 7.4)	0.881
Area-level poverty		10.9 (7.9, 17.7)	10.9 (7.9, 14.6)	10.6 (7.15, 15.1)	0.945

	Total (%) (*n* = 285)	CHR-NC (%) (*n* = 249)	CHR-C (%) (*n* = 36)	*p*
Area-level residential instability	43.8 (39.7, 54.3)	43.2 (38.2, 54.3)	49.1 (41.5, 54.1)	0.204

Abbreviations: CHR-NC = youth at clinical high risk for psychosis who did not convert to psychosis; CHR-C = youth at clinical high risk for psychosis who converted to psychosis.

Table 2

Correlations among sociodemographic characteristics.

	Age	Sex	White non-Hispanic race/ethnicity	Family history of psychosis	General socioeconomic status	Total life events	Residential instability	Area-level urban living	Area-level general socioeconomic status
Sex	−0.159 *								
White non-Hispanic race/ethnicity	−0.060	0.054							
Family history of psychosis	−0.028	0.068	0.050						
General socioeconomic status	−0.041	−0.091	0.029	0.016					
Total life events	0.132 *	0.037	0.084	0.042	−0.070				
Residential instability	0.150 *	−0.055	0.087	−0.052	−0.134 *	0.228 **			
Area-level urban living	−0.226 **	−0.083	−0.126 *	−0.201 **	−0.011	−0.236 **	−0.103		
Area-level general socioeconomic status	0.051	−0.008	0.167 **	0.068	0.139 *	0.160 *	−0.022	−0.146 *	
Area-level residential instability	0.095	−0.046	−0.041	−0.074	−0.043	−0.009	0.249 **	−0.036	−0.265 **

* = Correlation is significant at $p < 0.05$.

** = Correlation is significant at $p < 0.01$.

Table 3

Regression models predicting conversion to psychosis among youth at clinical high risk for psychosis.

	Univariable model			Model A		
	OR	**95% CI**	***p***	**OR**	**95% CI**	***p***
Individual-level characteristics						
Age	1.001	0.826–1.213	0.992	0.967	0.786–1.191	0.754
Sex	1.082	0.532–2.200	0.827	1.111	0.521–2.368	0.786
White non-Hispanic race/ethnicity	0.806	0.396–1.642	0.553	0.675	0.319–1.429	0.304
Family history of psychosis	**2.679**	**1.098–6.532**	**0.030**	**2.989**	**1.141–7.831**	**0.026**
General socioeconomic status	1.342	0.787–2.290	0.280	1.482	0.849–2.589	0.167
Total life events	1.001	0.980–1.021	0.955	0.989	0.963–1.017	0.450
Residential instability	**2.591**	**1.038–6.469**	**0.041**	**2.769**	**1.037–7.393**	**0.042**
Area-level characteristics						
Urban living	0.988	0.968–1.007	0.213	0.991	0.968–1.014	0.436
General socioeconomic status	1.168	0.804–1.698	0.415	1.224	0.798–1.879	0.355
Residential instability	1.029	0.990–1.071	0.150	1.028	0.985–1.072	0.200
Nagelkerke R^2				10.0%		

Model A adjusted for all individual- and area-level characteristics shown.

All significant associations ($p < 0.05$) are shown in bold.

Table 4

Regression models predicting conversion to psychosis for subgroup of youth at clinical high risk for psychosis who never moved during lifetime (n = 91).

	Univariable model			Model B		
	OR	**95% CI**	***p***	**OR**	**95% CI**	***p***
Individual-level characteristics						
Age	0.891	0.539–1.472	0.652	1.149	0.486–2.717	0.752
Sex	2.595	0.451–14.941	0.286	2.593	0.266–25.306	0.412
White non-Hispanic race/ethnicity	1.469	0.255–8.465	0.667	6.769	0.531–86.333	0.141
Family history of psychosis	–	–	–	–	–	–
General socioeconomic status	3.934	0.670–23.078	0.129	5.184	0.598–44.951	0.135
Total life events	0.966	0.838–1.113	0.632	0.956	0.785–1.165	0.659
Residential instability	–	–	–	–	–	–
Area-level characteristics						
Urban living	1.020	0.920–1.131	0.710	1.007	0.858–1.181	0.934
General socioeconomic status	0.476	0.197–1.152	0.100	0.490	0.131–1.833	0.289
Residential instability	**1.156**	**1.023–1.307**	**0.021**	**1.231**	**1.029–1.473**	**0.023**
Nagelkerke R^2				40.7%		

Model B adjusted for all individual- and area-level characteristics shown.

All significant associations ($p < 0.05$) are shown in bold.

Table 5

Regression models predicting conversion to psychosis for subgroup of youth at clinical high risk for psychosis who resided in residentially stable areas during childhood (n = 142).

	Univariable model			Model C		
	OR	**95% CI**	***p***	**OR**	**95% CI**	***p***
Individual-level characteristics						
Age	1.119	0.818–1.529	0.482	1.136	0.797–1.619	0.481
Sex	1.887	0.618–5.756	0.265	1.918	0.536–6.862	0.317
White non-Hispanic race/ethnicity	0.879	0.277–2.787	0.827	0.593	0.151–2.326	0.453
Family history of psychosis	2.055	0.514–8.212	0.308	2.635	0.512–13.545	0.246
General socioeconomic status	1.606	0.634–4.070	0.318	2.325	0.784–6.893	0.128
Total life events	1.002	0.975–1.030	0.899	0.977	0.926–1.030	0.381
Residential instability	**10.771**	**1.368–84.809**	**0.024**	**15.171**	**1.753–131.305**	**0.014**
Area-level characteristics						
Urban living	0.986	0.961–1.011	0.269	0.991	0.960–1.023	0.588
General socioeconomic status	1.581	0.775–3.224	0.208	1.582	0.676–3.701	0.291
Residential instability	–	–	–	–	–	–
Nagelkerke R^2				24.2%		

Model C adjusted for all individual- and area-level characteristics shown.

All significant associations ($p < 0.05$) are shown in bold.